Abstract: 1

Optimizing Caffeine treatment in the NICU, 10 years after the CAP trial

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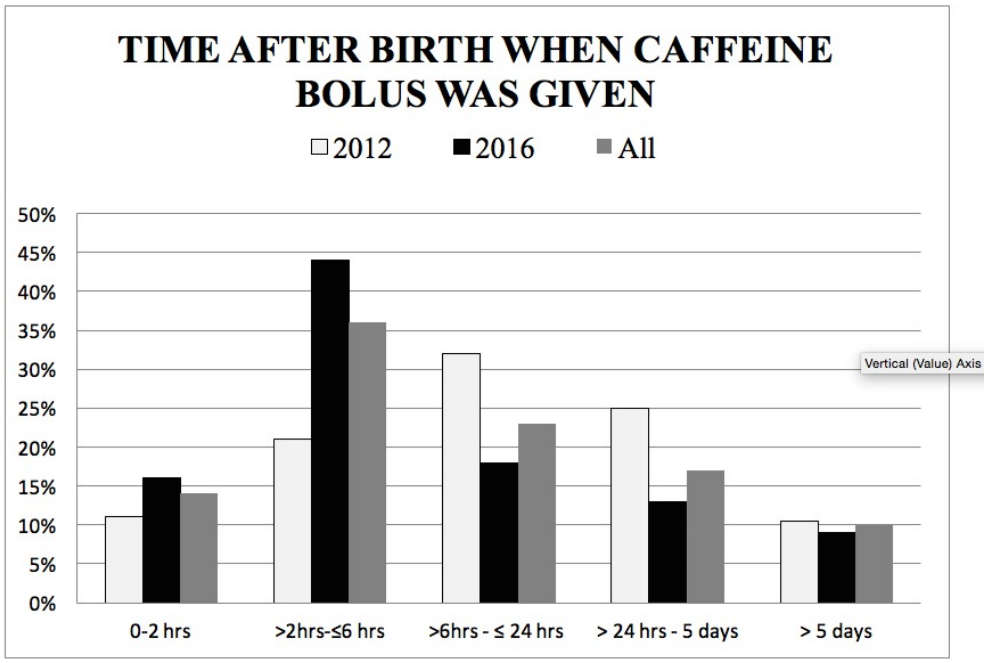
Background In the Caffeine for apnea of prematurity trial published in 2006, caffeine was better than placebo when given to infants after extubation. Caffeine is one of the most common medications given in the NICU. It is suggested that caffeine should be given soon after birth. Variations in the use of caffeine exist between individual NICUs and prescribers in the same NICU. Variations include: the time of ordering the loading dose, whether or not a maintenance dose is prescribed, and the amount of the maintenance dose. Additionally, when considering discontinuation of caffeine therapy, clinicians use either a pre-defined adjusted gestational age or clinical criteria. Guidelines are needed to avoid prolonging treatment that is no longer needed, versus stopping treatment prematurely.
Objective A retrospective chart review targeting the use of caffeine in our level III NICU in 2012 and 2016.
Design/Methods The infants who received caffeine at any time during hospitalization were identified from pharmacy records and their medical records were reviewed. Other than expected individual provider differences in caffeine management, we anticipated that there will be overall differences over time.
Results In 2012, 28 infants out of 256 (11%) admissions received Caffeine, while in 2016, 55 infants out of 183 (30%) admissions received Caffeine. Compared to the CAP trial, only 34/83 infants (41%) were on mechanical ventilation at the time of the first dose of caffeine. In 2016, the maintenance dose and loading dose were ordered at the same time in 44/55 (80%) infants. The loading dose was ordered at 20 mg/kg. The common maintenance dose among prescribers is 8 mg/kg/day. However, in 7/49 (14%) infants, the maintenance dose was ordered as 4.9-6.8 mg/kg/day. The graph shows the time after birth when the first caffeine bolus was given to all infants who received caffeine. The table depicts the course of caffeine in the 63 infants that remained in the hospital until discharge. The mean gestational age when caffeine was last given in the hospital was (34.1± 1.5 weeks).
Conclusion(s) In today's NICU, more infants are receiving caffeine with the majority receiving a loading dose followed by a maintenance dose. There is a group of infants who are only prescribed one loading dose and never given a maintenance dose. Clinicians prescribing caffeine in the NICU are in need of guidelines for the optimal use of caffeine, whether or not to consider maintenance therapy, and criteria for discontinuing therapy.



Course of Caffeine Treatment for infants who remained in NICU until discharge home			
	2012	2016	Total
Receiving Boluses only:			
One Bolus	3/22 (14 %)	6/41 (15%)	9/63 (14%)
Two Boluses	1/22 (4.5%)	0/41	1/63 (2%)
One Bolus + One Maintenance Dose	0/22	1/41 (2%)	1/63 (2%)
One Bolus + Second Bolus later + Maintenance	0/22	1/41 (2%)*	1/63 (2%)
Last Day of Treatment was a Bolus	0/22	3/41 (7%)*	3/63 (5%)
Bolus = M DOL#1, then off DOL#13, then back to Bolus + M DOL#28	0/22	1/41 (2%)	1/63 (2%)
Bolus + Maintenance			
Received the full course	18/22 (82%)	33/41 (80%)	49/63 (78%)
Received at least one mini bolus during the course	13/18 (72%)	18/33 (55%)	31/51 (61%)
Discharged home on Caffeine	0/22	0/41	
Discharged home on Monitor	6/22	0/41	

* Also included in Bolus + Maintenance

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Abstract: 2

Safety First? Parental Perceptions Regarding Protective Sports Gear for Youth Participating in Recreational and Competitive Sports

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Background Despite the wide availability of protective sports gear (PG), sports-related injuries continue to rise with over 3.5 million cases reported annually among children in the United States. These injuries may result, in part, from misconceptions among parents that PG is not necessary for children above a certain age or in certain sports supervision settings [SS; casual play (CP), official practice (OP), formal games (FG)].

Objective To determine the age, if any, at which parents of children (ages 4-18 years) would allow their child to play nine sports without PG in different SS.

Design/Methods In an anonymous questionnaire delivered via Amazon Mechanical Turk, parents were asked at which age, if any, they would allow their child to play seven team sports (volleyball, basketball, baseball, ice hockey, football, soccer, lacrosse) and two individual sports (biking, skateboarding) without PG in three SS. A Chi-square test of independence was performed to compare the percentages of parents who would allow their child to participate in these sports without PG in different SS.

Results Significant differences in parental attitudes towards PG use were noted across all sports and SS (Table 1). For every team sport, a greater percentage of parents, on average, reported allowing their child to play without PG in CP (60.4%) compared to OP (30.6%) and FG (23.7%). The average age at which parents would allow their children to play a sport without PG decreased from FG (11.2 years) to OP (10.3 years) to CP (9.2 years) for all seven team sports (Table 2). A greater percentage of parents reported allowing their child to skateboard without PG compared to biking (χ^2=18.47, p<.01) though parents indicated a younger age, on average, at which they would allow biking without PG (10.1 years compared to 10.9 years).

Conclusion(s) A substantial number of parents in a nationally representative sample reported that they would allow their children to participate in nine sports without PG. Across all sports, as the SS became less competitive and more recreational, parents became more willing to allow their child to participate without PG. In addition, with regard to casual play, a low supervision setting, there was an alarming tendency to allow younger children to participate in all sports without PG. Considering the increase in youth sports injuries in recent years, it is essential for clinicians to emphasize the use of PG for children of all ages in all SS to avert serious, yet preventable, childhood trauma.

Table 1. Percentage of parents (n=665, n_e=493) who would allow their children to participate in each sport without protective sports gear (PG) in three different sports settings.

Sports Settings	Baseball	Basketball	Football	Ice Hockey	Lacrosse	Soccer	Volleyball
Casual Play (CP)	62.5% (n=308)	82.6% (n=407)	53.3% (n=74)	23.9% (n=118)	37.7% (n=186)	80.1% (n=395)	83.0% (n=409)
Official Practice (OP)	22.3% (n=110)	57.4% (n=283)	14.4% (n=71)	11.1% (n=55)	17.0% (n=84)	36.5% (n=180)	55.2% (n=272)
Formal Games (FG)	15.8% (n=415)	45.8% (n=226)	11.8% (n=58)	10.3% (n=51)	15.0% (n=74)	24.9% (n=123)	42.0% (n=207)
χ^2 (p-value)	282.50 (p<.01)	147.37 (p<.01)	274.41 (p<.01)	44.58 (p<.01)	87.31 (p<.01)	344.95 (p<.01)	179.79 (p<.01)

Table 1. Percentage of parents (n=665, n_e=493) who would allow their children to participate in each sport, without PG, in three different sports settings.

Table 2. Average age (in years) at which parents (n=665, n_e=493) would allow their children to participate in each sport without protective sports gear (PG) in three different sports settings.

Sports Settings	Baseball	Basketball	Football	Ice Hockey	Lacrosse	Soccer	Volleyball
Casual Play (CP)	9.1 (n=308)	8.4 (n=407)	9.7 (n=74)	10.4 (n=118)	10.2 (n=186)	8.6 (n=395)	8.3 (n=409)
Official Practice (OP)	10.4 (n=110)	8.7 (n=283)	11.2 (n=71)	11.2 (n=55)	11.4 (n=84)	10.0 (n=180)	9.4 (n=272)
Formal Games (FG)	11.5 (n=415)	9.3 (n=226)	12.0 (n=58)	12.0 (n=51)	12.0 (n=74)	10.3 (n=123)	10.0 (n=207)

Table 2. Average age (in years) at which parents (n=665, n_e=493) would allow their children to participate in each sport without protective sports gear (PG) in three different sports settings.

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Abstract: 3

Change in Absolute Monocyte Count: a Potential Early Marker to Diagnose Acquired Neonatal Intestinal Diseases including Necrotizing Enterocolitis

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Background Acquired Neonatal Intestinal Diseases (ANIDs), including Necrotizing Enterocolitis (NEC), viral enteritis of infancy and ischemia, remain an important cause of mortality and morbidity in infants below 35 weeks of gestational age (GA). Current diagnostic methods are unable to differentiate ANIDs at the early stage from Feeding Intolerance (FI); therefore increases misdiagnosis with increased morbidities. This underlines the need to identify an early marker of ANIDs. Past studies where a decrease in Absolute Monocyte Count (AMC) was assumed to be a marker of NEC had contrasting results.

Objective To study whether ANIDs are more likely to be associated with decrease in AMC than those with FI, and the decrease in AMC will precede any changes on other known markers of ANIDs.

Design/Methods We reviewed medical records of 23-34 weeks preterm infants evaluated or treated for ANIDs (confirmed by x-ray) and FI from 2014-2017 at Brookdale Hospital Medical Center. We collected demographic data, clinical characteristics, AMC and known markers of ANIDs at three different points of time. We compared AMC and other markers in infants with ANIDs with those in a control group (infants with FI) by using paired t-test and independent t-test.

Results We compared 20 ANIDs cases with 55 controls. Demographic features showed no difference between the two groups except for GA, BW, and APGAR (Table 1). Paired t-test showed a significant decrease in mean AMC ($p < 0.001$) in the group with ANIDs from baseline to intervention (Figure 1). AMC in the ANIDs group returned to near baseline within a week following intervention. There was no statistically significant change in mean AMC in the control group (p=0.42). Independent t-test showed significant difference in mean decrease in AMC, white cells, and platelets (from baseline to NPO/intervention) between the two groups ($p< 0.001$; p=0.003 and p= 0.03 respectively)[Table 2]. Multivariate logistic regression analysis was done to control for confounding variables (BW, GA, and APGAR) and it showed significant decrease only in AMC in the infants with ANIDs at the early stage (OR:4.4, 95 % CI:1.721-11.241,p= 0.005)[Table 2].

Conclusion(s) A decrease in AMC can be used as an early marker to differentiate Acquired Neonatal Intestinal Diseases from Feeding Intolerance in the preterm infants. However, multicenter prospective studies with larger sample size are needed for further validation before applying to the clinical practice.

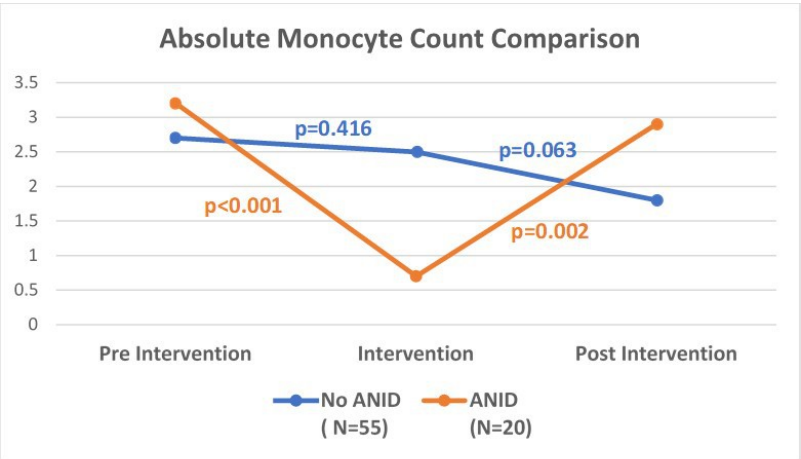

Figure 1

Table1 Demographic description and baseline data of infants in ANIDs and non ANIDs groups

Characteristic	ANIDs (N=20)	Non ANIDs (N=55)	P Value
Gender, n (%)	Male: 7 (35%) Female: 13 (65%)	Male: 25 (46.5%) Female: 30 (54.5%)	0.418
Maternal Race(Black), n (%)	19 (95%)	51 (93%)	1.000
Small for Gestational Age (SGA), n (%)	9 (45%)	32 (58%)	0.311
Expressed Breast Milk (EBM), n(%)	7 (37%)	20 (37%)	1.000
Bolus Feeding, n (%)	15 (75%)	31 (56%)	0.143
Full enteral feeding, n(%)	11 (56%)	20 (36%)	0.161
GA in Weeks, Mean (±SD)	25.9 (±2.2)	28.3 (±2.5)	<0.001
Birth Weight (BW) in Grams, Mean (±SD)	765 ± 246	1009 ±249	<0.001
APGAR score at 5 min, Median (IQR)	6 (4-7)	8 (7-9)	0.001

Table 2 Statistical Analysis

Comparison between change of laboratory parameters from baseline to NPO state / Intervention				
Laboratory Findings		ANIDs (n=20)	No ANIDs (n=55)	P value
White Blood Cell (WBC), Mean (±SD)		-4.6 (±8.0)	+1(±6.5)	0.003
Absolute Neutrophils, Mean (±SD)		-0.9 (±6.0)	+1.4(±4.3)	0.069
Absolute Monocyte Count(AMC), Mean (±SD)		-2.5(±1.7)	-0.1(±1.5)	<0.001
Platelets, Mean (±SD)		-51 (±91)	+12 (±118)	0.032
Mean Platelet Volume (MPV), Mean (±SD)		-0.5 (±1.7)	0 (±1.3)	0.138
Sodium, Mean (±SD)		-4.4(±7.4)	-2.3(±4.7)	0.265
Logistic Regression model for changes in laboratory parameters and baseline characteristics as risk factor in predicting ANIDs				
Laboratory Findings	Degree of Change	Odds Ratio	95% CI	P Value
White Blood Cell (WBC)	+0.04	0.957	(0.756-1.211)	0.713
Absolute Neutrophils	-0.1	1.104	(0.822-1.482)	0.512
Absolute Monocyte Count(AMC)	-1.40	4.048	(1.541-10.635)	0.005
Platelets	-0.5	1.005	(0.997-1.013)	0.199
Mean Platelet Volume	-0.07	1.072	(0.500-2.296)	0.859
Sodium	-0.11	1.114	(0.938-1.324)	0.218
Gestational Age	+0.03	0.968	(0.542-1.727)	0.911
Birth Weight	+0.04	0.996	(0.990-1.002)	0.193
APGAR at 5 mins	+0.3	0.724	(0.410-1.281)	0.268

Changes of laboratory parameters from baseline to Intervention (NPO state) stratified by ANIDs vs non ANIDs, and logistic regression model of these changes (n=75)

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Abstract: 4

Timing of Referral to Early Intervention (EI) Services in Infants with Severe Bronchopulmonary Dysplasia (sBPD)

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Background BPD affects ~25% of low birth weight infants and is associated with poor neurodevelopmental outcomes beyond the risk of prematurity. Outcomes of infants with BPD were improved in European EI programs that were implemented before 6 months of age. In the United States, services can only be initiated after discharge through a multi-step process. Many clinicians try to identify high-risk infants and start services early to capitalize on infant brain plasticity. It is unknown if timing of referral in high risk infants, such as those with severe BPD, is associated with faster time to services and improved outcomes.

Objective 1) Describe characteristics of infants with "early" referral to EI

2) Analyze if early referral decreases time to initiation of services

3) Correlate findings with developmental outcomes

Design/Methods This is an observational retrospective case series of 72 infants with sBPD at 3 NICUs. Enrollment was between March 2014-February 2015. Severe BPD was defined as infants ≤32 weeks gestational age needing ≥30% FiO2 or ≥2 liters/minute nasal cannula at 36 weeks post menstrual age. Subjects were excluded for: 1) incomplete EI records, 2) anomaly impacting either developmental outcomes or pulmonary function, or 3) inability to follow up. After exclusions, 50 infants were analyzed. Analysis was completed with Mann-Whitney and Fisher's exact tests and linear regression. An "early" referral was completed in ≤7 days of hospital discharge.

Results Table 1 shows population characteristics.

Shorter time to referral was associated with referral by a Neonatologist and longer length of hospital stay. Time to service initiation was significantly decreased in infants referred early. In adjusted linear regression analysis, developmental scores at 18-36 months corrected age were not associated with timing of EI referral (n=28).

Conclusion(s) Early referral was associated with shorter time to EI services. Even in early referrals, mean time to services was 52 days. For a population with an average hospitalization of 170 days, early referral may be the necessary catalyst to receiving services during a critical neurodevelopmental period. Although early referral was not associated with improved developmental outcomes, this study was not powered for these outcomes. Few recent advances in neonatology improve neurodevelopmental outcomes in high risk infants. Thus, it is essential to improve systems that are known to positively impact outcomes. Early referral to EI should be standard for all high risk infants.

Table 1: Population Characteristics

Birth weight (grams)	760 ± 257
Gestational age (weeks)	26 ± 2
Male	36 (72%)
Maternal age (years)	31 ± 6
Antenatal steroid exposure	35 (70%)
Hospital length of stay (days)	170 ± 77
Corrected age (CA) at time of discharge (months)	2.1 ± 2.6
CA at time of Bayley assessment (months)	24.0 ± 3.6
Discharged home with medical equipment	38 (76%)
Referred ≤ 7 days of discharge	20 (40%)
Source of EI referral Pediatrician Neonatologist Unknown	-- 10 (20%) 24 (48%) 16 (32%)
18-36 month CA Bayley scores (n=28) Cognitive Language Motor	-- 83 ± 17 82 ± 17 81 ± 18

Table 2: EI Referral and 1) Characteristics of Early Referral 2) Timing to Initiation of Services and 3) Bayley Scores

1	Days Between Discharge and Referral (n=50) (mean ± standard deviation)					p-value
Referral source Neonatologist Pediatrician	-- 36 ± 24 105 ± 73					0.03
Length of hospital stay ≤ 170 days > 170 days	-- 115 ± 43 56 ± 29					0.05
2	Days Between Discharge and Initiation of Services (n=29) (mean ± standard deviation)					p-value
Timing of referral Referred ≤ 7 days of discharge Referred > 7 days after discharge	-- 52 ± 21 169 ± 203					0.003
3	18-36 Months CA Bayley Scores (n=2) (mean ± standard deviation) (*adjusted p-value)					
	Cognitive		Language		Motor	
Timing of referral Referred ≤ 7 days of discharge Referred > 7 days after discharge	-- 79 ± 17 86 ± 16	*0.47	-- 82 ±17 83 ± 17	*0.75	-- 75 ± 16 84 ± 18	*0.97

*Adjusted for birth weight, gender, CA at time of referral, and G-tube

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Abstract: 5

Pediatricians' Documentation of Psychosocial Screeners in the Electronic Health Record

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Background Psychosocial factors play a significant role in the health and wellbeing of families and children. The AAP recommends pediatricians play a central role in screening families at risk for adverse social determinants of health to help connect families to resources. Little is known about how pediatricians document screening for social determinants of health in the electronic health record (EHR).

Objective To assess the extent of transcription, accuracy, and bias of documentation of psychosocial screeners by pediatricians in the EHR.

Design/Methods We conducted a quality improvement project to examine psychosocial screening in a pediatric practice at an academic medical center serving an urban, low income, minority community. Pediatricians were trained in the use of SEEK (Safe Environment for Every Kid), a validated 15 item screener that assesses psychosocial determinants of health (smoking, food insecurity, parenting difficulties, depression/stress, alcohol/substance abuse, domestic violence). Parents complete paper SEEK forms during well visits. Pediatricians review results with the family, offer resources, and transcribe paper responses into the EHR. In November/December 2017, we selected 215 random paper SEEK forms and categorized them as positive (any positive response) or negative (all negative responses). Outcome measures were % of paper forms transcribed into the EHR; accuracy of transcription into the EHR (all responses entered correctly Yes/No); and bias of documentation (likelihood that a positive paper form or a negative paper form was entered into the EHR).

Results The majority of paper forms (64%,137/215) were entered into the EHR. Of those forms entered electronically, most (86%, 118/137) were transcribed accurately, reflecting all the responses on the paper form. 69%(62/89) of paper forms with positive responses were entered into the EHR compared to 59% (126/215) of forms with negative responses (p=0.15).

Conclusion(s) Pediatricians only documented two thirds of psychosocial screeners in the EHR. However, most screeners were transcribed accurately and without bias in documentation of positive or negative results. To increase EHR capture of psychosocial

screening, alternative strategies should be explored, including transcription of paper forms into the EHR by medical assistants or online completion of screener by parents on mobile devices that directly interface with the EHR.

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Abstract: 6

Implementation of the new BRUE Guidelines: A Quality Improvement and Cost-Savings Initiative

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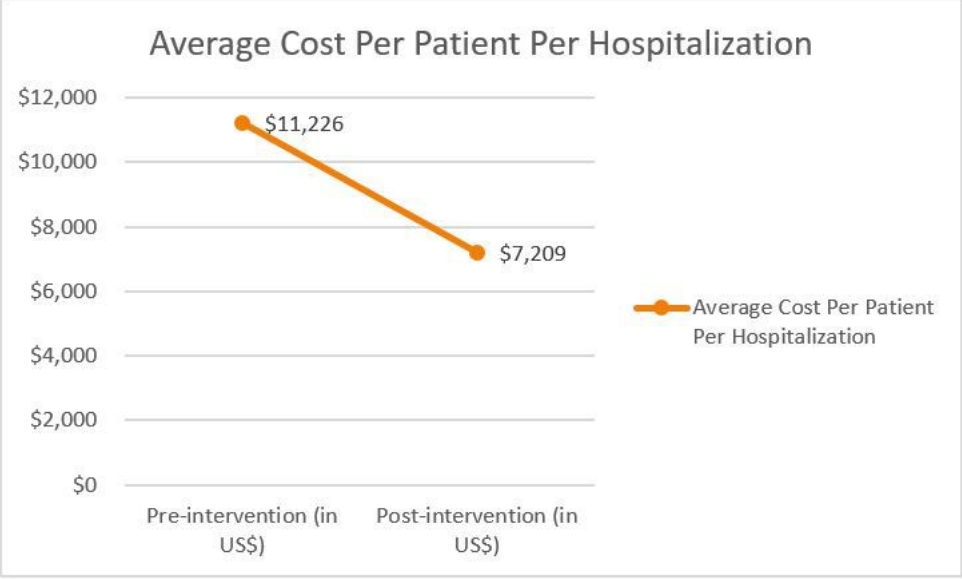
Background Significant variation exists in the evaluation and management of patients experiencing a Brief Resolved Unexplained Event (BRUE), previously known as Apparent Life-Threatening Event (ALTE). In May 2016, the AAP published the first Clinical Practice Guidelines (CPG) specific for patients experiencing BRUE. The CPG provide an approach to evaluation based on risk stratification, as well as management recommendations for the lower-risk infants. We suspect based on anecdotal experience that our institution does not adhere to the current guidelines. This may lead to extensive laboratory studies and radiologic work-up which is unnecessary for low-risk BRUE patients.

Objective This study aims to use quality improvement methodology to improve our classification and subsequent management of BRUE through increased adherence to the CPG. With emphasis on low-risk BRUE patients, we aimed to reduce the 1. Rate of admission by at least 25% 2. Cost of hospitalization by an average of $2,000 per patient per hospitalization 3. Number of studies involving radiation exposure (X-Rays and CT scans) by 50%, pneumocardiograms by 50% and laboratory investigations (CBC, respiratory viral panel) by 25%.

Design/Methods Low-risk BRUE patients who were either discharged from the ER or admitted to the ward were compared between the period of 7/1/2013 -7/31/2016 versus 8/1/2016 - 11/30/2017. Data was extracted through retrospective chart review and analyzed for type of diagnostic investigations (laboratory, radiology, EKG) performed, cost per hospitalization, Length Of Stay (LOS) and whether any medication or home apnea monitor was prescribed on discharge. Interventions included multiple educational sessions to educate pediatrics residents, inpatient and ER providers regarding the appropriate management of patients with low risk BRUE as per the CPG.

Results There was an absolute reduction of 47% in the admission rate for low-risk BRUE patients, 100% reduction in the use of CT scans, 61% reduction in pneumocardiograms, 33% reduction in EKGs and a 29% reduction in chest radiographs. However, there was a 335% increase in the use of respiratory viral panel. Average cost per patient per hospitalization reduced by $4,020. LOS reduced from 35 hours to 24 hours. Usage of apnea monitor reduced from 35% to 12.5% however medication prescribed on discharge increased from 20% to 37%.

Conclusion(s) We successfully achieved our target at reducing the admission rate and cost of hospitalization for low-risk BRUE patients through increased adherence to BRUE CPG.



Average cost per hospitalization per patient (in US$)

Average inpatient length of stay (in hours)

Cost and Savings Statistics

Diagnostic Test	Pre-Intervention Low-Risk BRUE (% of inpatient admissions)	Estimated Cost (in US$)	Post-intervention Low-Risk BRUE (% of inpatient admissions)	Estimated Cost (in US$)	Absolute Rate Reduction (in %)
Pneumocardiograms	95 (n=19)	32,509	37 (n=3)	5,133	61
CBC	80 (n=16)	96	87 (n=7)	70	-9
CMP	75 (n=15)	195	75 (n=6)	90	0
Chest X-Ray	70 (n=14)	5950	50 (n=4)	1700	29
EKG	55 (n=11)	3047	37 (n=3)	831	33
Urine Analysis	50 (n=10)	60	25 (n=2)	12	50
Urine Culture	20 (n=4)	62	12.5 (n=1)	16	38
Blood Culture	20 (n=4)	90	12.5 (n=1)	23	38
Respiratory Viral Panel	20 (n=4)	728	87 (n=7)	1274	-335
CT Scan	20 (n=4)	3000	0	0	100
CRP	15 (n=3)	12	25 (n=2)	8	-67
Echocardiogram	15 (n=3)	9000	12.5 (n=1)	3000	17
EEG	10 (n=2)	6000	0	0	100
Urine Toxicology Screen	5 (n=1)	150	0	0	100
Barium Swallow	5 (n=1)	850	0	0	100

n=number of patients

Inpatient Admission Rate for High-Risk and Low-Risk BRUE

Risk Category	Admission Rate Pre-Intervention (in %)	Admission Rate Post-intervention (in %)	Absolute Rate Reduction (in %)
High-Risk BRUE	100 (n=34)	100 (n=22)	0
Low-Risk BRUE	71.4 (n=20)	38.1 (n=8)	47

n=number of patients

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Abstract: 7

Unique phenotypic characteristics of lymphocytes in the umbilical artery versus vein of term infants

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Background Distribution of lymphocyte is different between the maternal and the placental blood. This variable distribution is believed to protect the fetus from infection and plays a possible role in promoting tolerance of the fetus in the maternal womb. The nature of cord blood lymphocytes is of renewed interest, as the long-standing paradigm of fetal lymphocytes being naïve due to environmental sterility has been challenged by a number of recent reports. To the best of our knowledge, no studies have compared the lymphocytes in the umbilical artery and vein as an indicator of the role played by the placenta in regulating the neonatal immune system. Better understanding of the immune cells before and after circulation through the placenta by analyzing the umbilical arterial and venous blood could be an important step to understanding neonatal immunity and could also be a cornerstone to understanding critical neonatal pathology.

Objective Identifying variations in the populations of lymphocytes in the umbilical artery and vein, both in population size and phenotype, will provide insight into how the placenta regulates the neonatal immune environment. We hypothesize that variable expression of surface markers and transcription factors related to effector function of lymphocytes will serve as starting points for the better understanding of neonatal disease.

Design/Methods WBCs were isolated by gradient centrifugation from umbilical artery and vein cord blood from infants delivered at term by elective uncomplicated cesarean section. To ensure comparability between acquired samples, all samples were processed with a standardized protocol. Cell populations were analyzed using flow cytometry.

Results We have identified a population of lymphocytes present in the umbilical artery that expresses phenotypic markers associated with inflammation and innate function. Remarkably, this population is absent in the umbilical vein, suggesting that these cells are removed, collected, or altered in the placental environment.

Conclusion(s) The identification of variation of lymphocyte population in the umbilical artery and vein is a novel approach to better understanding the role of the placenta in neonatal immunity. The potentially inflammatory nature of the unique umbilical artery subset makes it an important target for neonatal pathology and immune modulation.

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Abstract: 8

Effect of Delayed Cord Clamping in Preterm Multiple Births

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Background Delayed cord clamping (DCC), defined as cord clamping beyond 30 seconds after birth, is recommended for all vigorous term and preterm neonates. In preterm births, the benefits include cardiovascular stability, increased red cell volume, less packed red blood cell (PRBC) transfusion, intraventricular hemorrhage (IVH), patent ductus arteriosus (PDA) and necrotizing enterocolitis (NEC). DCC in preterm multiple births is not well studied.

Objective To study the effect of DCC on various outcomes in preterm multiple births less than 32 weeks gestation.

Design/Methods Retrospective case-control study of preterm multiple births with gestational age (GA) $\leq$32 weeks born at Flushing Hospital Medical Center between January 2015 and January 2017. Neonates who were transferred were excluded. G1 included neonates of multiple births who had DCC, G2 neonates of multiple births who did not have DCC. Data collected included GA, birth weight (BW), gender, antenatal steroids, early neonatal complications, neonatal morbidity, late morbidity and sepsis. Early neonatal complications included hypotension needing pressor or volume, NEC, PDA needing treatment, need for multiple PRBC transfusions and severe IVH. Neonatal morbidity included retinopathy of prematurity with laser, periventricular leukomalacia and chronic lung disease defined as oxygen dependency at 36 weeks postmenstrual age. Data were analyzed using SPSS, odds-ratios and chi-square,

p<0.05 was considered significant.
Results Of 144 charts reviewed, 46 were preterm multiple birth neonates. G1 included 21 neonates with a mean GA 29.0±1.8 weeks, mean BW 1131± 200 grams, 14 (66%) male and 17 (80%) received antenatal steroids. G2 included 25 neonates with a mean GA 30.4±2.2 weeks, mean BW 1200±180 grams, 16 (64%) male and 22 (88%) received antenatal steroids. Mortality, early complications, late morbidity and sepsis were compared for G1 and G2, p >0.05 for all outcomes (Table 1).
Conclusion(s) In our small sample, preterm neonates of multiple births having DCC had lower mortality, late morbidity and sepsis when compared to neonates of multiple births who did not have DCC. No statistical differences were found between G1 and G2 for mortality, early complications, late morbidity and sepsis.

Table 1

Outcomes	G1 (%) (N=21)	G2 (%) (N=25)	Odds Ratio	95% CI	p value
Mortality	1 (4.7)	2 (8)	0.58	0.0481-6.8261	0.33
Early Complications	9 (43)	9 (36)	1.33	0.4060-4.3788	0.63
Late Morbidity	5 (24)	7 (28)	0.80	0.2124-3.0403	0.74
Sepsis	4 (19)	6 (24)	0.75	0.1793-3.0961	0.68

p<0.05 was considered significant

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Abstract: 9
Maternal Chorioamnionitis as a Risk Factor for Pneumothorax in Term Newborns
Pradeep Velumula[1], Meghana Nadiger[1], Obeid Shafi[1], Lily Lew[1], Dakshayani Guttal[2], Sourabh Verma[3], Susana Rapaport[1], Kaninghat Prasanth[1]
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Background Respiratory distress (RD) in newborns is the most common indication for admission to neonatal intensive care unit (NICU). Signs and symptoms of RD in newborns are often subtle, from an asymptomatic neonate to RD requiring immediate needle decompression, chest tube placement and/or mechanical ventilation. Clinicians rely on antenatal and perinatal history, clinical examination, biochemical and imaging studies to identify etiology of RD. Known risk factors for pneumothorax in newborns are mechanical ventilation, male gender, premature and post mature gestation, low birth weight (BW), RD syndrome, use of surfactant, meconium aspiration syndrome and resuscitation at birth. Previous studies on maternal chorioamnionitis (MC) as a risk factor in term newborns were inconclusive.
Objective To assess MC as a risk factor for pneumothorax in term newborns admitted to NICU with RD.
Design/Methods Retrospective case-control study of term newborns admitted to NICU for RD and pneumothorax from January 2012 to October 2017 at Flushing Hospital Medical Center. G1 were term newborns with pneumothorax and G2 term newborns admitted to NICU with diagnosis other than pneumothorax. Exclusion criteria included intermittent positive pressure ventilation, intubation, chest compressions in delivery room and congenital abnormalities of heart or respiratory tract. Data collected included gender, maternal age, mode of delivery, gestational age (GA), BW, location of pneumothorax, delivery room CPAP and suspected or proven MC according to American College of Obstetrics and Gynecology 2017. Data were analyzed using SPSS and odds ratio, p<0.05 was considered significant.
Results Of 1790 charts reviewed, 30 in G1 and 1760 in G2. In G1, 22 (73.3%) were on the right. G1 and G2 were compared for gender, maternal age, mode of delivery, GA, BW, delivery room CPAP and MC (Table 1). Being male (76.6%) was a risk factor, odds ratio 3.05, p=0.01. Delivery room CPAP was in 15 (50%) in G1 and 258 (14.7%) in G2 with odds ratio 5.82, p<0.0001. MC was in 3 (10%) in G1 and in 209 (11.9%) in G2 with odds ratio of 0.824, p>0.05.
Conclusion(s) In our small sample, pneumothorax was more common in male newborns having GA>39 weeks and delivery room CPAP. Almost three quarters of pneumothorax were on the right. Advanced maternal age, mode of delivery, BW>3800 grams and MC were not associated with increased risk of pneumothorax

Table 1

Risk factor	G1 n=30 (%)	G2 n=1760 (%)	Odds ratio	95% CI	p value
Male gender	23 (76.6)	912 (51.8)	3.05	1.30-7.15	0.01
Maternal age >35 years	4 (13.3)	364 (20.7)	0.59	0.204-1.701	0.32

Cesarean section	11 (36.6)	851 (48.4)	0.6184	0.292-1.307	0.2082
GA >39, <42 weeks	22 (73.3)	1140 (64.8)	1.495	0.662-3.379	0.333
BW >3800 grams	4 (13.3)	359 (20.4)	0.6	0.208-1.73	0.34
Delivery Room CPAP	15 (50)	258 (14.7)	5.82	2.81-12.05	<0.0001
MC	3 (9.9)	209 (11.9)	0.824	0.248-2.74	0.753

$p<0.05$ is significant

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Abstract: 10

Medication Use and Polypharmacy in Infants with Severe Bronchopulmonary Dysplasia Admitted to United States Children's Hospitals.

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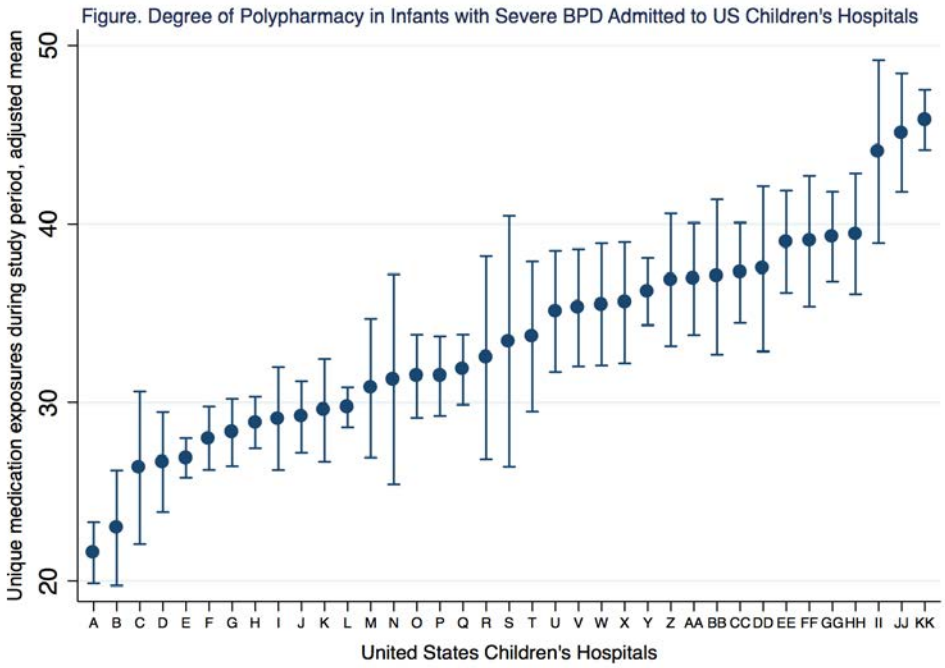
Background Infants with severe bronchopulmonary dysplasia (sBPD) are at risk of numerous medication exposures during initial hospitalization despite limited evidence to support their use. The most commonly used medications and the degree of polypharmacy between centers are not known.

Objective 1. Identify the medications with the highest incidence of any-time exposure and cumulative exposure days.
2. Measure the degree of between-center variation in cumulative polypharmacy.

Design/Methods We used the Pediatric Health Information System to construct a multi-center retrospective cohort. Subjects were born between 2007-2016 at < 32 weeks gestation and met sBPD criteria at 36 weeks corrected gestational age (CGA). We identified all medication exposures between 36 weeks CGA and discharge or 1 year of age ("study period"). We evaluated all medications and those targeting pulmonary gas exchange. Any-time exposure was defined per subject over the study period and reported as proportion exposed. Cumulative exposure days were the sum of exposure days across the cohort and reported for each medication per 100 patient-days. For degree of polypharmacy, we counted unique medication exposures across the study period in each subject. We measured between-center variation with multivariable regression, adjusting for key covariates to account for differential case-mix.

Results We identified 3252 sBPD infants across 43 centers. Furosemide, sodium chloride and potassium chloride were the top 3 medications for both any-time and cumulative exposure (Table 1). Medications not targeting gas exchange were prominent. A second diuretic, chlorothiazide, ranked 2nd in cumulative exposure among medications targeting gas exchange (Table 2). Per subject, median [interquartile range] unique medication exposures for the study period were 30 [17-45]. Significant between-center variation for cumulative polypharmacy was present despite adjustment for differential case-mix (Figure); $P < 0.0001$.

Conclusion(s) Infants with sBPD have extensive medication exposures despite inadequate efficacy data and potential for iatrogenic harm. Diuretics and electrolyte supplements commonly associated with diuretic use are most prominent and should be prioritized for further research. Awareness of the common use of medications not targeting pulmonary gas exchange but that may nevertheless influence disease course is warranted. Marked between-center variation in polypharmacy highlights the lack of consensus and need for further study.



BPD = bronchopulmonary dysplasia, US = United States. Plot depicts estimated marginal means and 95% confidence intervals for each center, ordered from lowest (A) to highest (KK) adjusted mean unique medication exposures during study period. Variation analysis restricted to the 37 centers with > 20 observations. Estimated marginal means obtained through adjustment for the following covariates in multivariable linear regression analysis: gestational age, gender, ethnicity, race, respiratory support mode at 36 weeks corrected gestational age, discharge year, length of stay, documented infection and operating room use. $P < 0.0001$ for overall between-center differences (Wald test).

Table 1. Top 10 Medications Used in Infants with Severe BPD During Initial Admission to US Children's Hospitals, All Medications

Any-time exposure	N = 3252	Cumulative exposure days	
Med., by rank order	No. (%)	Med., by rank order	Med. days/100 patient-days
1. Sodium chloride	2557 (79)	1. Potassium chloride	35
2. Furosemide	2391 (74)	2. Sodium chloride	33
3. Potassium chloride	2229 (69)	3. Furosemide	33
4. Cyclopentolate HCl and phenylephrine HCl	2172 (67)	4. Vitamin combinations with iron/minerals	26
5. Acetaminophen	2079 (64)	5. Ferrous sulfate	21
6. Dextrose in water	1928 (59)	6. Chlorothiazide	19
7. Heparin sodium	1831 (56)	7. Heparin sodium	18
8. Fentanyl	1815 (56)	8. Fat emulsions	17

9.Diphtheria/tetanus/pertussis/hepatitis vaccine	1814 (56)	9. Hyperalimentation solutions unspecified	16
10. Vitamin combinations with iron/minerals	1806 (56)	10. Dextrose in water	13

BPD = bronchopulmonary dysplasia, US = United States, N = total cohort sample, Med = medication, No = number, % = percent. Medications are listed by their generic names as recorded in the Pediatric Health Information System database. Any-time exposure reported as the number (proportion) of subjects exposed to the medication at any time during the study period. Cumulative exposure days are summed across the cohort and reported for each medication per 100 patient-days.

Table 2. Top 10 Medications Used in Infants with Severe BPD During Initial Admission to US Children's Hospitals, Medications Targeting Pulmonary Gas Exchange.

Any-time exposure	N = 3252	Cumulative exposure days	
Med., by rank order	No. (%)	Med., by rank order	Med. days/100 patient-days
1. Furosemide	2391 (74)	1. Furosemide	33
2. Caffeine	1551 (48)	2. Chlorothiazide	19
3. Albuterol	1222 (38)	3. Budesonide	12
4. Dexamethasone	1131 (35)	4. Caffeine	12
5. Chlorothiazide	1032 (32)	5. Albuterol	11
6. Ranitidine	1005 (31)	6. Ranitidine	11
7. Hydrocortisone	900 (28)	7. Lansoprazole	11
8. Lansoprazole	663 (20)	8. Spironolactone	9
9. Budesonide	620 (19)	9. Sildenafil	8
10. Glycopyrrolate	568 (17)	10. Hydrocortisone	8

BPD = bronchopulmonary dysplasia, US = United States, N = total cohort sample, Med = medication, No = number, % = percent. Medications are listed by their generic names as recorded in the Pediatric Health Information System database. Any-time exposure reported as the number (proportion) of subjects exposed to the medication at any time during the study period. Cumulative exposure days are summed across the cohort and reported for each medication per 100 patient-days.

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Abstract: 11

Urinary Tract Infection is Common in VLBW Infants

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Background There is limited information regarding urinary tract infection (UTI) as an etiology of late onset sepsis (LOS) in the neonatal intensive care unit (NICU), particularly in very and extremely low birth weight (VLBW <1500g, ELBW<1000g) infants. There is lack of consensus regarding diagnostic criteria for UTI and suboptimal frequency and accuracy of urine sampling in this population. Given the morbidity associated with UTI, it is crucial to properly delineate its epidemiology in these patients.
Objective Study the epidemiology of UTI in VLBW infants in the Georgetown NICU over an 11 year period.
Design/Methods Retrospective chart review of VLBW infants admitted to the Georgetown NICU between January 1, 2005-December 31, 2015. Exclusions: Patients who expired within 72 hours and transfers admitted > 72 hours of age. The electronic medical record was queried for all urine and blood cultures obtained after 72 hours of life. UTI was defined as urine culture, obtained via suprapubic aspiration or urethral catheterization, which grew ≥10,000 colony forming units/ml (CFU/ml) of one or two organisms, and intention to treat with antibiotics for > 4 days.
Results Of 632 VLBW infants, 105 were excluded. The mean birth weight of the 527 infants included was 1034g (±24g) and the mean gestational age 28 4/7 weeks (±3 weeks). Evaluations for LOS were performed in 56.4% of VLBW infants. Only 32.5% of LOS

evaluations included urine cultures. The rates of urine culture obtained with LOS work-ups varied, from 46.8% in 2007 to 15.5% in 2014, (Fig.1). Overall, 95 patients (18%) had 111 blood stream infections (BSI) and 45 patients (8.5%) had 54 UTIs. Concurrent BSIs were noted with 2 UTIs (3.7%). Thirty two of the 45 UTIs (71%) occurred in ELBW infants. The incidence of UTI per year varied, (Fig.2). By 2015, UTI surpassed BSI as the most common cause of LOS. The most common causative microorganisms were Klebsiella sp. (20.6%) and Enterobacter sp. (19%). Only 3 of 39 patients (7.7%) who underwent renal-bladder imaging had more than minimal pelviectasis on ultrasound. One patient had reflux.

Conclusion(s) UTI is a significant cause of LOS in VLBW infants. Some variation in the incidence of UTIs diagnosed each year may be attributable to varying frequency in obtaining a sterile urine culture as part of a LOS work-up. Lack of a urine culture may lead to under-recognition of bacterial infection in VLBW infants and missed opportunity for appropriate antibiotics. In order to effectively identify and treat UTI a urine culture should be included in all LOS evaluations.

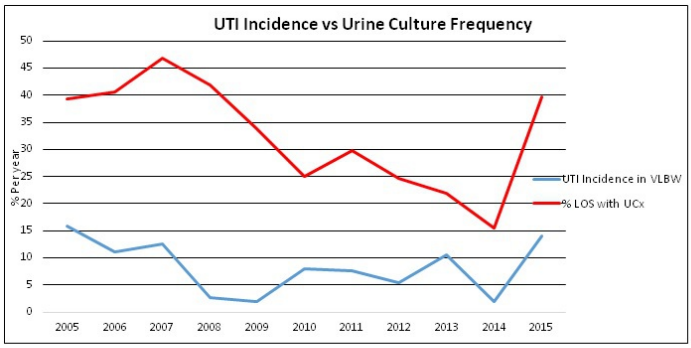

Figure 1

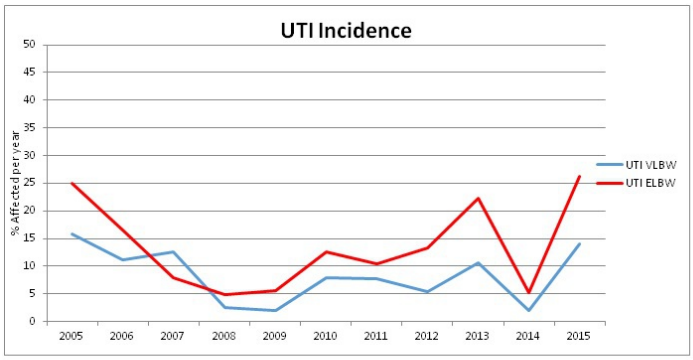

Figure 2

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Abstract: 12

A Comparison of Triple I Classification with Neonatal Early Onset Sepsis Calculator Results in Neonates of Mothers Diagnosed with Clinical Chorioamnionitis

David Carola[1], Amy J. Sloane[1], Caroline Edwards[1], Dorothy McElwee[1], Amanda Roman[2], Yury Cruz[2], Vincenzo Berghella[2], Zubair H. Aghai[1]

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Background The AAP recommends a blood culture and empiric antibiotic treatment for all neonates born to mothers with clinical chorioamnionitis (CHORIO), exposing many uninfected neonates to antibiotics. In 2015, the NICHD proposed a more rigorous classification called “Triple I” (intrauterine infection, inflammation, or both) instead of CHORIO for evaluating pregnant women for intrauterine infection and reducing antibiotic exposure to mothers and neonates. Another strategy for reducing antibiotic use involves employing a calculator developed by Kaiser Permanente to estimate the risk of EOS (early onset sepsis) and holding antibiotics unless the risk is above a threshold value. Both strategies reduce antibiotic exposure and may be involved in future recommendations for management.

Objective To evaluate the performance of the Neonatal EOS Calculator when mothers diagnosed with CHORIO were categorized using the Triple I classification.

Design/Methods This is a retrospective analysis of neonates born between Feb 2011 and Mar 2017 at ≥35 weeks gestation and exposed to CHORIO. We collected demographic data and all required data for the Neonatal EOS Calculator and Triple I classification. The EOS risk was calculated for each infant, and the mothers were categorized using the Triple I classification seen in the table. We then compared the calculator management recommendations with the Triple I categorization for each infant.

Results Our cohort included 10,923 infants. 807 (7.4%) were exposed to CHORIO. 742 (92%) of those had all necessary data available. The EOS calculator recommendation for empiric antibiotics or blood culture did not differ amongst the Triple I categories (Table). The calculator recommended empiric antibiotics in 38% of infants of mothers who didn’t meet fever criteria or had only isolated fever. The EOS calculator recommended holding antibiotics and not obtaining a blood culture in 70.4% of the infants born to mothers with confirmed triple I.

Conclusion(s) The NICHD recommended blood culture and antibiotics for all infants with confirmed triple I, but in our cohort, the EOS calculator did not recommend this management in the majority of infants born with confirmed Triple I. Conversely, The EOS calculator recommended blood culture and empiric antibiotics to many infants born to mothers not meeting fever criteria or with isolated fever. Conflict between these management recommendations suggests that further study is needed prior to widespread use.

EOS Risk Calculator Recommendations for Neonates in Each Triple I Category

	Did Not Meet Criteria for Fever n=290 (39.1%)	Met Criteria for Fever n=452 (60.9%)		Confirmed Triple I n=266 (35.8%)
		Isolated Fever n=117 (15.8%)	Suspected Triple I n=335 (45.1%)	
BC and Empiric Antibiotics (%)	63 (21.8)	19 (16.2)	74 (22.1)	60 (22.6)
BC and Vitals Every 4 Hours (%)	13 (4.5)	7 (6.0)	22 (6.6)	20 (7.0)
Strongly Consider Antibiotics (%)	1 (0.03)	0 (0)	0 (0)	0 (0)
No BC, No Antibiotics, Vitals Every 4 Hours (%)	57 (19.6)	30 (25.6)	74 (22.1)	56 (21.1)
No BC, No Antibiotics, No Vitals Every Hours (%)	156 (53.8)	61 (52.1)	165 (49.3)	130 (48.9)

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Abstract: 13

Haptoglobin in Cord Blood- A Biomarker to predict Neonatal Jaundice

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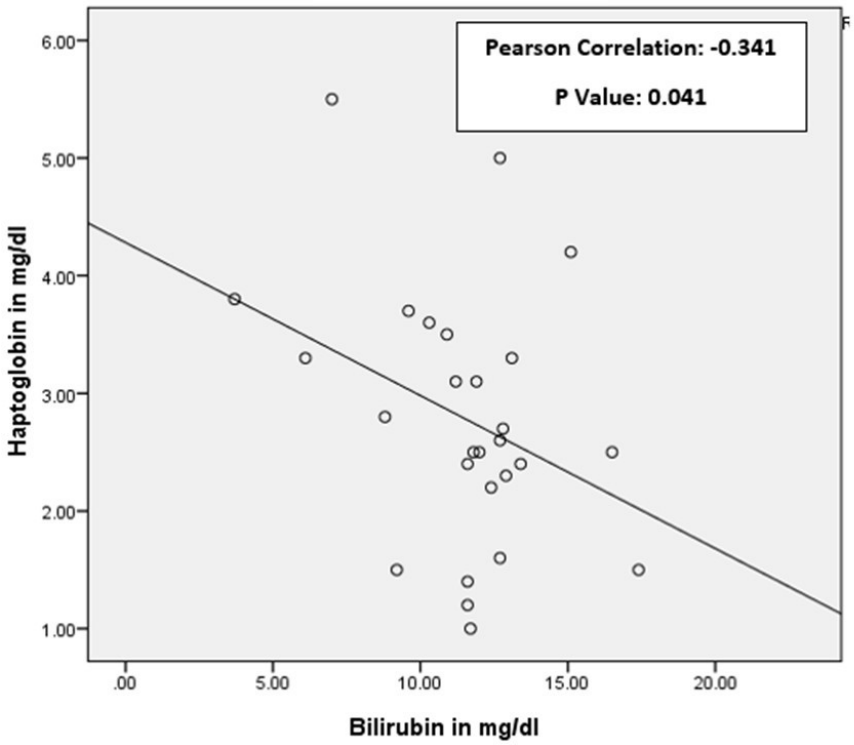
Background Jaundice is the most common condition that requires medical attention in newborns. It is observed during the 1st week of life ~60% term & 80% of pre-term infants. In some infants, serum bilirubin levels may excessively rise. Unconjugated bilirubin is neurotoxic and can cause permanent neurological sequelae. Hence, the presence of neonatal jaundice frequently needs diagnostic evaluation and monitoring.
The main source of bilirubin comes from breakdown of Hemoglobin in Red Blood Cells. When hemolysis takes place, a fall in Haptoglobin (Hp) levels occur, due to binding of free hemoglobin
Our study is aimed to assess whether Hp level in Umbilical Cord Blood (UCB) can serve as an early indicator to predict future occurrence of jaundice.
Objective 1. To assess Hp level in cord blood of babies born at term.
2. To correlate with UCB Hp level and bilirubin concentration of newborns who develop jaundice and assess whether Hp can be an early predictor of jaundice.
Design/Methods Full term, normal babies born to mothers with gestational age ≥37 weeks in a 1 month period was included in the prospective cohort study. Exclusion criteria: Sepsis, Liver disease, Birth trauma (Cephalhematoma), Congenital anomalies. In our institution, in all healthy term newborns, the standard practice is to perform serum bilirubin testing on clinically jaundiced babies before discharge, on Day 3 of life. Anicteric newborns do not get bilirubin testing done. IRB approval obtained. Cord blood collected in EDTA container in consecutively consenting mothers and assayed for Hp using Roche kits in Roche Integra Analyser. Correlational analysis performed using bilirubin and Hp values.
Results Out of 54 babies, 27 were clinically anicteric, with a mean Hp level of 3.66±2.51mg/dl. The remaining 27 clinically jaundiced babies' mean Hp level was 2.78±1.10 mg/dl. The mean Hp value of anicteric babies was higher than the icteric babies, however it was not statistically significant. (Ref. Table1)
A significant negative correlation was found between the Hp level from the Umbilical Cord taken during delivery and the bilirubin value on the third day (r= -0.341; P=0.04). (Ref. Graph 1)
Our study has shown that as the cord blood Hp value decreases, there is a corresponding increase in bilirubin value.
Conclusion(s) Hp from UCB maybe a useful marker to identify the risk of developing jaundice in newborns in the near future. Further studies with greater sample size are required to study this relationship. This may enable babies with higher risk for significant jaundice to be detected earlier.



Correlation Graph between Umbilical Cord Blood Haptoglobin values and the 3rd day Serum Bilirubin values

Table 1: Mean Cord Blood Haptoglobin (Hp) in Clinically Icteric and Anicteric Newborns on Day 3

	Icteric (N= 27)	Anicteric (N=27)	P value
UCB Haptoglobin mg/dl (X±SD)	2.78 ±1.10	3.66 ±2.51	0.103

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Abstract: 14

Impact of New "Triple I" Classification on the Incidence of Clinical Chorioamnionitis and Antibiotic Use in Neonates

Amy J. Sloane[1], Amanda Roman[2], Yury Cruz[2], David Carola[1], Dorothy McElwee[1], Kolawole Solarin[1], Vincenzo Berghella[2], Zubair H. Aghai[1]

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Background The CDC currently recommends blood culture and empiric antibiotics for all neonates born to mothers with suspected chorioamnionitis (CDC 2010). This can lead to excess antibiotic exposure and separation from mothers. To limit use of antibiotics, NICHD workshop (Obstet Gynecol, 2016) and ACOG (2017) proposed new criteria for the diagnosis of intrauterine infection, inflammation or both (Triple I).

Objective To evaluate the impact of new Triple I criteria on the incidence of chorioamnionitis and the use of antibiotics in neonates.

Design/Methods This is a retrospective review of women who delivered at ≥35 weeks' gestation between 2/2011-3/2017 and diagnosed with clinical chorioamnionitis. The cohort was reclassified using NICHD Triple I criteria: isolated maternal fever (temperature ≥39.0C or two temperatures between 38.0C - 38.9C ≥30 minutes apart), suspected triple I (maternal fever plus additional clinical risk factor), or confirmed triple I (microbiologic and/or histologic evidence of microbial invasion) and ACOG criteria (single temperature ≥39.0C equals suspected intraamniotic infection). The primary outcome was incidence of suspected and confirmed Triple I. The secondary outcome was use of antibiotics and incidence of culture positive sepsis in neonates.

Results There were 10,923 deliveries during the study period - 807 (7.4%) women were diagnosed with clinical chorioamnionitis and data was available for 742 (92%) women. When reclassified per NICHD guidelines only 335 (45.1%) women met the criteria for suspected Triple I, and 266 (35.8%) for confirmed Triple I (Table) and per ACOG guidelines, only (342) 46.1% met criteria for suspected intraamniotic infection. Only 3 infants (0.4%) had culture positive sepsis - 2 were born to mothers who were classified as suspected and subsequently confirmed Triple I. One infant was born to a mother who was classified as isolated fever per NICHD, but as suspected intraamniotic infection per ACOG.

Conclusion(s) The risk of EOS in neonates born to mothers with chorioamnionitis is very low. By using the new classifications, only 45.1% of women previously diagnosed as chorioamnionitis met criteria of suspected Triple I per NICHD and 46.1% per ACOG. If we evaluate and treat only neonates born to mothers with suspected intraamniotic infection (per either guideline) and symptomatic neonates born to mothers with isolated fever, we would reduce use of antibiotics, sepsis evaluation and NICU admissions without missing cases of culture positive sepsis.

Neonatal Outcomes (mean±SD)

	Not Met Criteria for Fever n=290 (39.1%)	Met Criteria for Fever n=452 (60.9%)		Confirmed Triple I n=266 (35.8%)
		Isolated Fever n=117 (15.8%)	Suspected Triple I n=335 (45.1%)	
Symptomatic (%)	75 (25.9)	23 (19.7)	80 (23.9)	63 (23.7)
Clinical sepsis (%)	33 (11.4)	15 (12.8)	*^84 (25.1)	*^71 (26.7)
Culture positive sepsis (%)	0 (0)	#1 (0.8)	2 (0.6)	2 (0.7)
Duration of antibiotics (days)	2.6±1.6	2.7±1.9	*^3.3±2.4	*^3.4±2.4

*p<0.05 compared to Not met criteria for fever group // ^p<0.05 compared to Isolated fever group // #Classified as suspected intraamniotic infection as per ACOG criteria

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Abstract: 15

Are Early-Onset Sepsis Evaluations and Empiric Antibiotics Mandatory for all Neonates Admitted with Respiratory Distress?

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Background Broad-spectrum antibiotic therapy is one of the most common interventions for neonates admitted with respiratory distress at birth. Increasing knowledge of the numerous adverse effects of antimicrobials have prompted reflection on whether this intervention is appropriate for all newborns with respiratory pathology. Antimicrobial stewardship for this high-risk patient population is important but requires evaluation for safety.

Objective Our objectives were to evaluate the success and safety of an antimicrobial stewardship program for neonates admitted with respiratory distress at birth. Neonates born with risk factors for early-onset sepsis (EOS) (preterm labor, chorioamnionitis, etc.) were prescribed antibiotics. Conversely, neonates with respiratory distress born secondary to maternal indications (hypertensive disorders, elective Cesarean without spontaneous labor, etc.) were managed without sepsis evaluations or empiric antibiotic therapy.

Design/Methods We conducted a retrospective cohort analysis of all infants born from April 2016 (onset of antimicrobial stewardship program) to November 2017 admitted to the NICU with respiratory distress. Empiric antibiotics were defined as broad spectrum antibiotics prescribed at admission and discontinued if blood cultures were negative at 48 hours. Neonates were divided into two groups: maternal indications for delivery (no risk factors for EOS) and fetal indications (risk factors present) for delivery. We used descriptive statistics to characterize neonates treated according to this protocol.

Results No patients in this cohort had culture-positive EOS. The majority of neonates (59%) admitted with respiratory distress did not receive empiric antibiotics. 6 of these patients were later started on antibiotics due to clinical deterioration. Blood cultures in all 6 patients were negative and antibiotics were discontinued at 48 hours. Neonates who received empiric antibiotics (41%) were more likely to be lower GA and lower birth weight.

Conclusion(s) Prior to the antimicrobial stewardship program, all neonates admitted with respiratory distress at birth received empiric antibiotic therapy. Its implementation resulted in the majority of patients managed without therapy. Thus far the protocol has been safe with no missed cases of EOS. Continued assessment of its safety is necessary for greater acceptance of antimicrobial stewardship in this high-risk population.

	Subjects (N=395)	GA (weeks) Mean ± SEM	Birth Weight (grams) Mean ± SEM
Received Antibiotics	162 (41%)	35 6/7 ± 0.4	2869 ± 79
No Treatment	233 (59%)	37 5/7 ± 0.2	3067 ± 54

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Abstract: 16

Glucose Homeostasis in the first 24 hours following Resuscitation after Birth

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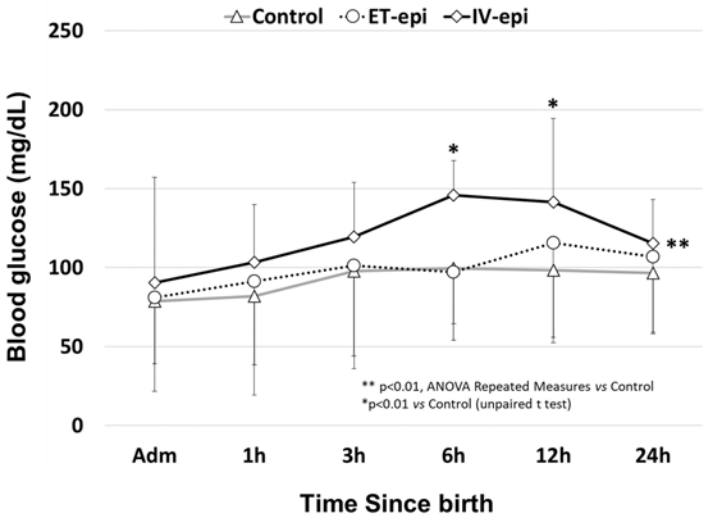
Background Initial hypoglycemia is an important risk factor for perinatal brain injury and adverse outcomes, particularly in infants who require resuscitation after hypoxic-ischemic (HI) insult. Depressed infants may require significant resuscitation including intratracheal (IT) or intravenous (IV) epinephrine. Epinephrine augments hepatic glucose production by stimulating glycogenolysis and gluconeogenesis; inducing glucose intolerance and hyperglycemia. There is a paucity of data on the role of glucose following HI insult in the peripartum period.

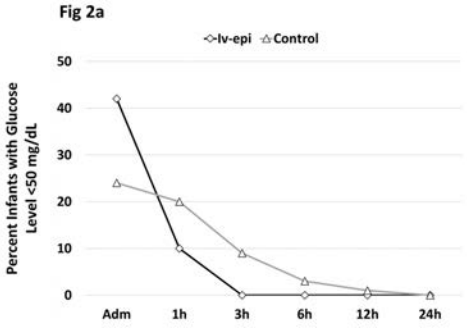
Objective To determine the role of IT and IV epinephrine (epi) at resuscitation on blood glucose (BG) levels in the first 24 hours of life.

Design/Methods We performed a retrospective chart review of all infants admitted to Level 4 NICU, with HR < 100/min at 1min from 1/11 to 2/17. Infants classified into three groups: (1). Control group (CG): no epinephrine at resuscitation (2). ET-Epi Group (ETE): infants received ET-epi at resuscitation (3). IV-Epi Group: infants received IV-epi (with or without ET-epi). Blood glucose levels on admission to NICU, 1h, 3h, 6h, 12h & 24h of birth documented. Low (<50 mg/dL) or high (>150mg/dL) BG levels & glucose infusion rate (GIR) at 24 hours were noted. Analysis performed with Student t test & ANOVA repeated measures to assess significance.

Results The demographic and resuscitation characteristics of the three groups are shown in Table 1. Cord pH was significantly higher; base deficit, Apgar at 1, 5 and 10 minutes were significantly lower in the control group versus ET-Epi and IV-Epi groups (Table 1). Apgar was significantly lower in IV-Epi group vs ET-Epi group ($p<0.05$, ANOVA). BG levels were significantly different in IV-Epi group compared to the control group ($p<0.05$, ANOVA repeated measures, Fig.1). BG was significantly higher at 6h & 12h in IV-Epi group vs control group (Fig.1). GIR was not different among the groups. Percent infants with blood glucose variability either

<50mg/dL (Fig.2a) or >150mg/dL (Fig.2b) were more common in the IV-Epi group.
Conclusion(s) Sicker infants with HI insult required resuscitation with IV-Epi at birth. Infants required resuscitation with IV-Epi at birth are at risk for hypoglycemia soon after birth; however, high BG levels are more of a problem after 3-6h of life. Supra-physiologic doses of epinephrine at resuscitation along with counter-regulatory hormones may contribute to metabolic stress and relative hyperglycemia. Studies should address glucose homeostasis following hypoxic-ischemic insult at birth.





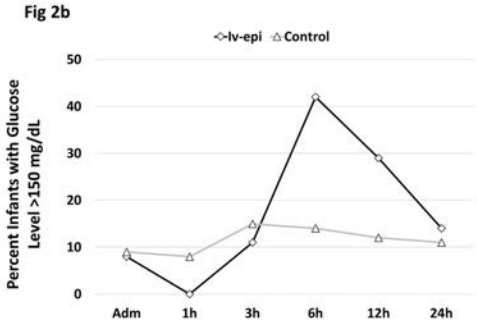


Table 1. Prenatal and Birth Characteristics of the Three Resuscitation Groups

Characteristics	Control Group (N=76)	ET-Epi Group (N=8)	IV-Epi Group (N=15)
Gestational Age (Wks)	33.4 ± 6.0	33.0 ± 7.0	31 ± 5.9
Birth Weight (gms)	2334 ± 1246	2244 ± 1429	1987 ± 1257
C-Section	48 (63%)	7 (87%)	8 (53%)
Sex (Male)	39 (51%)	5 (62%)	9 (60%)
Cord pH	7.14 ± 0.16*	6.95 ± 0.23	7.02 ± 0.20
Base Excess (BE) (mEq/L)	-7.5 ± 0.1*	-16.8 ± 8.0	-14.0 ± 9.4
Apgar – 1min Median (IQR)	1 (0)**	0 (1)	0 (1)

Apgar – 5min Median (IQR)	5 (4)**	1 (2)	1 (1)
Apgar – 10min Median (IQR)	7 (2)**	3 (3)	1 (3)†
ET Intubation (%)	56 (74%)	8 (100%)	15 (100%)
Chest Compressions (%)	11 (14%)	8 (100%)	15 (100%)
Glucose Infusion Rate (GIR) (mg/kg/min)at 24h	5.09 ± 1.28	5.03 ± 1.11	4.96 ± 1.01

Data expressed as mean ± SD; *p<0.05 vs ET-Epi & IV-Epi groups, ANOVA Fisher's Post Hoc test; ** p<0.001 vs ET-Epi & IV-Epi groups, ANOVA Fisher's Post Hoc test; †p<0.05 vs ET-Epi group, ANOVA Fisher's Post Hoc test.

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Abstract: 17

Stopping caffeine in premature neonates: How long does it take for level of caffeine to fall below the therapeutic range?

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Background Caffeine is routinely used in preterm infants for apnea of prematurity. The use of caffeine in preterm infants also improves respiratory and neurodevelopmental outcomes. In the past, the standard dosage of caffeine was 5mg/kg/day. More recently, a higher dose of caffeine is used in preterm infants as it has a wide therapeutic window. Because of the long half-life of caffeine, preterm infants are usually monitored for 5 days after discontinuation of caffeine to assess for possible recurrence of apnea. However, with the use of a higher dose, the level of caffeine may still be therapeutic 5 days after stopping the drug.

Objective To determine if the serum concentration of caffeine drops to a sub-therapeutic level 5 days after its discontinuation.

Design/Methods This is a retrospective analysis of all preterm neonates (birth weight ≤ 1500 grams) admitted to the NICU between 01/2010 and 06/2017 who received caffeine, and whose levels were measured after its discontinuation. Demographics, clinical characteristics and caffeine levels were collected from the infants' medical records. A sub-therapeutic level of caffeine was defined as <5 mg/dl. The infants with high doses of caffeine (> 5 mg/kg/day) were compared with those with the low dose of caffeine (≤ 5mg/kd/d).

Results A total of 686 preterm infants were admitted to the NICU and received caffeine during the study period. The caffeine level was measured in 280 infants after the discontinuation of caffeine. The mean (±SD) birth weight and gestational age was 1246±390 grams and 29.2±2.4 weeks respectively. The median (range) day of measuring caffeine level after discontinuation was 7 (1-32) and the median caffeine level was 3.9 mg/L (<1 to 21.4). Caffeine levels were measured in 103 infants on days 5-6 after discontinuation of the drug, 46 infants (44.7%) had a caffeine level ≥ 5mg/L. Similarly, 36 of 144 infants (25%) had a caffeine level of ≥ 5mg/L, 7-10 days after caffeine was discontinued. The number of infants with high caffeine levels and the level of caffeine was significantly higher in the groups of infants who were on higher dose of caffeine when it was stopped (Table 1).

Conclusion(s) A large number of preterm infants treated with caffeine for apnea of prematurity had therapeutic levels of caffeine 5-10 days after discontinuation of the drug. Preterm infants should be monitored for recurrence of apnea for more than 5 days after stopping caffeine or consider checking caffeine levels before discharge.

Table 1: Dose of caffeine when stopped (mean±SD)

	Caffeine > 5mg/kg/d (n=144)	Caffeine ≤5mg/kg/d (n=136)	p
Birth Weight (grams)	1138 ± 333	1362 ± 412	<0.01
Gestational Age (weeks)	28.4 ± 2.3	29.9 ± 2.3	<0.01
Male sex (%)	71 (49)	74 (54)	0.4
Black Race (%)	58 (40)	62 (46)	0.4
Cholestasis (%)	10 (7)	6 (4)	0.4
Days on caffeine	38 ± 20	29 ± 19	<0.01

Dose of caffeine when stopped (mg/kg/d)	8.2 ± 2.1	4.9± 0.2	<0.01
Day caffeine level measured after stopped	7.1 ± 4.2	7.6 ± 3.4	0.3
Caffeine level (mg/L)	5.3 ± 3.3	3.5 ± 2.5	<0.001
Number of infants with caffeine level ≥ 5 mg/L	61 (42.3)	31 (22.8)	<0.001

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Abstract: 18

Demographic Differences in Protective Sports Equipment Usage Among Children

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Background While physical activity is essential for healthy child development, sports safety practices are crucial to prevent unnecessary injuries. Out of the 30 million children in the U.S. who participate in organized sports each year, several million are treated for sports-related injuries, many of which may result from limited usage of protective sports equipment (PE). To date, no studies have examined differences in the perceived importance of PE usage among parents in various demographic groups.
Objective To investigate differences in parental attitudes towards PE usage based on child race, gender, ethnicity, and number of siblings.
Design/Methods Parents of children (4-18 years) responded to an anonymous questionnaire via Amazon Mechanical Turk reporting demographic characteristics of their children and the age, if any, at which they would allow their child to participate in 9 sports without PE (volleyball, basketball, baseball, ice hockey, football, soccer, lacrosse, biking, skateboarding) in recreational, training, and competitive environments. A two-sample t-test was performed to compare these ages by gender, race (White/Black), and ethnicity. A Pearson Correlation was used to assess whether this age varied with the number of children in the family.
Results Children of responding parents were 60% male; 75.3% White, 10.4% Black, 5.5% Asian, 8.7% Other; 87.8% not Hispanic/Latino. For all sport/environment combinations, parents reported a lower age at which they would permit participation without PE for male children, with significant differences of 2 years, on average, in 8 sport/environment combinations. Parents of White children reported a lower age than parents of Black children, with significant differences of 2.4 years, on average, in 10 sport/environment combinations. Similarly, parents of non-Hispanic children indicated they were willing to allow sports participation without PE for younger children (Table 1). For four sport/environment combinations, the age at which parents would be comfortable with their children playing without PE decreased as the number of children in the family increased (Table 2).
Conclusion(s) Major disparities were found with regard to parental perceived importance of PE across all demographic categories, including race, gender, and ethnicity. Of particular vulnerability are male children, Non-Hispanic and White children, and those with more siblings. It is imperative that pediatricians educate all parents on the importance of PE usage to prevent injuries.

Table 1. Results of two-sample t-tests comparing the average age (in years) at which parents would allow their children to participate without protective sports equipment (PE) in each sport/environment combination by gender (male, female), race (White, Black), and ethnicity (not Hispanic/Latino, Hispanic/Latino).

Sport/Environment Combination		Gender (n_e = 470) ($\bar{x}_{male}$, $\bar{x}_{female}$)	Race (n_e = 399) ($\bar{x}_{White}$, $\bar{x}_{Black}$)	Ethnicity (n_e = 470) ($\bar{x}_{Non\text{-}Hispanic\ Latino}$, $\bar{x}_{Hispanic/Latino}$)
Baseball	Recreational	8.7, 9.6*	8.7, 11.5***	8.9, 9.7
	Training	10.1, 10.8	9.8, 11.6	10.0, 12.1
	Competition	11.2, 12.2	11.2, 12.3	11.0, 13.0
Basketball	Recreational	8.4, 8.4	8.0, 11.3***	8.2, 8.7
	Training	8.7, 8.7	8.5, 11.0***	8.5, 9.7
	Competition	9.3, 9.3	9.0, 11.5***	9.1, 10.7
Football	Recreational	9.7, 9.8	9.4, 11.4*	9.6, 9.0
	Training	10.3, 13.4**	11.1, 11.7	11.0, 12.0
	Competition	11.4, 13.8*	11.9, 12.5	11.8, 13.4
Ice Hockey	Recreational	10.6, 10.6	10.5, 11.4	10.2, 10.5
	Training	10.0, 13.2*	11.2, 11.5	11.0, 11.1
	Competition	11.1, 13.7*	12.2, 12.3	11.8, 12.1
Lacrosse	Recreational	9.6, 11.0*	9.9, 12.2**	10.2, 9.3
	Training	11.0, 12.1	11.4, 12.4	11.4, 11.3
	Competition	11.7, 12.6	12.1, 12.9	12.0, 12.8
Soccer	Recreational	8.6, 8.6	8.4, 10.0**	8.5, 8.4
	Training	10.2, 10.3	9.8, 11.2	10.1, 9.7
	Competition	11.0, 11.8	10.8, 12.1	11.2, 10.9
Volleyball	Recreational	8.3, 8.4	7.9, 10.2***	8.1, 9.2
	Training	9.3, 9.4	9.0, 11.5*	9.3, 10.2
	Competition	9.7, 10.3	9.7, 11.7**	9.7, 11.4
Biking		9.9, 11.2**	10.5, 9.8	10.3, 10.9
Skateboarding		11.1, 12.5*	11.5, 10.8	11.4, 13.1*

*p<.05, **p<.01, ***p<.001

Table 1. Results of two-sample t-tests comparing the average age (in years) at which parents would allow their children to participate without protective sports equipment (PE) in each sport/environment combination by gender (male, female), race (White, Black), and ethnicity (not Hispanic/Latino, Hispanic/Latino).

Table 2. Results of Pearson Correlation between the number of children in the family and the age at which parents would allow their children to participate in sport/environment combinations without protective sports equipment (PE).

Sport/Environment Combination	Correlation Coefficient	p-value*
Recreational Baseball	-0.13	.025
Basketball Competition	-0.24	.047
Recreational Soccer	-0.10	.049
Skateboarding	-0.23	.003

*Only statistically significant results are displayed.

Table 2. Results of Pearson Correlation between the number of children in the family and the age at which parents would allow their children to participate in sport/environment combinations without protective sports equipment (PE).

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Abstract: 19

Playing the Blame Game: Gender Differences in Perceived Sources of Parental Guilt

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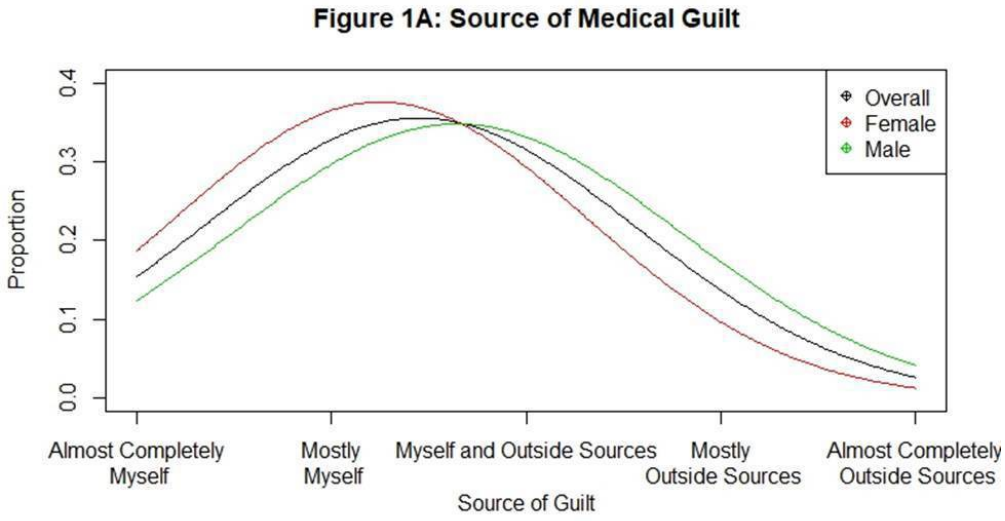
Background Previous research on parental guilt repeatedly indicates that females are more prone to experiencing guilt. However, while existing literature highlights the relationship of maternal guilt to poor mental health and parenting outcomes, little is known about the source of maternal guilt, or if there are gender differences in the extent to which parents identify internal or external influences as sources of guilt.

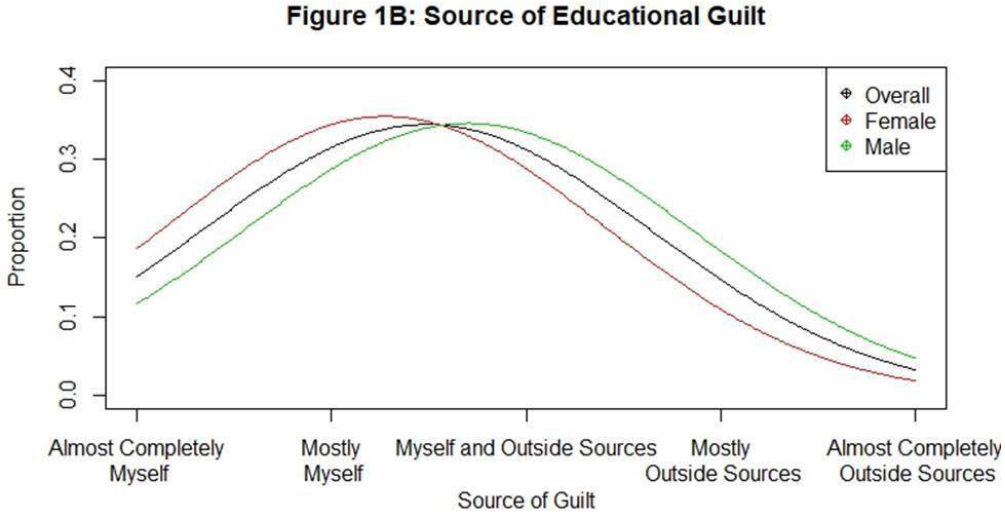
Objective To examine the relative extent to which mothers and fathers report internal or external sources of parental guilt in medical, educational and sociocultural guilt domains.

Design/Methods Subjects, parents of children aged 5 -12 years, completed an anonymous online survey distributed via Amazon M-Turk. After completing demographic questions, subjects completed 30 items regarding 3 domains, medical, educational and sociocultural guilt, on a 3-point Likert scale. Parents were then asked the extent to which guilt in each domain was either internally or externally sourced on a 5-point scale ranging from “almost completely myself” to “mostly outside sources” (Figure 1A-C). T-tests were performed to examine gender differences in the extent to which mothers and fathers attribute guilt to largely external or internal sources.

Results A total of 1,128 parents completed the survey (51% mothers). 54% were between 26-35 years old. 57% of participant identified as white, 7.9% identified as Black, and 27.2% identified as Asian. Figure 1A-C demonstrates the extent to which males and females attribute their guilt to largely external or largely internal sources. Across all three domains of guilt, males were more likely than females to attribute their feelings of guilt to external sources ($p < .001$ for medical, educational and sociocultural domains; Figure 1A-C).

Conclusion(s) Clinicians should be aware that there are significant gender differences in the sources of parental guilt, with mothers being significantly more likely to experience self-inflicted guilt, and fathers identifying largely external sources of guilt. To this end, mothers and fathers likely need different types of support structures to address these disparate sources of guilt and receive maximum benefits from adequately tailored interventions.





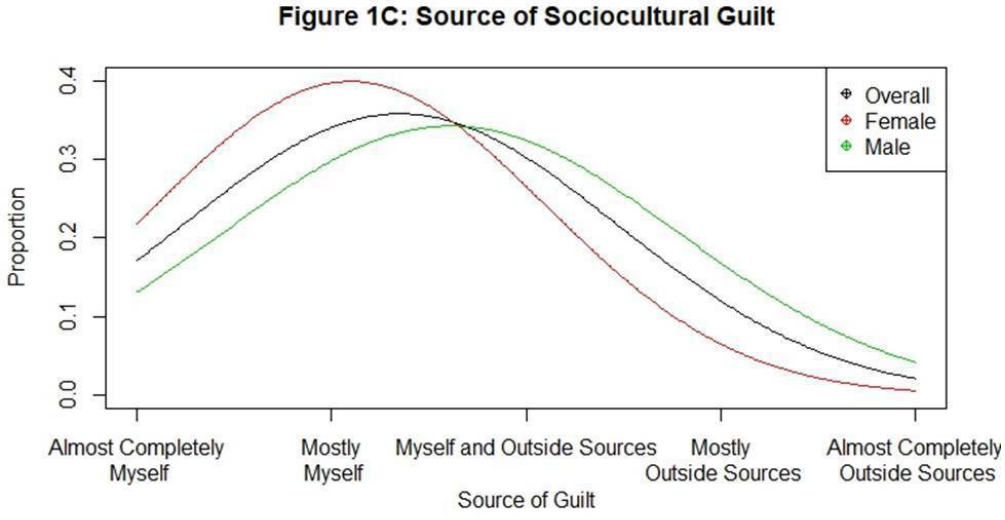


Figure 1: Source of Medical, Educational and Sociocultural Parental Guilt in Mothers and Fathers

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Abstract: 20

Exploring the Effect of Mindfulness on Burnout in a Pediatric Emergency Department (PED)

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Background Burnout affects a large number of medical professionals and can adversely affect providers' mental health, quality of patient care, and job satisfaction. Emergency department providers often have higher levels of burnout compared to healthcare providers in general. While mindfulness-based interventions and programs have been shown to decrease levels of burnout, little is known about the personal mindfulness practices of PED staff and its effect on burnout.
Objective The aim of this study was to measure and explore the relationship between current mindfulness-based practices and degree of burnout among PED staff (physicians, nurses, technicians).
Design/Methods A cross-sectional study was conducted in an urban, tertiary care PED. An anonymous electronic survey was distributed to all PED staff. Demographic information, perception of burnout, and frequency of mindfulness activity practices were collected. Mindfulness activities included breathing exercises, meditation, yoga/stretching, mindfulness observations and relaxation techniques. A validated instrument, the Maslach Burnout Inventory (MBI), was embedded in the survey and was scored for three sub-scales, emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA), as either high, moderate, or low level. Higher levels of EE and DP, and lower levels of PA indicate burnout.
Results Among 83 eligible staff members, 75 surveys were completed (90% response rate). 77% were female (n=58), 51% were nurses (n=38), median age was 35 years (IQR: 30, 46), median total years in profession was 7 (IQR: 2, 15), median years working in PED was 4 (IQR: 1,9). Regarding perception of burnout, 24% reported yes, 49% maybe/unsure, and 27% no burnout. Self-reports of burnout correlated with MBI results; respondents who were unsure scored positively for burnout. MBI scores and frequency of mindfulness activities are reported in Table 1. The majority of staff experience moderate to high levels of burnout and do not participate in mindfulness activities regularly. There were no significant associations found between frequency of mindfulness practices and burnout scores.
Conclusion(s) While the majority of PED staff experience moderate to high levels of burnout, few practice mindfulness regularly. Among the small proportion of staff who participate in mindfulness activities, there was no significant reduction in burnout scores. Differences in personal mindfulness practices and more formalized mindfulness programs should be explored to understand the effects on burnout.

Burnout scores and mindfulness practice frequency among all staff (N=75)

MBI Subscales	Low Level	Moderate Level	High Level
Emotional exhaustion	31 (41%)	20 (26%)	25 (33%)
Depersonalization	39 (51%)	26 (34%)	11 (14%)
Personal accomplishment	30 (40%)	29 (38%)	17 (22%)
Mindfulness Practice	Never	A few times a month or less	A few times a week or daily
Breathing exercises	43 (59%)	17 (23%)	13 (18%)
Meditation	56 (79%)	12 (17%)	3 (4%)
Yoga/Stretching	37 (52%)	22 (17%)	12 (4%)
Mindfulness observations	46 (62%)	15 (20%)	13 (18%)
Relaxation techniques	31 (43%)	28 (38%)	14 (19%)

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Abstract: 21
Implementation of an I-PASS Curriculum Adapted for a Level IV Neonatal Intensive Care Unit
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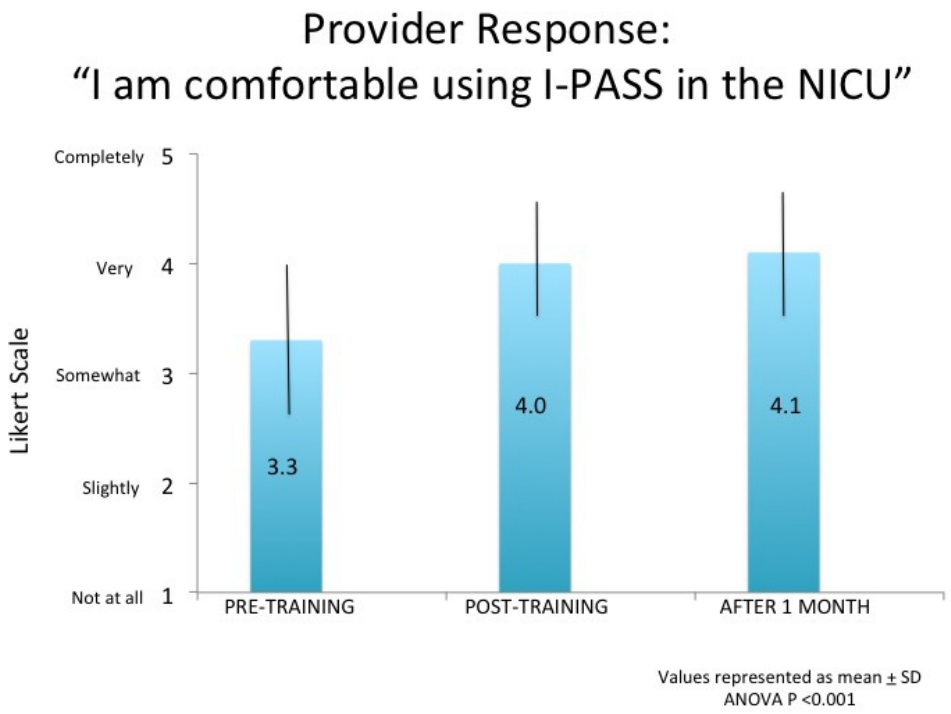
Background The Joint Commission named communication errors as one of the top 3 root causes of sentinel events. Handoffs are integral to medical communication and ACGME now requires programs to provide handoff instruction and evaluation. The I-PASS Study Group created a standardized handoff, which reduced medical errors and improved handoff in the general pediatric inpatient setting. The high-risk nature of the Neonatal Intensive Care Unit (NICU) demands that every medical provider use a high quality, standardized handoff to facilitate optimal exchange of information and responsibility.
Objective To evaluate the effectiveness of an I-PASS curriculum adapted to the NICU (NICU I-PASS) as an educational tool.
Design/Methods All medical providers in an academic Level IV NICU were trained with the NICU adapted I-PASS curriculum. Rotating residents and new providers, including fellows, NNPs, PAs and an attending, were trained monthly for a 10-month period.

Surveys evaluating the perception of NICU I-PASS and curriculum effectiveness were completed at 3 epochs by each trainee: 1) pre-training, 2) immediately post-training and 3) after 1 month. These were compared using Kruskal-Wallace ANOVAs.
Results Trainees completed surveys: 36 pre-training, 32 post-training and 20 after 1 month of use. 75% of respondents had previously received I-PASS training and 92% had experience with I-PASS. When asked about their interest in learning NICU I-PASS, the mean response on a 1-4 Likert scale was 3.64 (SD 0.68), where somewhat interested corresponds to 3 and very interested to 4. Comfort with NICU I-PASS increased over the 3 epochs with mean response 3.33, 4.0 and 4.1, respectively (Likert scale 1-5, $p< 0.001$) (Figure 1). When asked post-training, if providers felt more prepared to give NICU I-PASS handoff, 97% responded quite a bit (4) or very much (5), with a mean response of 4.4 (Likert scale 1-5, SD 0.56).
Conclusion(s) This study demonstrates the effectiveness of our NICU-adapted I-PASS curriculum for trainees' preparedness and comfort providing handoffs in the NICU. This was achieved with the majority of trainees having already had experience using I-PASS, further validating the curriculum as an effective educational tool to teach this enhanced handoff methodology in the NICU. We speculate that future widespread dissemination of this curriculum will enable other NICUs to standardize medical handoffs and improve the care for their smallest patients.



Provider Comfort with NICU I-PASS

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Abstract: 22
Do Neonatologist Transitions Matter for Patient Care?
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Background Regional neonatal intensive care units (NICUs) use different neonatologist staffing models to balance continuity of care with original clinical perspectives for patients. The effects of these models on patient outcomes are unknown.
Objective To describe the frequency of neonatologist transitions of care and estimate the independent association between these transitions & selected patient outcomes.
Design/Methods Three centers provided masked neonatologist daily schedules and their corresponding patient data from the Children's Hospitals Neonatal Database from 2014-15. The centers used different models – 2-week (center A), 3-week (B), & 1-month (C, referent) neonatologist "on-service" blocks. The main outcomes were the description of transitions (defined as 2 consecutive days where the neonatologist differed) associated with staffing models and central venous line (CVL) days, days of mechanical ventilation, & oxygen use at NICU discharge. Regression analyses estimated the associations between transitions & patient outcomes, independent

of length of stay (LOS), case-mix, & inborn status. Subgroup analysis stratified the cohort by LOS categories (14, 28, 60, & 120 days). Results Patient characteristics are described in T1. Accounting for LOS, the number of transitions varied at least 3.3-fold between centers (F1: p<0.001) & persisted in multivariable analysis (incidence rate ratio (IRR) per patient: $IRR_{2\text{-}wk}$ = 5.0, 95% CI: 4.8, 5.3; $IRR_{3\text{-}wk}$ = 4.2, 95% CI: 4.0, 4.4). Number of transitions was associated with staffing models independent of LOS, surgical intervention, inborn birth, birthweight, CVL days, mortality, and use of systemic steroids referent to the center with 1-month service blocks. These differences were greater than expected after grouping patients by LOS categories (2-week blocks: IRR 2.1 for LOS <14d & increasing to 4.2 for LOS>120d; 3-week blocks: IRR 1.9 to 3.5, p≤0.002 for all) relative to 1-month blocks. Duration of CVL use (1.01, 95% CI 1.0, 1.03) was minimally & independently associated with the number of transitions per patient. No differences were observed in ventilator days or oxygen use at NICU discharge.
Conclusion(s) Within regional NICUs, transitions in neonatologists are frequent for patients. These 3 regional NICUs appear to have similar patient-centered outcomes despite different staffing models & frequencies of neonatology transitions. This study highlights the need for high-quality patient handoffs for NICU infants & supports the use of measured patient outcomes in the design of physician staffing models for regional NICUs.

T1: Center-specific Patient Characteristics	Centers			
Center	All	A	B	C
Patient admissions, n	3422	768	1037	1617
Length of service blocks		2 wks	3 wks	1 mon
Median number of transitions per patient (IQR)	2 (4)	5 (9)	3 (4)	2 (1)
Female sex, %	42.6	42.4	42	43.1
Median gestational age, weeks (IQR)	37 (7)	36 (7)	37 (5)	36 (8)
Median birth weight, kg (IQR)	2.70 (1.64)	2.54 (1.67)	2.90 (1.43)	2.66 (1.73)
Median NICU LOS, days (IQR)	12 (28)	15 (29)	9 (21)	15 (31)
Median age at admission, days (IQR)	1 (4)	0 (4)	4 (12)	0 (2)
Weekend admission (Sat/Sun), %	23.9	23.3	22.9	24.7
Outborn (ambulance/air transport), %	55.9	53.3	65.2	54.3
At home prior admission, %	11	7	25.2	3.8
Any surgery, %	22.7	35.4	17.6	20
Median CVL days, (IQR)	9 (14)	9 (16)	13 (19)	8 (11)
BSI, %	4.1	4.3	2.8	4.8
Median ventilator days, median (IQR)	5 (13)	6 (20)	6.5 (15)	4 (11)
Home oxygen use %	16	24	11.4	15.2
Mortality, %	5.1	4.3	5.2	5.4
All variables were significantly different (p<0.001) between centers except sex, weekend admission, BSI, & mortality (P>0.5 for these four)				

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Abstract: 23
Factors associated with the development of late pulmonary hypertension (PH) in preterm infants with bronchopulmonary dysplasia (BPD).
Sudip Sheth[1], Lisa Goto[2], Vineet Bhandari[1], Boban Abraham[3], Anja Mowes[1]
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Background Preterm infants with BPD are at increased risk for development of late PH, which has an increased risk of mortality and adverse neurodevelopmental outcomes. Complex interactions between antenatal and postnatal factors contribute to impair normal pulmonary vasculature, leading to altered growth, structure, and function of the developing pulmonary circulation after preterm birth.
Objective To investigate risk factors for developing late PH using defined echocardiographic criteria in preterm infants with BPD.
Design/Methods We performed a retrospective case control study of preterm infants admitted to our level IV referral NICU of a free-standing children's hospital in an urban area of Philadelphia over the period of 2013-14. We included 113 preterm infants, who fit the NIH consensus definition for BPD at 36 weeks postmenstrual age. Twenty-four out of 113 infants (21.2%) were diagnosed with late PH (PH diagnosed >28 day of life). We compared prenatal and postnatal characteristics between infants with or without BPD-associated late PH. Descriptive statistics, univariable, and multivariable models were evaluated, and results reported as odds ratios (OR) with 95% confidence intervals (CI).
Results Lower gestational age, birth weights, duration of conventional or high frequency mechanical ventilation, nasal intermittent positive pressure ventilation, nasal cannula, and length of stay were significant risk factors (all p <0.05) found to be associated with the development of BPD-associated late PH. On logistic regression analysis, the presence of tracheitis (3.0, 1.06- 8.41), tracheostomy

(8.56, 1.98- 37.04) and systemic steroid use for BPD (3.87,1.36- 11.01) increased the odds of late PH, when controlled for gestational age and gender.
Conclusion(s) Several early clinical variables are predictive of the development of late PH in infants with BPD. In our study cohort, we identified tracheitis, tracheostomy and systemic steroid use for BPD as additional novel risk factors. Prospective studies are needed to transform these risk factors into a risk-based scoring system.

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Abstract: 24

Early Vitamin C levels in the Preterm Infant and Infection Risk

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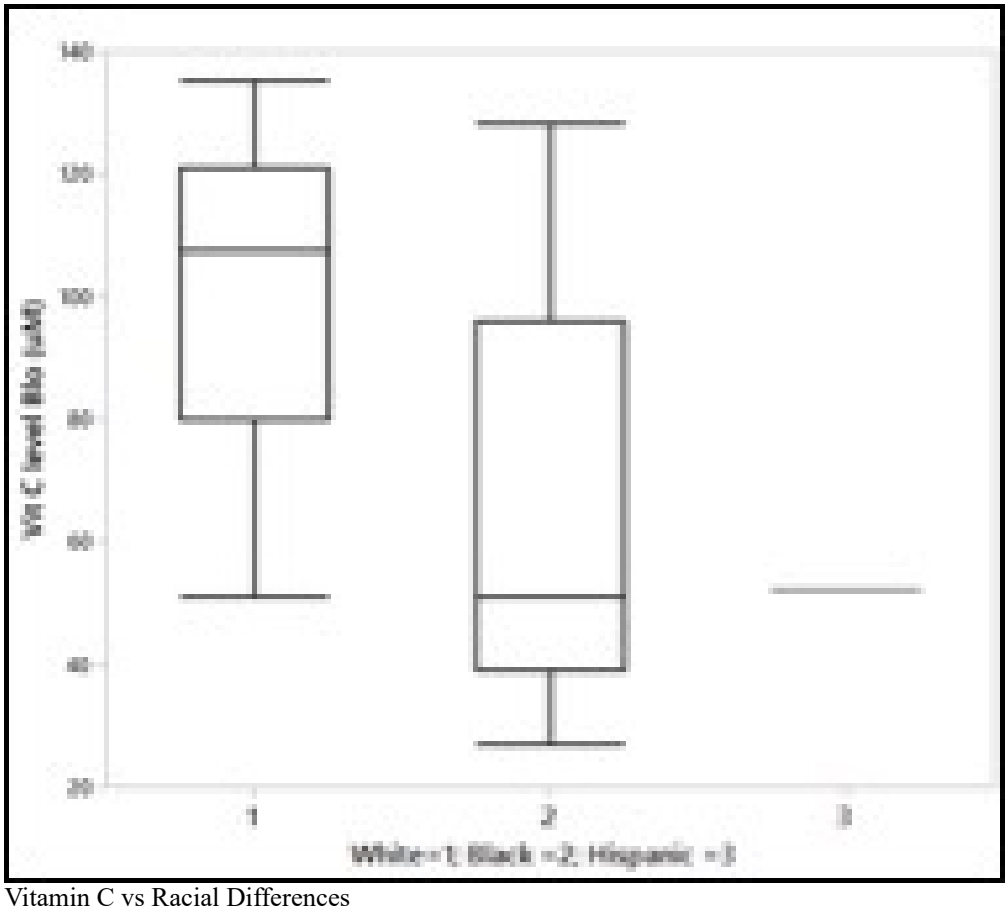
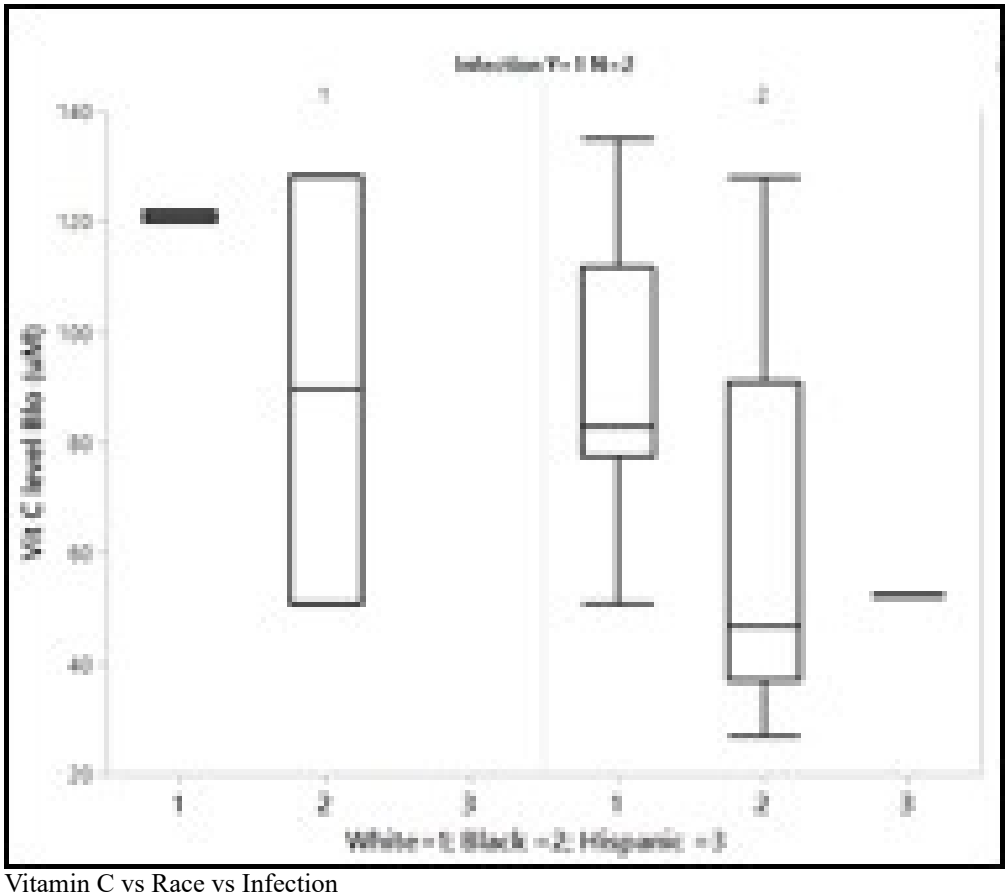
[2]Pulmonary Disease and Critical Care Medicine, Virginia Commonwealth University School of Medicine, Richmond, Virginia, United States

Background Early-onset and late onset sepsis in the United States is highest among preterm and low birth weight infants. Nutritional deficiencies are known to play a significant role in infection risk. Vitamin C (Ascorbic acid) is a well-known antioxidant, anti-inflammatory regulator, and immune response enhancer. Early Vitamin C in the preterm neonate is dependent on adequate maternal vitamin C levels, through placental and human milk transfer, and NICU enteral and parenteral therapy. Parenteral vitamin C has recently been associated with improved clinical outcomes in adults with respiratory failure from pneumonia or sepsis by attenuating the pro inflammatory state and modulating macrophage function. We hypothesized that early low Vitamin C levels would be associated with greater infection risk and mortality.
Objective To determine early plasma vitamin C levels in preterm infants during the first week of life with later infection risk and mortality
Design/Methods The study was approved by the IRB of VCU School of Medicine. Maternal consent was obtained to enroll infants in the study. Cord blood and plasma samples were analyzed from infants ≤34 weeks (wks) gestational age (GA) on 1st week of life. Infant demographics and medical conditions were tracked including infections, morbidities and mortality. Vitamin C levels were determined using a multi-function monochromator fluorescent plate reader. Statistical analysis was performed using JMP software. A probability $p< 0.05$ was considered statistically significant.
Results Twenty-three patients were included in the analysis, with mean GA 27wks ±SD (range 23 to 34). One infant expired. Vitamin C levels during the first week of life ranged from 25 umol to 125 umol, Vitamin C levels were significantly different by racial category but not by gender, Figure 1. Early Vitamin C levels in surviving Infants were increased in those who later developed infection compared to infants who did not develop infection, Figure 2.
Conclusion(s) Vitamin C levels were significantly lower in Black and Hispanic infants. Higher levels of Vitamin C earlier in life trended towards greater risk for later infection risk. Further research is needed to assess the early role of Vitamin C, racial background and later risk of infection, morbidities and death in the preterm population.



Vitamin C vs Racial Differences



Vitamin C vs Race vs Infection

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Abstract: 25

Lenticulostriate Vasculopathy in Neonates- A Single Center Experience

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Background Lenticulostriate vasculopathy (LSV) refers to the increased echogenic streaking in the arteries of the basal ganglia and thalamus on cranial ultrasonogram. It incidence varies between 0.4-5.8 % of neonates who had a cranial ultrasonography. Its association has been reported with various conditions including congenital infections, chromosomal anomalies, intrauterine hypoxia, twin to twin transfusion etc. Cytomegalovirus (CMV) infection in particular has been reported to have a strong association. However, there is inconsistent and sparse literature on the etiologies resulting in LSV.

Objective To evaluate the association between LSV and known risk factors in neonatal population.

Design/Methods This is a retrospective study where data was obtained on infants diagnosed to have LSV on cranial ultrasonograms.between 1/1/2015 and 12/31/2017. Data on gender, IUGR status, multiple gestation, metabolic acidosis at birth, chorioamnionitis, pre-eclampsia, maternal magnesium therapy, maternal prenatal labs, group B streptococcus status was obtained to investigate their association with LSV. Evaluation for toxoplasmosis, cytomegalovirus infections and the outcomes of infants were also studied.

Results 31 infants were identified to have LSV during the study period. There was no significant association with any of the maternal risk factors studied. 16 infants had testing for CMV out of which 2 (12.5%) were found to have congenital cytomegalovirus infection. Of the two, one patient was diagnosed with CMV based solely on the abnormal ultrasonogram findings. Other associations in our study included Pitt Hopkins syndrome, Septo-optic dysplasia, Dandy-walker malformation, ventricular cyst, twin to twin transfusion syndrome.

Conclusion(s) In an experience from a single tertiary level NICU, LSV was found to have an association with structural brain anomalies, inborn errors of metabolism, chromosomal anomalies and seizure disorders. CMV infection has a correlation with LSV and its testing must be considered in all infants with LSV, especially since it is a relatively inexpensive test with potential benefit. Further large scale studies are required to understand the clinical importance of this finding and long term outcomes of infants with LSV on cranial ultrasonograms.

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Abstract: 26

Partnering with Art Educators to Develop an Asthma Educational Video

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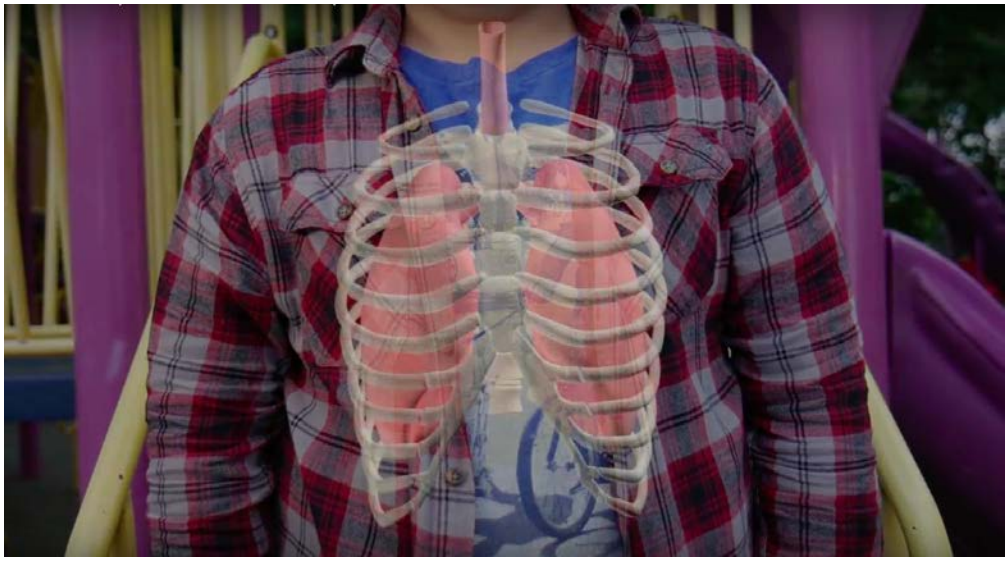
Background Patient-centered education enhances outcomes in pediatric patients with asthma. Multi-modal educational materials demonstrate improvements in provider-patient communication and patient comprehension. Multimedia is an underutilized modality in patient education and often restricted by time and cost associated with the development and production of content. This project produced an asthma educational video free of cost in collaboration with a local art school.

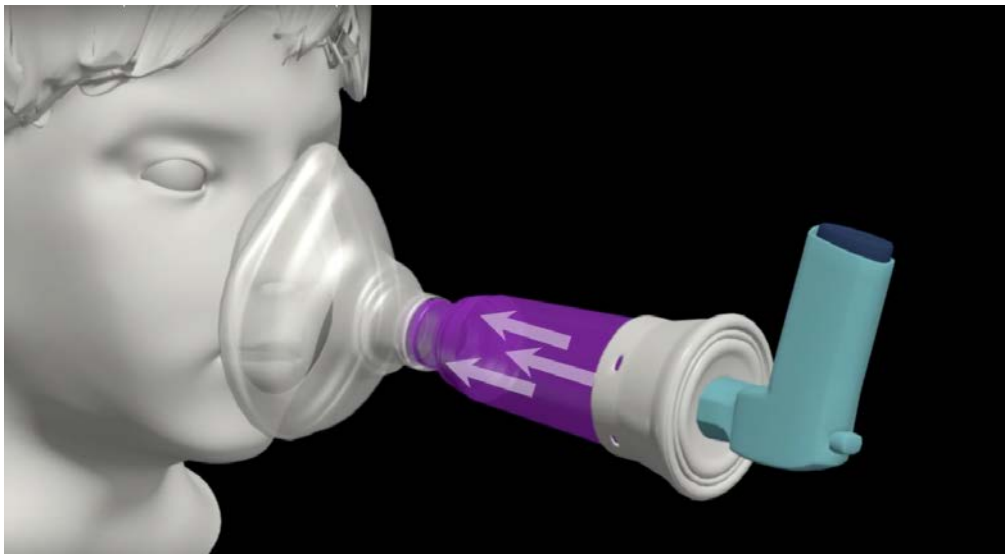
Objective Describe an innovative and cost-effective process for creating an asthma educational video by establishing a community partnership.

Design/Methods The project utilized 3 stages in generating a finished video product: 1. Identification of a community partner with expertise in video production, 2. Development and peer-reviewed revision of the medical content of the video, and 3. Partner collaboration through production and video editing. College-level institutions focused on digital media production were identified through web-based searches. The existing curriculum requirements of one local art school aligned with the research project goals, allowing for the formation of a partnership. The video script was drafted by the medical team and focused on delivering asthma education, highlighting the disease process, symptoms of an exacerbation, medication use with proper spacer technique, and indicators for seeking medical care. Initial versions of the script were vetted through a series of cognitive interviews with experienced faculty mentors. An online tool was used to verify that the content utilized plain language. The script served as the foundation for a creative vision, inspired by the physicians' medical knowledge combined with the students' artistic skills. The finalized script was reviewed with the community partnership who was then responsible for recruitment of unpaid actors, videography, and integration of 2D and 3D animations. A series of collaborative meetings throughout the editing process resulted in a high-quality asthma educational video.

Results The final video was presented to several families in clinic and received with great satisfaction. Parents stated it was easy to understand and covered the basics of asthma, serving as an excellent reference for newly diagnosed asthmatics.

Conclusion(s) The utilization of community partners can generate educational videos at no cost to the home institution. This video will be used as part of a multimodal educational intervention to improve asthma control in economically disadvantaged pediatric patients.





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Abstract: 27

Who's counting? Assessing the effects of a simulation-based training intervention on neonatal heart rate auscultation accuracy.

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Background Heart rate (HR) assessment is a vital component in the neonatal resuscitation (NR) algorithm. Research has consistently found auscultation to be an inaccurate means of assessing neonatal HR and thus may lead to incorrect resuscitation interventions. Current Neonatal Resuscitation Program (NRP) recommendations include auscultation for initial HR determination. Whether HR assessment via auscultation during NR can be improved with HR-specific training remains unknown.

Objective The purpose of this study is to determine if simulation-based medical education (SBME) can improve pediatric residents' ability to accurately assess neonatal HRs via auscultation. We hypothesize that a single simulation-based training intervention will improve residents' ability to assess neonatal HRs.

Design/Methods The study population includes all pediatric residents at our institution during the study time period. Primary outcomes include HR accuracy and NRP group accuracy, defined as resident ability to assess HR consistent with NRP defined decision-making criteria groups (< 60, 60-99, or ≥ 100 bpm). Pre-intervention assessment: residents estimated 15 HRs on a high fidelity neonatal manikin operated by trained simulation operators. Intervention: residents received a 20-minute, standardized training intervention consisting of didactic review for neonatal HR assessment and simulation skill practice for auscultating HRs on high fidelity manikins. Post-intervention assessment: one month post training, residents repeated the pre-intervention assessment.

Results HR estimates from 21 pediatric residents showed improved overall HR accuracy from 53.6% to 78.7% ($p < 0.0001$). These results remained significant when controlling for post-graduate year and recent delivery room exposure. Residents were least accurate

when estimating HR ≥ 100 bpm. Overall NRP group accuracy also improved from 68.3% to 80% (p=0.0002). Subgroup analysis revealed group accuracy increased significantly in HR 60-99 bpm (p=0.001), HR ≥ 100 bpm (p=0.0006), but not in HR < 60 bpm (p=0.56). Group accuracy was lowest when identifying HR < 60 bpm (67%). Residents were more likely to overestimate low HR and underestimate high HR.
Conclusion(s) HR SBME significantly improved residents' HR estimation and NRP group accuracy. Providers participating in NRP may benefit by receiving HR skills assessment-focused training during NRP certification. Improving providers' HR accuracy may lead to more effective NR.

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Abstract: 28

Pediatric Resident Burnout: Impact of Debriefing

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Background Burnout is recognized as a pervasive problem in residency. One possible approach to avoid burnout is to debrief after critical incidents in patient care.
Objective
Design/Methods This study is an assessment of residents' burnout and experience with debriefing critical incidents in a mid-size pediatric residency program. The Maslach Burnout Inventory was administered to pediatric interns and residents at the end of the academic year. Concurrently, the same instrument was administered to the incoming intern class during orientation. The Maslach is scored in three domains: emotional exhaustion, depersonalization, and personal accomplishment. An average score in each domain was generated for each participant. All residents also were surveyed about their experience and comfort with debriefing after critical incidents.
Results 20 interns and residents (33% response rate) and 23 orientees (100% response rate) completed the surveys. A significant difference in burnout was found between orientees and those in training, with the average score on a 6-point scale for emotional exhaustion (EE) of 1.7 vs. 3.3, depersonalization (DP) of 1.2 vs. 2.7, and sense of personal accomplishment (PA) of 5.1 vs. 4.4, respectively. A trend towards higher levels of emotional exhaustion and depersonalization were noted in junior residents vs. interns and senior residents, although not statistically significant. 37% of residents reported sometimes or most times debriefing after critical incidents, with the remaining 73% reporting rarely or never debriefing. Residents who had more frequently participated in debriefings had significantly higher levels of burnout (EE: 3.9 Most Times vs. 2.1 Rarely, DP: 3.5 Most Times vs. 1.5 Rarely). Further, burnout was not diminished even in those residents who placed a high value on debriefing.
Conclusion(s) The pediatric residents in this study experienced a high degree of burnout, increased from a pre-residency baseline, with some improvement at the end of residency but no return to baseline. Surprisingly, burnout symptoms of emotional exhaustion and depersonalization were actually higher in individuals who more frequently participated in debriefing after critical incidents. Further clarification of the relationship of debriefing to burnout symptoms in pediatric residents should be undertaken.

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Abstract: 29

Relationship Between ADHD and Suicidal Behavior

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Background Suicide in the United States has surged to the highest levels in nearly 30 years, From 1999 through 2015, 1,309 children ages 5 to 12 took their own lives in the United States.
The American Psychiatric Association states in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5, 2013) that 5% of children have ADHD. However, other studies in the US have estimated higher rates in community samples.
The association between ADHD and suicide has been studied in the past. It has been stablished that all subtypes of ADHD in young children robustly predict adolescent depression and/or suicide attempts 5 to 13 years later. A recent study found that among young children who committed suicide, ADHD was a more common mental health diagnosis than depression.
Knowing of the growing interest in this topic over the last couple of years, we found it useful to conduct an study in our predominantly Black and Latino population.
Objective To examine the relationship between ADHD and suicide in a population of inner city children.
Design/Methods Retrospective chart review of patients seen in the pediatric ED for suicidal attempt or ideation from 2010 – 2015 at a university-affiliated community health system. Data was analyzed using bivariate and multivariate methods.
Results 197 charts reviewed, with a mean age of 14.04 (±3.14). 67% were females(,took out males,) 60% Hispanic and 36% African Americans. 76% presented to pediatric ER for suicidal ideation, the rest (24%) had attempted suicide. The majority lived with their biological family (85%), 8% were in the foster care system and 4% reported to be living in a shelter. Most of the patients stated family difficulties (40%) as the reason for their suicidal behavior followed by problems at school (27%) - from this group 11.5% specifically reported school bullying - followed by sexual abuse (7%). 42% had added psychiatric disorders other than ADHD; depression followed by disruptive behavior were the most common. 32% of the patients required subsequent psychiatry admission. 19.3% had previous diagnosis of ADHD with a mean age of 11.8 (± 3.1), most of them males (55%). We found no association between suicide behavior and ADHD controlled by age and gender.

Conclusion(s) In a predominantly Black and Latino population, ADHD is not associated with increased suicidal behavior. Future studies should examine this relationship using a prospective evaluation.

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Abstract: 30

Training Video Effects on Pediatric Resuscitation Team Performance Using a Validated Assessment Tool

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Background Simulation Based Medical Education (SBME) has been shown to improve technical and nontechnical skills and provide more training opportunities to pediatric providers for high-stakes, low-frequency events. To date, no studies evaluate changes in team performance after observing an educational video to demonstrate optimal patient management as outlined by Pediatric Advanced Life Support guidelines from the American Heart Association.
Objective We aimed to determine whether the implementation of a training video for simulated pediatric cardiac arrest would affect team performance as measured by a modified, validated Tool for Resuscitation Assessment Using Computerized Simulation (TRACS).
Design/Methods Simulations conducted in a high-fidelity simulation suite at a university teaching hospital between July 2014 and June 2017 were scored with the modified TRACS. Team credentials (resident or nurses) and total participants were recorded for each session. Training video intervention for pediatric residents began in October 2015. Thirty pre- and 21 post-training video sessions were tabulated. TRACS domains were: Basics (B), Airway and Breathing (AB), Circulation and Rhythm (CR) and Competency and Behavior (CB). Each TRACS item was scored by one trained technician.
Results Total TRACS scores (and domain sub-scores) pre-and post-viewing of the instructional video were compared using t-tests, repeated measures Analysis of Covariance, and Chi-Square tests. A p-value of <0.05 was considered statistically significant. The mean scores increased in the AB, CR and CB categories, but none were statistically significant. Controlling for presence of residents and nursing indicated a significant group improvement in the AB domain ($p = 0.019$). Domain (CB) sub-score analysis showed a significant improvement in “feedback communication demonstrated” post-intervention ($p = 0.011$).
Conclusion(s) While mean scores improved in three domains, there was no significant change in overall team performance after training video implementation. Still, itemized analysis showed areas of significant improvement. Limitations of the study include sample size and unknown number of video views by participants. The study demonstrated areas of performance needing improvement; using the modified TRACS tool may be a feasible method to assess team performance and identify areas to improve upon in pediatric SBME.

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Abstract: 31

Effect of 24/7 attending coverage in the Neonatal Intensive Care Unit on fellow autonomy and education

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Background There is a current change in type of attending coverage in the neonatal intensive care units (NICU) across the United States where more programs are transitioning from home coverage to 24/7 in house (IH) coverage. This change in practice has been implemented to enhance patient safety by providing continuous experienced advice and immediate help in emergent situations. Concerns have been raised that this change might affect fellows’ education negatively, by decreasing their autonomy to make decisions. Effects on education of NICU fellows have not been studied.
Objective The objectives of this study are to evaluate the fellows’ perception of in house attending coverage on their education and to assess the effect of in house attending coverage on fellow’s autonomy of decision-making.
Design/Methods A secure, anonymous, web-based survey using RedCap, comprising 14 questions, was sent via the section of Neonatal Perinatal Medicine of the American Academy of Pediatrics, to all members of Training & Early Career Neonatologists (TECaN). Pearson chi-square test was used for statistical purposes, $p < 0.05$ was considered statistically significant.
Results We report 123 surveys that included responses from 82 fellows & 41 early career neonatologists that graduated within the past 5 years. 52% reported having 24/7 attending IH coverage. 24.4% (30/123) respondents experienced a change in model of attending coverage during their fellowship training. Of them, 26.6 % preferred having the model of attending IH coverage. Among all respondents, 35.8% agreed that IH attending coverage improved fellow education. The respondents currently working in IH models, when compared to those in non-IH coverage models felt more likely that IH attending coverage improved patient care and fellow education (($p=0.02$, $p <0.05$, respectively) but that it was less likely to give fellows autonomy for decision making ($p=0.02$). Throughout all coverage models, 69.1% of respondents acknowledged not having guidelines, on when to call attending with patient status changes.
Conclusion(s) At this point, the majority of fellows & early career neonatologists do not perceive that the attending IH model improves fellow education. It decreases fellows’ autonomy for decision-making and may result in them not feeling prepared for independent practice. Institutions practicing or considering IH attending coverage should implement adequate measures to balance teaching, supervision, and autonomy of their fellows.

Fellows' perception of IH attending coverage model

Question	Most frequent answers (respondents could choose multiple answers)
Most important reason for switching to IH model	- Patient safety (37/123, 30.1%) - Possible emergency situation that requires additional help (37/123, 30.1%)
In IH model, how does the program encourage fellows' autonomy	- Fellows encouraged to act independently/make a plan prior to consulting attending (79/123, 64.2%) - Nurses encouraged to call fellow first (68/123, 55.3%)
Factor influencing fellows' autonomy for decision making	- Attendings' preference (103/123, 83.7%) - Fellows' experience (98/123, 79.7%)

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Abstract: 32

Evaluations of Objective Structured Clinical Examinations: Who Knows Best? An Analysis of Faculty Assessment vs. Self, Peers, and Standardized Patient

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Background We developed a 4-station formative OSCE for senior medical students on advanced communication skills topics. The purpose of this study was to evaluate the concordance of assessment based on four information streams: student self-evaluation, same-level peer observer, standardized patient (SP), and faculty.

Objective

Design/Methods Graduating medical students rotated through OSCE stations in groups of three, participating in three of four stations: palliative care, goals of care, medical error, and difficult patient encounter. Didactics on these topics and on giving and receiving feedback preceded the OSCE. Interviewing students received peer feedback based on a task-specific checklist (TSC) designed by faculty-experts and a modified Master Interview Rating Scale (MIRS). After each interview, the interviewing student and SP completed a TSC, and the observing students completed a TSC and MIRS. Encounters were videotaped and later reviewed by two faculty trained to use the TSC and MIRS. Both reviewed 25% of the videos to ensure agreement. The remaining 75% of encounters were divided randomly and evaluated by one faculty member. TSC were scored as a percentage of possible points, and MIRS as a mean score. Intra-class correlation coefficients (ICC) were used to compare interrater agreement, with faculty score as the gold standard.

Results Based on videotaping capacity, 45 (49%) students participated. Scores on TSC were similar among different raters with ICC showing substantial agreement between faculty and self-evaluations (0.712) and among peers (0.735), and moderate agreement between faculty and peer (0.553) and SP (0.470) evaluators, all of which were statistically significant. Average scores on the 5-point MIRS were 4.2 by faculty and 4.7 by peers, with ICC showing statistically significant substantial agreement among peers (0.670) but no significance with fair agreement between faculty and peers (0.245).

Conclusion(s) Self, same-level peer, and SP-assessment on OSCE performance task completion resembled that of trained faculty assessment. Agreement on the MIRS between untrained peers and faculty was not significant, but on a practical level, the comparable raw scores may allow for actionable and reasonably accurate peer-assessment for purposes of formative feedback. Thus, a combination of self, peer, and SP-assessment may be a useful alternative to faculty assessment for a formative OSCE on advanced communication skills for senior medical students.

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Abstract: 33

Uncovering the Hidden Impact of Neonatology Boot Camp

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Background Many residency and fellowship programs have developed simulation-based boot camps to help trainees learn and practice critical skill domains associated with new roles and responsibilities. A recent meta-analysis showed improvements in clinical skill performance, knowledge, and learner confidence after participation in boot camps (Blackmore 2014). However, the individual studies do not explore how participation in boot camp led to these outcomes or other potential impacts boot camp may have on learners. Our study sought to understand how the experience of boot camp impacts new fellows using qualitative research methodology.

Objective

Design/Methods Semi-structured phone interviews were conducted with first-year neonatology fellows after they attended the Regional Neonatology Boot Camp. Interview questions focused on the fellows' experience of boot camp and effect on transition into fellowship. Interviews were thematically analyzed according to standard methods of qualitative research and were conducted until

thematic saturation was reached.
Results We interviewed 11 fellows, representing 7 fellowship programs. Analysis yielded 47 codes that were refined into 5 themes: 1. Acquisition of skills ("I had to needle a chest and I remembered doing it at boot camp"), 2. Boot camp as a shared experience ("We know everyone's in the same boat"), 3. Gaining understanding of the fellow role ("Boot camp helped you realize that now it's you, you should be running that scenario"), 4. Building confidence ("It made me feel more confident, by the end of boot camp I was like ok, I know this"), and 5. Gaining insight into personal attributes ("It was a good opportunity to get an idea of what is and is not comfortable for me and where that comfort zone lies"). Elements of boot camp reported to lead to desirable outcomes included its safe environment and supportive faculty.
Conclusion(s) This study explores the impact of boot camp on fellows' transition into fellowship. Our findings suggest that participation in boot camp is instrumental in facilitating fellows' professional identity formation by allowing them to explore their new roles, engage with others, and build their confidence. Developing a strong professional identity prior to entering clinical work is a crucial step in transitioning into fellowship. This has an important impact on fellows' social, emotional, and cognitive well-being during training (Tahim 2015). Curriculum design for simulation-based boot camps for trainees should incorporate elements that facilitate the process of professional identity formation.

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Abstract: 34

Delivering the Right Evidence at the Right Time for the Right Patient:
An Intervention to Increase Use of Evidence-Based Medicine

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Background Practicing evidence-based medicine (EBM) is essential to providing quality care. It requires various skills including seeking, appraising, and applying the highest quality evidence while considering clinical expertise and patient values. These skills are not easily mastered. Trainees and practicing physicians struggle to apply EBM principles daily. Lack of time, difficulty accessing proper resources, and formulating clinical questions are commonly cited obstacles to implementing EBM.
Objective To investigate if a web-based app designed to provide easily accessible evidence-based content increases real-time use of EBM by pediatric residents
Design/Methods A web-based app was designed to provide quick access to a library of EBM materials. Content was created by residents at a mid-sized pediatric residency and approved by faculty. A prospective, non-blinded, randomized control, crossover study was conducted to evaluate how this app influenced resident use of EBM. The primary endpoint was number of literature searches per resident per day. Secondary endpoints included time of day, average time spent, and resources used for literature searches. Demographics and confidence in EBM skills were collected in pre-post surveys, and number of literature searches was collected via biweekly surveys. App usage, including times of day it was accessed, was monitored.
Results The study enrolled 21 pediatric residents at a single institution during month-long hospital medicine rotations. The average number of literature searches performed per day in the control and intervention arms were 1.38 +/-1.06 and 1.03 +/- 0.71 ($t = -1.46$, $p = 0.16$). Based on usage, the app was most utilized during pre-rounding, early afternoon, and nighttime patient handoff. Lack of time was a common reason not to seek evidence in both controls (18%) and intervention (24%) arms. When comparing pre-post survey data, overall use of primary evidence and understanding of clinically appraised topics increased ($p = 0.04$, $p = 0.21$, respectively).
Conclusion(s) Accounting for small sample size, providing a web-based app to pediatric residents did not increase EBM usage. However, the introduction of the app was associated with increased EBM utilization and understanding in both the control and intervention compared to baseline. Data revealed that residents most utilized evidence during critical decision-making time periods. Our future investigations are to expand app content to be more comprehensive and study a larger sample size.

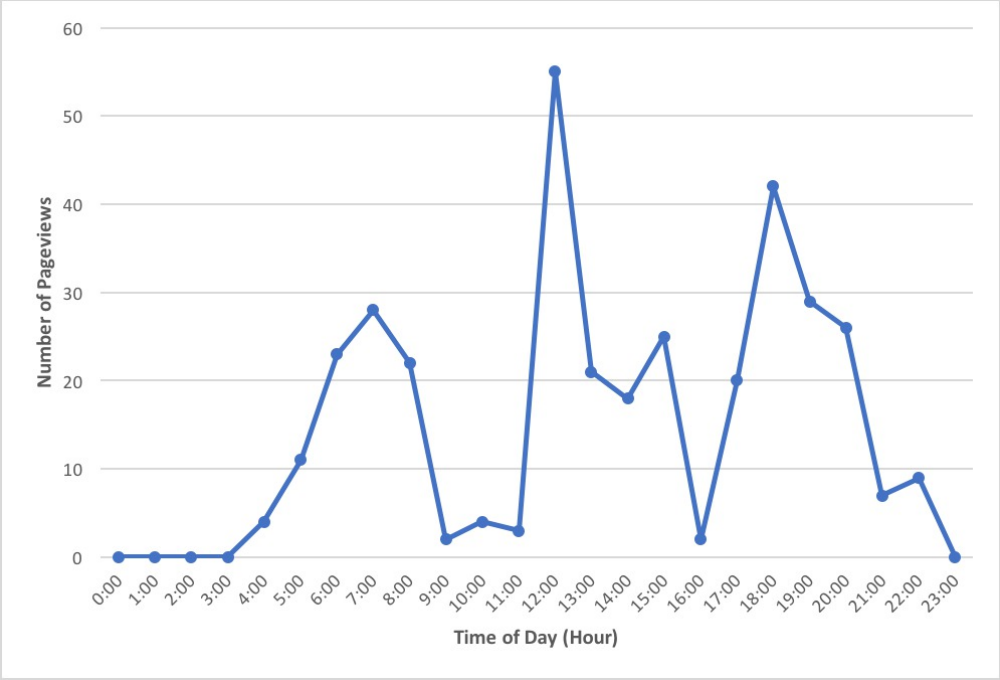

Figure 1. Cumulative Web-App Usage by Time of Day. The x-axis shows the time of day and y-axis illustrates number of times the web-app was accessed during the study period. Resident work flow consists of the following: pre-rounding and morning patient handoff from 6-8am, rounding from 8:30 -11:30am, and nighttime patient handoff from 5-6pm. The app was most utilized during pre-rounds, early afternoon patient care time, and nighttime patient handoff.

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Abstract: 35

Pediatric Resident Procedural Experience in the Contemporary Training Environment

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Background A national survey on the procedure experience of neonatal-perinatal fellows in 2016 demonstrated more limited procedural experience compared with fellows in previous eras. Recent changes in the training environment have highlighted concerns that pediatric residents may also have limited opportunities to gain proficiency in certain critical procedures.

Objective Describe procedural experience of pediatric residents at a single urban tertiary care academic center.

Design/Methods An anonymous survey was emailed to current pediatric residents at Yale-New Haven Children's Hospital, as well as recent graduates (response rate =57%, n= 37) to determine procedural experience. Resident perception of their procedure experience during residency was also explored.

Results Of the respondents, 38% (13) were recent graduates, 29% (10) were 3rd year residents and 27% (9) were second year residents. The majority (73%) plan to apply for subspecialty fellowship training. Residents at advanced levels of training were more likely to have completed more procedures. The most commonly performed procedures were lumbar puncture (average 10.9/ resident) and simple laceration repair (average 9.3/ resident). The most infrequently performed procedures were bladder catheterizations (average 0.4/ resident; 21/37 had never performed the procedure) and neonatal endotracheal intubation (average 0.7/ resident; 14/37 had never performed the procedure). Many residents were unaware that they were required to record immunization administration and splinting of fractures. Most procedural experiences were reported in the emergency department (57%).

There were several concerns raised about the consistency and accuracy of procedural logs, with 19% reporting recording only successful attempts and only 9% reporting that their procedural log was completely updated. The majority of residents did not feel they had sufficient procedural experience at their current level of training (71%, 19/37), and 92% indicated that they would prefer to have additional procedural experience, specifically with intubation (24%) and peripheral IV placement (30%). The most common suggestions to improve exposure were a dedicated procedural elective (59%) and simulation (43%).

Conclusion(s) Resident procedure experience increases significantly throughout training. Additional strategies, such as enhanced use of simulation and dedicated procedural electives, may be utilized to improve exposure to particular procedures such as bladder catheterization and endotracheal intubation.

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Abstract: 36

Development and piloting of a multi-disciplinary refugee health education program

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Background More than 800 refugees settle in Connecticut annually, and of those, approximately one-half of them are resettled by the non-profit refugee resettlement agency in New Haven, CT, Integrated Refugee and Immigrant Services (IRIS).
Objective A refugee health program was developed and piloted with the goal of delivering evidence based, multidisciplinary, culturally-sensitive health education for new refugees resettling in New Haven.
Design/Methods Health care providers associated with Yale-New Haven Hospital across various disciplines including attendings and residents in medicine and pediatrics, dietitians, lactation consultants, and medical students worked together to develop curriculum on eight healthcare topics: breastfeeding, nutrition, smoking cessation, maternal health, mental health, miscarriage, pediatric health, and health systems navigation. Each class was delivered during a two-hour long session on-site at IRIS. Interpreters were present in order to translate course content. Live demonstrations and durable materials were provided when relevant as visual learning opportunities.
Results Each class was attended by between 6 and 40 Pashto, Arabic, and Swahili speaking participants. Participants were actively engaged, sharing their cultural understanding of topics and asking many questions. Verbal feedback on course satisfaction was obtained with overall positive comments, particularly towards live demonstrations.
Conclusion(s) The development of an evidence-based, discussion-oriented curriculum by a multi-disciplinary healthcare team can provide timely, culturally sensitive health information to newly settled refugees. Lessons learned from initial pilot classes included using less medical jargon, allowing more open-ended time for questions, and allowing for sufficient time for translation of durable materials into the languages spoken by attendees. Further evaluation using attendee surveys are necessary to objectively measure course satisfaction and impact on health knowledge. Overall, close partnership of a multi-disciplinary healthcare team with local refugee resettlement agencies has the potential to greatly improve healthcare education among newly resettled refugees, with the ultimate goal of improving individual health outcomes and overall community health.

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Abstract: 37

Establishing an Education Plan for Families and Staff Caring for Infants with Severe Bronchopulmonary Dysplasia

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Background Bronchopulmonary Dysplasia(BPD) is an important cause of morbidity and mortality in preterm infants. Caring for infants with severe BPD (sBPD) is extremely challenging given the chronicity and multi-system involvement of the disease, and lack of effective treatment.
The Newborn and Infant Chronic Lung Disease Program at the Children’s Hospital of Philadelphia is a NICU based program focusing on the care of infants with sBPD.
Having cared for over 400 infants with sBPD, we have found communication and education is the key to improve care coordination and successfully relieving stress and anxiety of our parents as well as the clinical staff.
Objective
Design/Methods To describe our approach and challenges in improving communication and education for parents and staff caring for infants with sBPD
Results We identified family education needs would include an initial communication (basic understanding of CLD, their infant's disease status and our hospital policies/resources), followed by continued communication regarding progress and potential outcome. To address these needs, our team assembled a parent admission packet with a social work resource tool. This packet provides detail background information about BPD and commonly used diagnostic method and treatments. Initial family meetings and follow up meetings will then take place at preset intervals. Challenges for these meetings included parental work schedule, parental expectations, and level of understanding.

To carry out education for our multidisciplinary team was a bit more challenging. Challenges identified included willingness to participate, various levels of understanding and time constraints. However, we were able to establish good team communication and ongoing team education through weekly rounds, targeted nursing education, unit wide nursing CLD education modules, CLD education during orientation and through monthly lecture/case study series for front line clinicians and fellows.

With year-round education efforts and improved communication, both parents and our team member report better understanding of the disease process and more consistency in care approach.
Conclusion(s) Organized communication and education plans are beneficial for both the parents and our multidisciplinary team members, and help improve the quality of care in infants with sBPD.

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Abstract: 38

Risk Stratification System for Use in the Epilepsy Monitoring Unit (EMU) and Correlation with Adverse Events During Hospital Admissions

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Background Video EEG monitors children undergoing epilepsy evaluation during intentionally provoked seizures through electrographic and video recording and is used to characterize epileptic events. This is often done in an Epilepsy Monitoring Unit (EMU). Safety in EMUs is of concern, as patients are at risk for developing convulsions, prolonged seizures, and other risks. Presently, no standard guidelines exist for risk assessment prior to admission. Stratification of children based on risk level of their underlying epilepsy may have utility in directing appropriate activities, staff ratio, and treatment to minimize patient risks.
Objective To evaluate the association between the risk level stratification system implemented at Connecticut Children's Medical Center and adverse events in the pediatric EMU.
Design/Methods A retrospective chart review was done for 300 children who were admitted to a Pediatric EMU between 2011 and December 2016 for video EEG monitoring. All ages were eligible, and children with less than 12-hour stays or missing essential information were excluded. Adverse event data and pertinent health information were recorded for each subject. Risk classification levels were defined as: (1) patients with low risk for convulsions, fall risk, or other safety concerns, (2) patients with increase in frequency of seizures, history of convulsions or status epilepticus, or other respiratory or safety concerns, (3) pre-surgical evaluation, including medication reduction, for seizure localization, and (4) intracranial electrode placement for seizure localization. Data was analyzed using descriptive statistics.
Results 300 children were included in this study: 52% female, 61% Caucasian, 24% Hispanic, 9% African American, and 6% other. Mean age was 8.9 years (SD=5.5). 208 (69%) patients were admitted with risk level 1, 69 (23%) level 2, 20 (7%) level 3, and 3 (1%) level 4. In total, 2 adverse events (AE) were recorded: temporary blindness during seizure and extensive psychogenic event associated with medication manipulation.
Conclusion(s) The current risk levels appear accurate for identifying patients at the highest risk for adverse events, as all adverse events were confined to the highest risk level. These levels may be used to develop a risk stratification scoring system. More intensive staffing may be needed for children with a higher risk stratification score. Results from this study may aid other EMUs in improving care provided while minimizing patient risk.

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Abstract: 39

Variation and Impact of Very Low Birth Weight, Neuro-Centric Care Practices Across California Neonatal Intensive Care Units

Sara Handley[1], Molly Passarella[1], Scott A. Lorch[1], Henry Lee[2]

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Background Neonatal intensive care unit (NICU) outcome variation has been well described in the literature. However, there are limited data regarding variation in unit level care practices and the impact of practices on patient outcomes.
Objective Describe the adoption of very low birth weight (VLBW), neuro-centric care practices and evaluate the association between practices and severe (grade 3 or 4) intraventricular hemorrhage (IVH).
Design/Methods Retrospective cohort of infants delivering at hospitals participating in the California Perinatal Quality Care Collaborative (CPQCC), N=135, linked to a prospective survey of neuro-centric practices at California NICUs, N=148. Analysis of practice variation included description of time trends, univariate analyses by NICU California Children's Services (CCS) level, and latent class analysis to assess for practice domains. Associations between practices and practice domains and the quartiles of severe IVH rate after adjustment by patient characteristics, delivery characteristics, birth year and hospital of birth were evaluated.
Results 64% (N=95) of units completed the survey. Respondent and non-respondent NICU characteristics were not signficiantly different. There was marked variation in practice adoption (Figure 1). Adoption of delayed cord clamping had the most dramatic change over time with a 78-fold increase, follwed by a 5-fold increase in non-delivery room (DR) premedication for intubation. The use of premedication for intubation and an algorithm for patent ductus arteriosus management differed by CCS level (Table 1). Latent class analysis identified two domains-adoption of any VLBW protocols and adoption of VLBW DR protocols. The quartile of hospitals with the lowest adjusted rate of severe IVH (median 1.7%, range 0%-2.7%), adopted fewer VLBW DR protocols and had a trend towards more prophylactic indomethacin use. Among community and regional units, those in the lowest quartile (median 2.2%, range 0%-2.7%) were not the highest volume units and had fewer VLBW, neuro-centric quality improvment initiatives (Table 2).
Conclusion(s) There is marked variation in the adoption of VLBW, neuro-centric NICU care practices across California, which has changed over time. Units with the lowest adjusted rates of IVH did not necessarily have the most robust VLBW, neuro-centric practices. This may be due to units in higher quartiles working to adopt relevant practices or may suggest it is not quantity but quality of implementation impacting IVH outcomes.

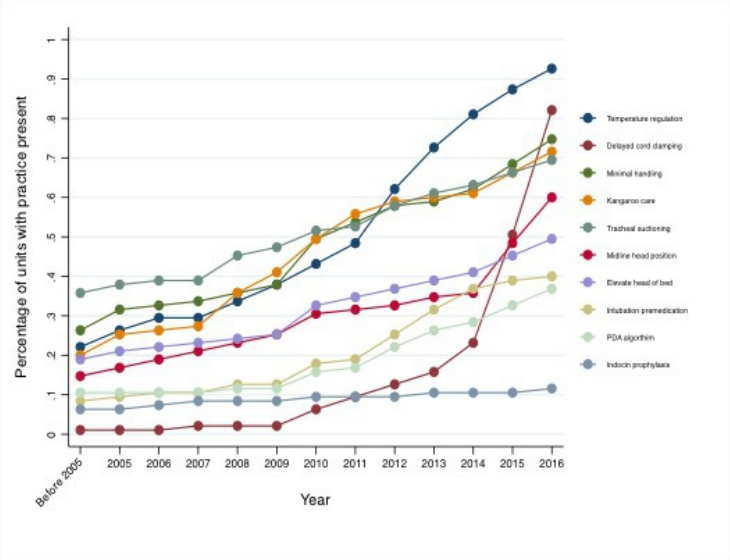

Figure 1. Adoption of VLBW, Neuro-Centric Practices Across California

Adoption of Practices by CCS Level

	Total	Non-CCS/CPQCC	Intermediate	Community	Regional	P-value
All NICUs	148	28	15	82	23	
Survey respondents	95 (64%)	19 (67.9%)	7 (46.7%)	56 (70.7%)	13 (56.5%)	
Practice/Protocol						
VLBW resuscitation training	78 (82.1%)	15 (79%)	6 (85.7%)	45 (80.4%)	12 (92.3%)	0.746
Delayed cord clamping	78 (82.1%)	14 (73.7%)	5 (71.4%)	48 (85.7%)	11 (84.6%)	0.570
DR temperature control	88 (92.6%)	17 (89.5%)	5 (71.4%)	54 (96.4%)	12 (92.3%)	0.108
VLBW nursing guidelines	85 (89.5%)	18 (94.7%)	5 (71.4%)	49 (87.5%)	13 (100%)	0.192
Minimal handling	71 (74.7%)	14 (73.7%)	5 (71.4%)	42 (75%)	10 (76.9%)	0.993
Midline head position	57 (60%)	11 (57.9%)	4 (57.1%)	33 (58.9%)	9 (69.2%)	0.908
Elevation of head of the bed	47 (49.5%)	7 (36.8%)	3 (42.9%)	29 (51.8%)	8 (61.5%)	0.530
Tracheal suctioning frequency	66 (69.5%)	12 (63.2%)	3 (42.9%)	41 (73.2%)	10 (76.9%)	0.333
Kangaroo care	68 (71.6%)	13 (68.4%)	3 (42.9%)	41 (73.2%)	11 (84.6%)	0.252
Premedication for intubation (non-DR)	38 (40%)	5 (26.3%)	5 (71.4%)	19 (33.9%)	9 (69.2%)	0.020
Indomethacin prophylaxis	11 (11.6%)	3 (15.8%)	0 (0%)	6 (10.7%)	2 (15.4%)	0.689

PDA treatment algorithm	32 (33.7%)	6 (31.6%)	1 (14.3%)	16 (28.6%)	9 (69.2%)	0.026
Unit developed VLBW specific QI projects	46 (48.4%)	8 (42.1%)	3 (42.9%)	25 (44.6%)	10 (76.9%)	0.176

Practices Adopted by Adjusted Severe IVH Quartiles for Community and Regional Units

	Quartile 1	Quartile 2	Quartile 3	Quartile 4	P-value
N (survey respondents within quartile)	17	17	14	18	
Adjusted rate of severe IVH, median (min-max)	2.2% (0%-2.7%)	3.4% (2.8%-4.0%)	4.8% (4.0%-5.8%)	7.1% (5.8%-14.0%)	
Volume of <32 week infants/year	36.4 (30.5-48.3)	33.7 (30.1-84.3)	66.5 (32.7-90.2)	27.5 (20.3-48.1)	0.049
Volume of <1500g infants/year	37.2 (27.1-47.2)	32 (30.6-82.5)	62.6 (30.4-88.7)	27.3 (18.6-46.6)	0.055
Practice/Protocol					
VLBW resuscitation training	12 (70.6%)	15 (88.2%)	13 (92.9%)	15 (83.3%)	0.362
Delayed cord clamping	13 (76.5%)	16 (94.1%)	12 (85.7%)	16 (88.9%)	0.497
DR temperature control	16 (94.1%)	17 (100%)	14 (100%)	17 (94.4%)	0.608
VLBW nursing guidelines	16 (94.1%)	16 (94.1%)	12 (85.7%)	15 (83.3%)	0.638
Minimal handling	14 (82.4%)	14 (82.4%)	10 (71.4%)	12 (66.7%)	0.624
Midline head position	9 (52.9%)	13 (76.5%)	7 (50%)	11 (61.1%)	0.412
Elevation of head of the bed	10 (58.8%)	11 (64.7%)	9 (64.3%)	6 (33.3%)	0.201
Tracheal suctioning frequency	12 (70.6%)	14 (82.4%)	11 (78.6%)	12 (66.7%)	0.710
Kangaroo care	11 (64.7%)	14 (82.4%)	12 (85.7%)	13 (72.2%)	0.492
Other VLBW guidelines	11 (64.7%)	10 (58.8%)	5 (35.7%)	7 (38.9%)	0.258
Premedication for intubation (non-DR)	8 (47.1%)	9 (52.9%)	5 (35.7%)	5 (27.8%)	0.436
Hypotension management consensus	13 (76.5%)	13 (76.5%)	11 (78.6%)	14 (77.8%)	0.999
Hypotension definition	4 (23.5%)	8 (47.1%)	9 (64.3%)	7 (38.9%)	0.141
Standard time for bolus (NS or blood) administration	11 (64.7%)	15 (88.2%)	13 (92.9%)	14 (77.8%)	0.190
Guideline for sodium bicarbonate use	3 (17.7%)	2 (11.8%)	2 (14.3%)	6 (33.3%)	0.377
Indomethacin prophylaxis	4 (23.5%)	3 (17.7%)	0 (0%)	1 (5.6%)	0.156
PDA treatment algorithm	6 (35.3%)	7 (41.2%)	6 (42.9%)	5 (27.8%)	0.800
Standardized post-hemorrhagic hydrocephalus management	5 (29.4%)	7 (41.2%)	7 (50%)	8 (44.44%)	0.682
QI projects specific to VLBW neuro care	5 (29.4%)	11 (64.7%)	10 (71.4%)	6 (33.3%)	0.031
Neuro-NICU designation	1 (5.9%)	0 (0%)	3 (21.4%)	1 (5.6%)	0.144
Domain-DR VLBW practices, median (IQR)	3 (2-4)	4 (4-4)	4 (3-4)	4 (3-4)	0.061
Domain-Any VLBW practices, median (IQR)	9 (8-11)	12 (11-13)	12 (10-13)	9.5 (8-14)	0.091

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Abstract: 40

Relationship Between BMI and Self-Esteem, Self-Efficacy and Depression in an Adolescent Population

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Background Adolescent obesity is a major health problem in the US. In New York City, over 25% of high school students are now overweight or obese. In some populations, obesity has been linked to multiple health and psychosocial risk factors including social stigmatization, depression, and lower self-esteem. Understanding key relationships between these comorbid conditions may help clinicians provide more targeted comprehensive and effective treatment strategies for weight-related issues in this population.

Objective To examine the relationship between body mass index (BMI), self-esteem, self-efficacy and depressive symptoms in a diverse urban adolescent population.

Design/Methods This cross-sectional comparative study explored sociodemographic variables, mental health, self-efficacy, self-esteem and body composition in adolescents ages 14-19 years old recruited through convenience sampling from a university affiliated community health system in the Bronx, NY. Self-esteem was measured with the Harter Self Perception Profile for Adolescents (α 0.925); self-efficacy with the Shwarzer Nutrition and Exercise Self-Efficacy Scales (α 0.872) and depression with the PHQ-9 questionnaire. Statistical analysis employed univariate, bivariate and multivariate methods.

Results 106 surveys completed. 55% of study subjects were overweight or obese (35% females, 20% males). 20% had poor diet and exercise self-efficacy scores, 18% had poor global self-worth / self-esteem scores and 53% suffered from depression (25% moderate and 5% severe). There was no statistically significant association between BMI, race/ethnicity, or age with self-efficacy, self-esteem and depression measures. There was, however, a significant correlation between self-efficacy, self-esteem and gender. Males had significantly higher overall self-esteem compared to females (OR 2.8, p = .02). Of the self-esteem subscales, males had higher self-esteem scores for social competence (OR 3.7, p = .006), athletic competence (OR 3.58, p = .005) and romantic appeal (OR 3.96, p = .011). Similarly, males had higher exercise self-efficacy compared to females (OR 1.5, p = .049).

Conclusion(s) Obesity and depression are highly prevalent among Bronx adolescents. These data suggest that gender may be more important than weight status in identifying patients at risk for low self-esteem and self-efficacy, which could have broader health implications. Future studies should focus on gender specific prospective evaluations and interventions.

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Abstract: 41

Hydrocortisone Rescue for Persistent Pulmonary Hypertension of the Newborn (PPHN)

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Background PPHN is a complex syndrome characterized by elevated pulmonary vascular resistance resulting in right to left shunting of blood causing severe hypoxemia. The role of steroids in the management of PPHN in neonates is not clear. Hydrocortisone (HC) is known to reduce inflammation, stabilize systemic BP and inhibit phosphodiesterase-5 (PDE5) in the pulmonary vasculature leading to improved oxygenation in PPHN.

Objective To determine the effects of intravenous (IV) hydrocortisone therapy on oxygenation and systolic blood pressure (SBP) in infants with PPHN.

Design/Methods A retrospective chart review of all infants admitted to level-4 NICU from 01/2010 to 06/2017 was performed. Infants (≥ 35 weeks GA) with the diagnosis of PPHN confirmed by echocardiography and who received hydrocortisone rescue for PPHN management were included in the study. Severity hypoxemic respiratory failure was determined by oxygenation index ($OI=FiO_2 x MAP x 100 / PaO_2$; MAP - mean airway pressure) and PaO_2/FiO_2 ratio (P/F ratio). OI was calculated prior to administration of hydrocortisone (HC); 6h into HC therapy; 6h after completion of HC therapy and 72h post HC therapy. Data analyzed by student t-test and ANOVA repeated measures.

Results Fifteen infants with PPHN received IV HC. The demographic characteristics of infants who received HC therapy are shown in Table 1. Majority of infants received dopamine prior to starting hydrocortisone (13/15 - 87%) and half of them received milrinone (Table 1). Hydrocortisone, was initiated at 4mg/kg followed by 1mg/kg/dose q6h for a median duration of 3 days (1.5-6.5 days). SBP increased with HC and remained significantly higher even after completion of HC therapy (*$p<0.001$ vs prior to HC, Fig.1a). OI decreased with HC therapy in infants with PPHN (*$p<0.05$ vs prior to HC, Fig.1b). PaO_2 / FiO_2 ratio increased significantly with HC treatment (*$p<0.05$ vs prior to HC, Fig.2a). On linear regression, P/F ratio increased significantly with systolic blood pressure over time on HC (Fig.2b).

Conclusion(s) Hydrocortisone increases SBP and improves oxygenation. Increase in SBP with a reduction in R→L shunt may contribute partly to improvement in oxygenation in PPHN. Prospective randomized trials evaluating HC therapy in PPHN are needed to confirm this observation.

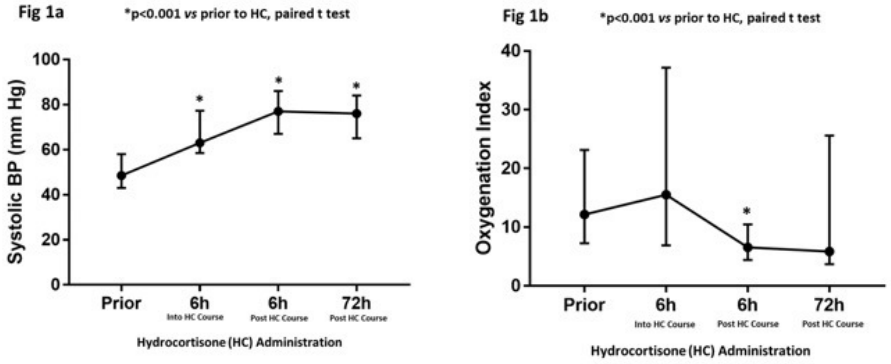

Figure 1 a,b. Effect of IV HC on Systolic BP and Oxygenation index.

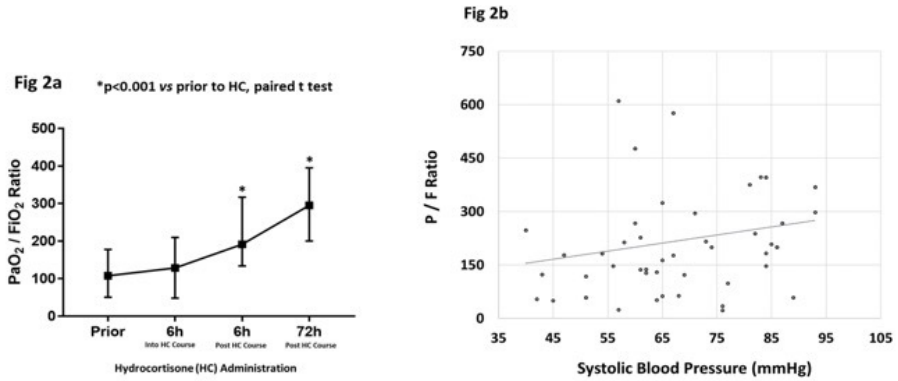

Figure 2 a Effect of IV HC on PaO2/FiO2 rate
Figure 2 b Linear regression between PaO2/Fio2 ratio and Systolic blood pressure over time.

Characteristics of Infants on Hydrocortisone for PPHN

Gestational age in Weeks (Mean ± SD)	38.2 ± 1.6
Birth Weight (gms) (mean ± SD)	2991 ± 650
Sex (male) (%)	12 (80%)
C-section (%)	6 (40%)
Cord pH (mean ± SD)	7.05 ± 0.28
APGAR @ 5 min (median, IQR)	6 (6)
Surfactant (%)	11 (73%)
Dopamine (%)	13 (86%)
Inhaled NO (%)	14 (93%)
Milrinone (%)	7 (46%)

ECMO (%)	2 (13%)

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Abstract: 42

Management of Gestational Diabetes Mellitus, Autism Spectrum Disorder and Attention Deficit Hyperactivity Disorder

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Background Gestational diabetes mellitus (GDM) is glucose intolerance with onset during pregnancy. Prevalence of GDM is increasing and is attributed to mothers being overweight and obese prior to pregnancy. Offsprings of mothers with GDM are at increased risk of fetal, neonatal and long term morbidities. Management of GDM include lifestyle changes, insulin and oral agents. When glycemic targets are not achieved with lifestyle changes (diet and exercise), pharmacological treatment is recommended, usually insulin. Oral agents, glyburide and metformin, have been used for their patient friendliness and better compliance. Studies have shown association between GDM and risk of autism spectrum disorder (ASD) and attention deficit hyperactivity disorder (ADHD) in offspring. There are few studies on type of management of GDM and risk of ASD and ADHD.
Objective To explore any association between GDM management with ASD and ADHD.
Design/Methods A retrospective cohort chart review of children aged 18 months to 11 years seen with diagnosis of ASD and ADHD according to standardized diagnostic criteria in the Behavioral and Developmental Clinic of Flushing Hospital Medical Center between January 2013 and December 2016. Demographic data collected included gender, ethnicity, mean age of mothers at delivery, mean age of fathers, birth history, age of diagnosis and mode of treatment of GDM. Data were compared using percentages.
Results Of the 814 charts reviewed, 419 (51.4%) were diagnosed ASD, 395 (48.6%) ADHD. Mothers with GDM were 58 (7%) and 4 were excluded for incomplete data. Of 54, 36 (66%) have ASD, 18 (33%) ADHD, 40 (74%) male, 37.9% Hispanic, 32% Asian. Mean age of mothers at the time of delivery was 32.2 years and mean age of fathers 35.6 years. Mean gestational age was 38 weeks, almost all (96%) singleton pregnancy, no birth weight >4000 grams and more than half (53%) first born. Mean age of diagnosis was at 2.35 years for ASD and 6.7 years for ADHD. Management of GDM was diet and exercise in 32 (59.3%), insulin in 18 (33.3%) and glyburide in 4 (7.4%).
Conclusion(s) Prevalence of maternal GDM was not higher among children with ASD and ADHD. In our small sample, most were males and there were twice as many with diagnosis of ASD as ADHD. Of children with ASD and ADHD, higher percentage of mothers with GDM was managed with diet and exercise compared to mothers on diabetic medications.

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Abstract: 43

Fine mapping genomic regulatory regions for platelet traits using machine learning

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Background Platelets are the most abundant cell type in blood and play central roles in hemostasis, inflammation, wound healing and cardiovascular disease, yet the processes by which platelets and their precursor cells (megakaryocytes, MKs) form and function are incompletely understood. Genome wide association studies (GWAS) previously linked single nucleotide polymorphisms (SNPs) from 68 genomic loci with altered platelet size and/or count. With few exceptions, the causal SNPs and biological mechanisms of action at these sites remain unknown.
Objective
Design/Methods We utilized machine learning to identify causal SNPs and biological mechanisms underlying platelet trait variation. Specifically, we applied the least absolute shrinkage and selection operator (LASSO), which uses regression analysis to enable feature selection and regularization, to identify and quantify the importance of key chromatin features enriched at SNP sites previously associated with human platelet trait variation.
Results From an initial set of 631 chromatin features derived from ENCODE and primary MK datasets, we created a quantified statistical model incorporating 9 chromatin features, including key MK transcription factors GATA1 and FLI1, with an area under the curve (AUC) of 80% to discriminate GWAS SNPs. We used this model to assign scores to SNPs genome-wide, representing the probability of a given SNP to functionally impact platelet trait variation. High-scoring SNPs marked MK- and hemostasis-related Gene Ontogeny pathways, and SNPs near the transcriptional start sites for MK genes scored more highly than a set of random genes. Moreover, our scoring algorithm reliably identified SNPs known to impact MK development and/or platelet traits, as well as several novel genomic loci with plausible biochemical mechanisms that may impact development or function of MKs or platelets.
Conclusion(s) In sum, our findings demonstrate that machine learning can be successfully applied to large-scale genetic data as a tool to identify important chromatin features that underlie important human phenotypes. Furthermore, our results validate machine learning as a hypothesis-generating approach to identify putatively functional genomic elements. In addition to several known expression quantitative trait loci (eQTL) for platelet genes and/or traits, our model suggests several interesting loci as potential targets for further study. Cell based biochemical studies and genome-editing experiments will further investigate mechanisms of action for these genomic regions.

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Abstract: 44

Optimal Inspired Oxygen Concentration during Chest Compressions in Term Lambs with Perinatal Asphyxia -Induced Cardiac Arrest.

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Background Less than 1% of neonates require chest compressions (CC) and medications at birth. However, these infants have high neurological morbidity and mortality. The 2015 ILCOR guidelines advocate 100% oxygen when CC is needed. We hypothesized that 100% O_2 increases carotid arterial oxygen content (CaO_2) and brain O_2 delivery in a model of perinatal asphyxial cardiac arrest.

Objective

To evaluate cerebral O_2 delivery and time to return of spontaneous circulation (ROSC) following ventilation with 21% and 100% O_2 during chest compressions in lambs with perinatal asphyxial cardiac arrest.

Design/Methods Pulseless cardiac arrest was induced by umbilical cord occlusion in fetal lambs. After 5 min of asystole, lambs were delivered and resuscitated with 21% O_2 as per NRP guidelines. At the onset of CC, inspired O_2 was either increased to 100% O_2 or continued at 21% during CC. Following ROSC, FiO2 was titrated to achieve preductal SpO2 of 85-95%. Lambs were ventilated for 30 minutes post ROSC.

Results The characteristics of 13 lambs in the study are shown in Table 1. 7 lambs were resuscitated with 21%O_2. 6 lambs received 100% O_2 during CC. All lambs achieved ROSC. FiO_2 was adjusted by 5-10% every 20 sec after achieving ROSC to maintain preductal saturations in the 85-95% range. No statistical differences were noted between the 2 groups in time to ROSC, the number of epinephrine doses, carotid artery blood flow, SpO_2, PaO_2, CaO_2 or O_2 delivery to the brain during chest compressions. During the whole resuscitation time, there was no statistical difference in the oxygen delivery to the brain, but PaO_2 levels immediately after ROSC were significantly higher in the 100% group (165±145mmHg) compared to 21% (41±16, P-value=0.046) Figure1A and B. FiO_2 was titrated and there was no difference in PaO_2 at 5, 10, 20 and 30 minutes' post ROSC.

Conclusion(s) In a model of perinatal cardiac arrest, 100% O_2 during CC did not enhance oxygen delivery to the brain or time to ROSC but resulted in high PaO_2 levels following ROSC. If 100%O2 is used during CC, we recommend weaning and titrating FiO_2 immediately after ROSC to maintain preductal saturations in the 85%-95% range.

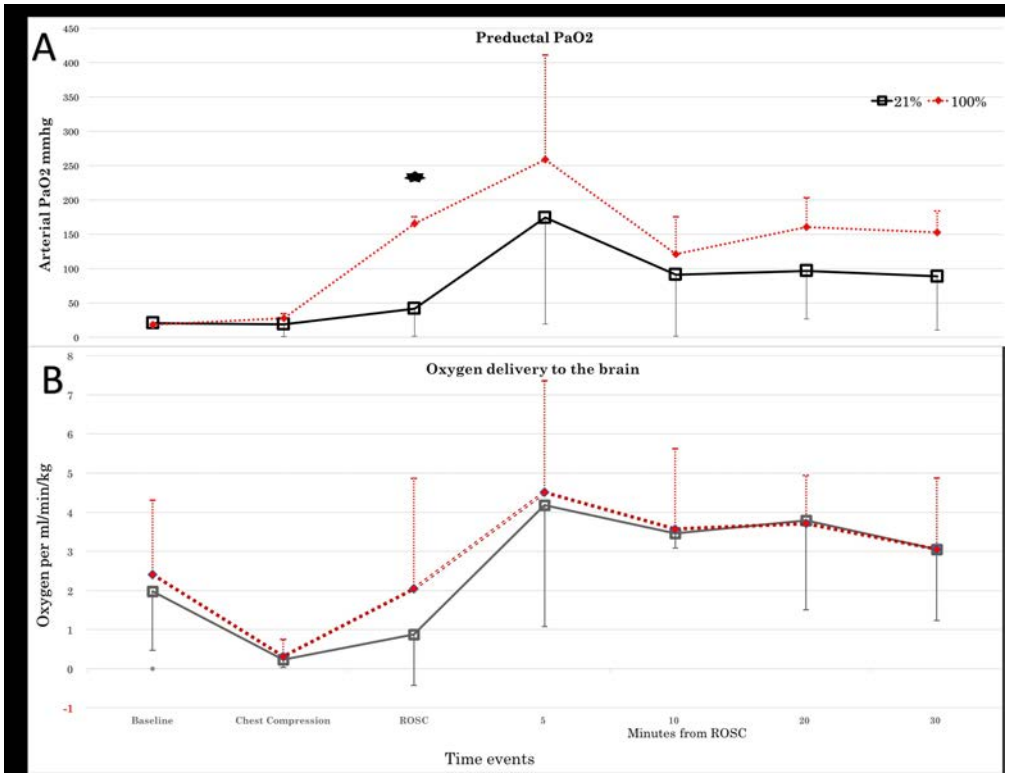

Fig 1 Changes in PaO2 (A), and Oxygen delivery to the brain (B) following asphyxia by cord occlusion and resuscitation with 21% oxygen or 100% oxygen. * P<0.05

Table1: Baseline charstristics and resuscitation data for both groups.

Inspired Oxygen Concentration during Chest Compression	21% Oxygen (n=7)	100% Oxygen (n=6)	
Gestational age, Days	141±0.75	141±0.4	
Birth weight, kg	3.8±0.7	3.9±0.9	0.76
Multiple gestation (%)	45%	50%	
Time to asystole, Seconds	705±177	609±83	0.552
Time to ROSC, Seconds	211± 145	306±270	0.474
Number of Epinephrine doses	1.3 (0.5)	1.5 (1.2)	0.67

Values are reported as Mean±SD.

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Abstract: 45

MicroRNA as a Biomarker for Cardiac Fibrosis Induced by Chronic Hypoxia

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Background Chronic hypoxic stress has a major impact not only on the lungs, but on cardiac function. Patients (adults or children) with chronic lung disease are at risk for pulmonary hypertension which contributes to high morbidity and mortality. Our laboratory previously reported that a chronic hypoxic state induces cardiac remodeling and fibrotic changes. The regulation of microRNA expression in cardiac fibrosis due to ischemia has been studied in adults. Data are lacking on the role of microRNA in the regulation of cardiac fibrosis induced by chronic hypoxia.
Objective To determine specific serum microRNA markers that correlate with the presence of cardiac fibrosis induced by chronic hypoxia in a murine animal model.
Design/Methods Adult male mice aged between 8-10 weeks were housed in 10% oxygen for 21 days. Cardiac tissue was collected and stained for trichrome and cardiac fibrosis markers including collagen-1a, SNAIL and alpha-smooth muscle actin, to confirm the presence of fibrosis. MicroRNA was extracted from both cardiac tissue and blood serum. MicroRNA profile panel was studied using a custom designed microarray plate. All findings were compared to a matched control group that was housed in room air.
Results Presence of cardiac fibrosis in the hypoxic group was confirmed via both immunofluorescence and trichrome staining and found to be in greater amount when compared to the control group. MicroRNA expression assays in cardiac tissue of hypoxic mice showed more than a two fold increase of microRNA-2137, 5130 and 5672-5p when compared to the control. There was also a significant reduction in expression of the following microRNAs by more than fivefold: microRNA- 1197-5p, 1905, 3059-5p, 341-5p, 3569-3p, 466m-3p, 5103, 543-5p, 6897-3p, 6908-3p, 6918-3p, 6922-3p, 6931-3p, 6941-5p, 6954-3p, 696, 6980-5p, 7018-3p, 7020-3p, 7031-3p, 7045-5p, 7056-3p, 7068-5p, 7076-3p, 7076-5p, 7077-3p, 7082-5p, 7085-3p, 7115-3p, 712-3p, 742-3p, 7659-3p, 7674-3p, 7683-3p, 7687-3p, 882, 9768-5p. Serum blood samples from both groups were studied for the specific miRNA which showed a significant increase or decrease in cardiac tissue to find out serum biomarkers for cardiac fibrosis.
Conclusion(s) MicroRNA profile expression in cardiac tissue induced by chronic hypoxia is unique and can be used as specific serum biomarkers for diagnostic/prognostic purposes. Specific cardiac microRNA mainly mir2137, mir5130 and mir5672-5p have potential to be used as new therapeutic molecular targets.

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Abstract: 46

Vasopressin is not more effective than Epinephrine in an ovine model of perinatal asphyxial arrest during resucitation

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Background Vasopressin is an alternate medication to epinephrine for bradycardia and cardiac arrest. Vasopressin (0.4U/kg) was observed to be more effective than epinephrine (0.03mg/kg) in <3d old piglets with cardiac arrest induced by disconnecting the ETT. Recently, vasopressin was removed from the AHA ACLS to make the cardiac arrest algorithm simple as there was no added benefit from vasopressin compared to epinephrine alone.Given its potential advantage to reduce constrictor effect on the pulmonary vasculature, it may be beneficial in neonatal resuscitation.
Objective To evaluate incidence of return of spontaneous circulation (ROSC), time to ROSC and hemodynamic changes in a lamb model of cardiac arrest induced by umbilical cord occlusion.
Design/Methods Design: prospective randomized blinded study
18 term fetal lambs were asphyxiated by umbilical cord occlusion leading to cardiac arrest. After 5 min of cardiac asystole, lambs were resuscitated with positive pressure ventilation followed by chest compressions for 5 min. If ROSC was not achieved by 5 min,

epinephrine or vasopressin was administered by low UVC. Blood gases and hemodynamic parameters were recorded.
Results Out of 18 lambs, 5 achieved ROSC prior to medication. 7 lambs were randomized to vasopressin and 6 to epinephrine. Baseline characteristics were similar (Table). In vasopressin group 3/7 lambs achieved ROSC; in epinephrine group 4/6 lambs achieved ROSC. Average time to ROSC was 8+/-6 min after vasopressin and 2+/-1.9 min after epinephrine.Lambs required more doses of vasopressin (median-3, IQR 1.7) compared to epinephrine (median -1, IQR 0.5). Vasopressin resulted in higher systolic and diastolic blood pressures before ROSC (figure 1A & 1B, p=0.05). After ROSC, the heart rate was significantly higher with epinephrine (figure 1C & figure 2, p=0.04 – with one lamb having HR>300/min). Pulmonary blood flow was higher with vasopressin (figure 1B, p=0.02).
Conclusion(s) Epinephrine and vasopressin resulted in similar incidence of ROSC in this perinatal model of asphyxial arrest. Although adverse events were noted with epinephrine, ROSC was quicker and required fewer doses of medication compared to vasopressin. These results do not support addition of vasopressin to the current NRP algorithm. Further studies are required to study different doses of vasopressin and epinephrine in this model.

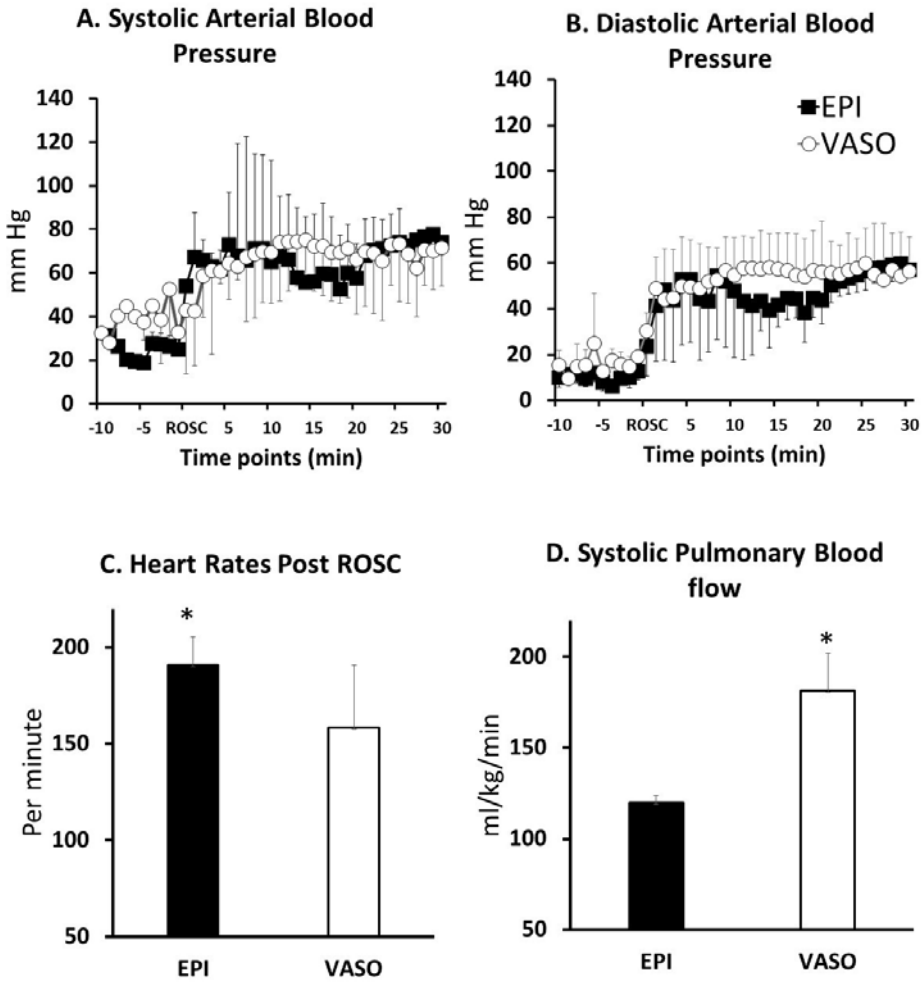

Figure 1. A & B - Systolic and diastolic blood pressure was higher with vasopressin 5 min before ROSC. C. Average Heart Rate post ROSC was higher in the lambs that received epinephrine compared to vasopressin. D. Systolic pulmonary blood flow was higher in the lambs that received epinephrine.

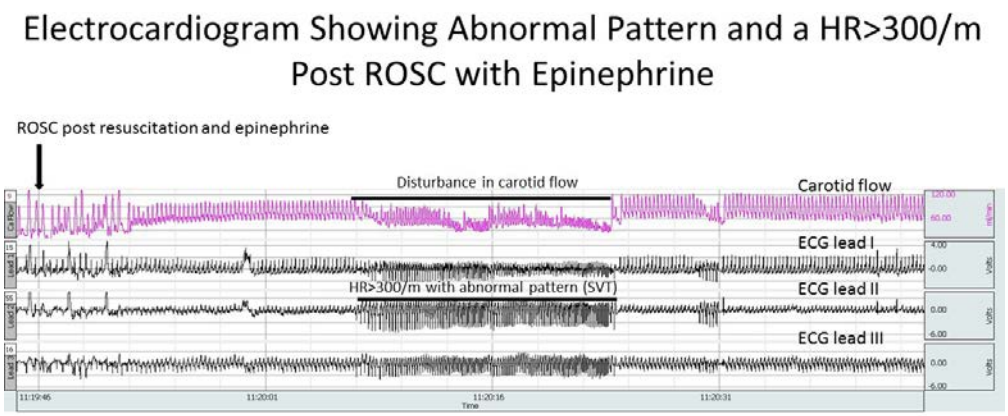

Figure 2- Biopac snapshot of a lamb that received epinephrine and achieved ROSC. The first row shows carotid flow and rows 2 to 4 show ECG tracing. Post ROSC the lamb went into SVT for a brief period with corresponding disturbance in carotid flow.

Baseline Fetal Characteristics

Baseline Characteristics	Epinephrine	Vasopressin
Total Lambs	6	7
Weight	3.9(1)	4.3(8)
Gender	3	2
Mean Carotid Artery Flow (ml/Kg/min)	24(5)	29(12)
Mean Pulmonary Artery Flow (ml/Kg/min)	20(18)	15(9)
Heart Rate (BPM)	176(28)	191(38)
Mean Arterial Pressure (mm Hg)	56(8)	57(5)

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Abstract: 47

Screening for developmental and behavioral concerns in Hispanic pediatric populations

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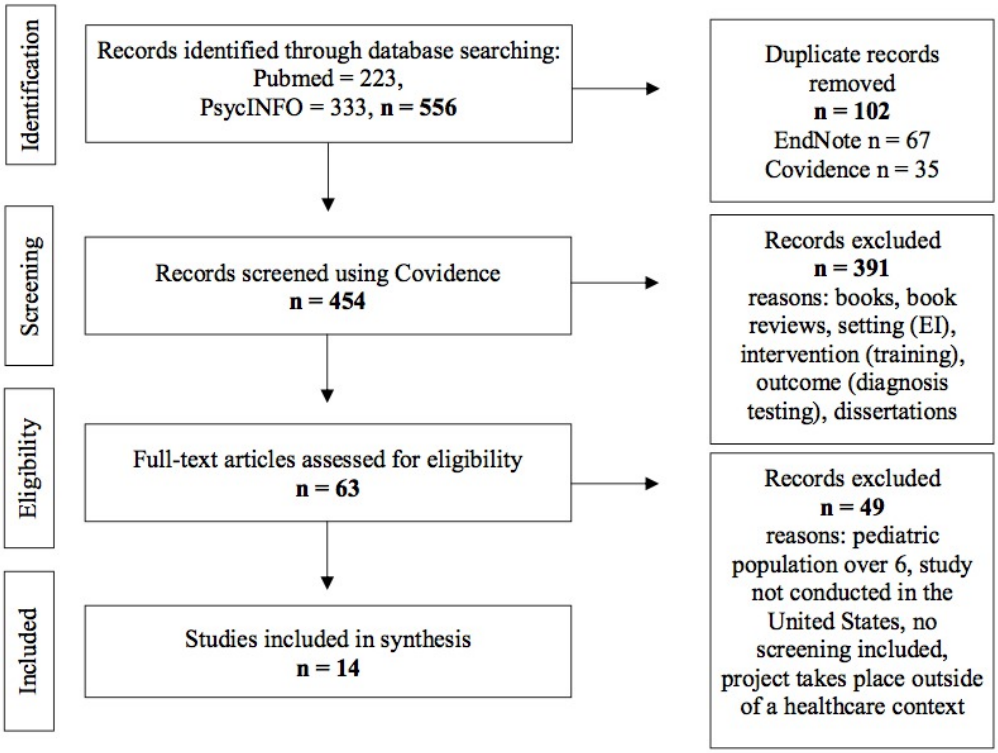
Background Developmental-behavioral screening is mandated in some states and has been endorsed by the American Academy of Pediatrics (AAP) since 2006, yet evidence based recommendations regarding in-practice use, reliability across language and cultural norms and referral cut-offs for non-English instruments is limited. Racial and ethnic disparities for age of diagnosis of developmental-behavioral problems and subsequent initiation of treatment are documented. Developing screening tools appropriate to language and cultural norms that are feasibly administered in a primary care setting will reduce this disparity.
Objective The aim of this study is to critically analyze literature on developmental-behavioral screening instruments administered in pediatric healthcare settings to Hispanic parents of young children. Data synthesis will investigate implementation variation due to language and cultural factors.
Design/Methods A systematic literature review using PubMed and PsycINFO was conducted of articles published from January 1, 2006 to December 12, 2017. Abstract and full-text screening followed by critical appraisal resulted in 14 studies that met criterion for inclusion.
Results 8 different instruments were used to screen parents of Spanish-speaking children under six years of age. Sample populations were derived from pediatric healthcare practices across eight cities in the US, representing over 6,000 children. One study did not report on translational or cultural variations in Spanish instruments and found a non-significant difference in the percentage of Hispanic families that presented to well child check-ups for screening. Of the remaining 11 studies, 7 reported no variation in translation of the utilized instrument. However, one study that utilized the ASQ reported translation variation and specific items on MCHAT demonstrated differential item functioning when administered in Spanish. 8 of 11 studies reported a significant difference in responses

related to cultural variation; the ASQ was the only exception. Several studies reported a higher concern threshold for Hispanic parents and differing interpretation of developmental milestones, which is the predominate method of identifying concerns in screening instruments.
Conclusion(s) Validation of translated Spanish screening instruments is necessary to eliminate detection bias and misdiagnosis of developmental delay. Screening improvements should address culturally and linguistically appropriate tools and referral rates after a positive developmental-behavioral screener.



PRISMA Diagram

Primary Findings

Citation	Population and Setting	Screening Tool	Translation Variation	Cultural Variation
Bauer, 2016	953 children aged 5–12 years recruited from primary care, pediatric community health clinics in the Eskenazi Health System in Indianapolis, IN. 201 children were Hispanic.	VADRS	No: A sub-analysis of anxiety and ADHD criteria scores was conducted for the Hispanic families. There was no significant difference in the reporting of anxiety or ADHD symptoms among parents based on language.	Yes: Hispanic parents, regardless of language, were less likely to report symptoms that met criteria for potential anxiety. This suggests that among Latino families, examination of functional impairment from disruptive behaviors, rather than symptomatology alone, is an important part of a larger cultural appropriate assessment.
Cox, 2010	740 children aged 3 to 5 years recruited from Children's	PEDS	No: The rate of mismatch between comments and question intent was equal for the English and Spanish forms.	Yes: Spanish-speaking parents reported significantly fewer concerns than English-speaking parents, particularly on questions 1, 4, 8 and 10. English-speaking parents were

	Hospital Primary Care Center and Martha Eliot Health Center in Boston, MA. 18% of the study sample was conducted in Spanish.			also more likely to comment about a behavioral concern. Medical concerns were more commonly expressed on English forms compared to Spanish forms, however when concerns were listed in Spanish Hispanic parents were less likely than white and black parents to be concerned about self-help but more likely to be concerned about medical status. English forms were far more likely to contain comments than were Spanish forms.
Grossman, 2010	138 children aged 6 to 36 months of age recruited from Bellevue public hospital in New York, NY. 75% were either Latino or Spanish-speaking.	ASQ	No: The single characteristic that was significantly associated with a positive screen was age, with children aged 12 to 30 months more likely to screen positive in the regression model.	No: In unadjusted analyses, the mother's primary language English and birthplace in the United States were each associated with increased odds of a positive screen, however these data were ultimately not significant. A possible explanation may involve the healthy immigrant effect, in which assimilation among immigrants has been associated with worsening health outcomes in their children, in part related to changes in social support.
Huntington, 2016	607 children recruited from Martha Eliot Health Center in Boston, MA, most of whom are recent immigrants and approximately two thirds of parents were primarily Spanish speaking.	PEDS	No: Close to half of all children had at least one concern of any type identified, either according to clinic notes or as indicated on the PEDS, a pattern held for both genders, English and Spanish speakers, and children categorized as "at risk." There was no association with family language for any concern types indicating that the integration of the PEDS had the same impact for both language groups.	Yes: Difference in rates of developmental concerns approached significance for English-speaking patients and for girls, however was ultimately not significant. Behavioral concerns increased significantly for Spanish-speaking patients, boys, 4-year-olds, and children defined as "at risk." Spanish speakers wrote fewer comments overall on their PEDS forms and, in their comments, were less likely to discuss self-help skills and more likely to discuss medical concerns than English speakers.
Lowe, 2013	850 children born extremely preterm aged 18 to 22 months corrected age recruited from sixteen centers of the Eunice Kennedy Shriver	BITSEA	No: Spanish-speaking children scored significantly worse on the BITSEA competence and problem scales in the unadjusted analyses compared to English-speaking children. These differences were no longer significant after adjustment for medical and socio-economic covariates. However, children who had	No report

	National Institute of Child Health and Human Development Neonatal Research Network. 98 children were from Spanish-speaking homes.		Spanish as the primary language in their home had significantly lower language scores on the BSID-III (a gold standard developmental test) than children with English as their primary language; this difference remained, even after adjustment for medical and socio- economic covariates. In contrast, no significant differences in cognitive scores between English and Spanish-speaking groups was found.	
Marshall, 2016	24 children aged 0-5 years were recruited from Hillsborough County, FL. 61% of the sample identified as Hispanic and 42% spoke Spanish as a primary language.	PEDS, KIDI	Yes: Because the Spanish version has not been validated, it was reviewed and corrected by fluent Spanish speakers from South America, Mexico, and Puerto Rico. One question on the KIDI had inconsistent wording across English and Spanish versions and was removed from all scoring and analysis.	Yes: The KIDI score was significantly correlated with family income and maternal race/ethnicity but not with parent age or parenting experience. There were discrepancies between what parents reported on the PEDS questionnaire and what they described in the interviews, and whether the parent reported the concern as “a lot” or “a little” is subjective and context-dependent.
Miller, 2011	796 children aged between 14 and 24 months were recruited from a large community pediatric practice in Salt Lake City, UT, 75 of the screeners were completed in Spanish.	MCHAT and ITC	No report	No report: Nonsignificant difference in the percentage Hispanic families that presented to well child checkups for screening, however a significant difference in scores was found if families did not have insurance.
Ortega, 2009	450 children under 6 years of age participated in the California Health Interview Survey that included every county in CA. Two thirds of	PEDS	No: Difference in odds of any developmental risk for all Mexican children compared with white children does not reach the level of statistical significance after adjusting for age, federal poverty level, parental education, and language spoken at home.	Yes: A significantly higher percentage of developmental risk in children in the undocumented Mexican and documented Mexican categories compared with white children was found.

	the families were Latino.			
Knuti Rodrigues, 2016	450 children aged 8-40 months recruited from Denver Health, a large community health system in Denver, CO. 150 children were identified from English-speaking families, 150 children from Spanish-speaking families, and 150 children from families who spoke languages other than English and Spanish.	ASQ, Denver	No: No differences between English- and Spanish-speaking children were observed for receipt of developmental surveillance or screening with a standardized tool. This practice has multiple in-person Spanish interpreters, many certified Spanish-speaking health care professionals and staff, and a phone service, nurse advice line, and appointment line that are equally accessible for English- and Spanish-speaking patients.	No: No significant differences were found for referrals for diagnostic developmental evaluation between English- and Spanish-speaking groups or between the English-speaking and non-English, non-Spanish groups; however, this analysis was underpowered. Children from English- speaking families had the highest referral rates, and, interestingly, referral rates for the Spanish-speaking group were lower than for the non-English, non-Spanish group, despite the standardized screening tool being available in Spanish and not in other languages; there were no statistically significant differences.
Weitzman, 2011	378 children aged between 12 and 48 months recruited from the Pediatric Primary Care Center at Yale-New Haven Hospital in New Haven, CT. 169 children identified as Hispanic.	Sections of the BITSEA and PEDS	No: Initial analysis of ethnicity by BITSEA status was not significant. Parent scores were non-significantly higher in Spanish-speaking participants, BITSEA at risk and CS scales.	Yes: Ethnic differences in worry were observed. Worry was significantly more common in Hispanic parents relative to African-American parents. These findings indicated that worry and reporting problems on the BITSEA were both more common among Hispanic parents and parents with lower education. While some of this worry seemed to be mediated by cultural characteristics, other factors may be important such as health literacy, which has been found to be lower in Hispanic families. Less knowledge about normal child behavior may also contribute to more diffuse worry about the child, including worry about a child whose behavior is normal. Similarly, parents with low education were more likely to worry, and studies have shown that families with low health literacy are more likely to perceive their children as sicker.
Weitzman, 2014	378 children aged between	BITSEA, PRQ	No: Examination of child age and gender as well as	No report

	12 and 48 months recruited from the Pediatric Primary Care Center (PCC) at Yale-New Haven Hospital, New Haven, CT. 169 children identified as Hispanic.		demographic variables revealed that only child age and low respondent education were significantly associated with socioemotional/behavioral problems in bivariate analyses. Comparisons of age groups indicated that high BITSEA scores were significantly more common in 3-year- olds than they were in 2-year-olds. All other group comparisons were nonsignificant.	
Windham, 2014	1,965 children aged between 16-30 months (predominantly Hispanic families) were recruited from primary care pediatric clinics at the public safety-net hospital and clinic system for Santa Clara County, CA. 81% of the parents self-identified their children as Hispanic.	MCHAT and ASQ	Yes: At the time of screening, there was not a validated Spanish MCHAT to use in the US, so the same one as the medical system was used for consistency with current practice. Item 21 did not appear to differ by ethnicity among Hispanics but those screened with the Spanish version were much more likely to fail it. Higher rates of ASD screening are likely due to differences interpretation or comprehension of the screening instrument by parents. False positives were also somewhat more likely to be Hispanic and to have used a Spanish screener. The difference by language of screener items may indicate that the Spanish translation did not clearly reflect the English version.	Yes: Several items on the MCHAT were more frequently failed by Hispanics, among items that differed by ethnicity were numbers 3,4,18 and 22 indicating some differences by language of screener. Hispanic children were more likely to have mothers who were less educated, younger and of higher parity. Adjusting for these factors, the higher MCHAT- positive rates persisted in Hispanic children, as did the lower rates for older mothers and borderline for higher education. The responses that differed by ethnicity but not by language indicated different cultural values about desirable behaviors. There were no significant demographic predictors of ASQ-positivity.

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Abstract: 48

Screening for Neonatal Hypoglycemia in Breastfeeding Infants Increases Risk of Supplementation

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Background The AAP recommends screening for neonatal hypoglycemia in at-risk infants. Concerns have been voiced that frequent blood sugar monitoring and scheduled feedings may adversely affect breastfeeding.
Objective To evaluate if screening for neonatal hypoglycemia is a risk factor for supplementation in healthy term infants who initiate breastfeeding.
Design/Methods We conducted a retrospective cohort study at an academic medical center serving a low income, urban, minority community. We included all term, singleton infants admitted to the nursery between February and October 2016 who initiated breastfeeding. Infants were screened for neonatal hypoglycemia if the birth weight was < 2.5 kg, > 4 kg, small or large for gestational age (GA), and/or infant of diabetic mother. Blood sugars were monitored after the first feed, then every 2-3 hours prior to feeding until 4 normal blood sugars were obtained and lastly, at 24 hours of life. All infants were roomed in and screening was done at bedside. Infants with two consecutive blood sugars < 45mg/dL after 4 hours of life were transferred to NICU and excluded from this study. Independent variables were demographics, parity, infant GA, birth weight(BW) and screening for hypoglycemia. Outcome measures

were exclusive breastfeeding and supplemental formula feeding.
Results The cohort included 815 infantss: 65% black, 80% public insurance, 82% mothers completed high school, mean maternal age 27 years, 54% male, mean GA 39 weeks and mean BW 3280 grams. 19% of infants were on hypoglycemia protocol. In bivariate analysis, infants screened for hypoglycemia were more likely to receive supplementation (66%) compared to those that were not screened (52%, p 0.002). On multivariate regression analysis, controlling for maternal age, race, education, insurance, parity, infant GA and BW, infants screened for hypoglycemia were almost twice as likely to receive supplementation (aOR 1.872, 95% CI 1.25-2.79) compared to infants who were not screened. Mothers who had less than high school education were also more likely to supplement (aOR 1.73, 95% CI: 1.04-2.88) compared to mothers who had a college degree (Table).
Conclusion(s) Screening for neonatal hypoglycemia is an independent risk factor for supplementation in breastfeeding infants. This special group of infants need more intense breastfeeding support.

Table: Risk Factors for Supplementation in Singleton Term Newborns Who Initiated Breastfeeding

Variable	Adjusted Odds	95% Confidence Interval	P-Value
Screening for hypoglycemia	**1.872**	**1.256 – 2.790**	**0.002**
Maternal age (years)	0.995	.969 – 1.023	0.736
Race			
Hispanic	Ref	Ref	
White	1.089	0.564 – 2.100	0.8
African American	1.072	0.602 – 1.908	0.813
Other	1.223	0.607 – 2.466	0.573
Education			
College graduates	Ref	Ref	
Less than high school	**1.733**	**1.042 – 2.882**	**0.034**
Completed high school	0.926	0.621 – 1.380	0.706
Insurance			
Public	Ref	Ref	
Private	0.976	0.361 – 2.639	0.962
Primiparity	1.281	0.939 – 1.747	0.118
Gestational age (weeks)	0.883	0.769 – 1.015	0.081
Birthweight(grams)	1	1.000 – 1.000	0.925

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Abstract: 49
Screening for Family Dietary Behaviors in Pediatric Emergency Department: Associations with family income and child adiposity

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Background Pediatric emergency departments (PED) are part of multi-tiered approaches to prevention chronic diseases in children. Previous studies show that the pediatric-adapted liking survey (PALS) offers a feasible, valid and reliable method to screen for dietary behaviors in the PED.
Objective We aimed to evaluate the associations between dietary behaviors, family income, and child adiposity in a diverse cohort of urban child/parent dyads.
Design/Methods Children/parents were recruited from an urban PED and each reported their likes/dislikes on PALS (33 foods or activities, paper/pencil version). PALS foods fit into nutritional groups to describe diet healthiness and to analyze patterns of association with child adiposity. Adiposity was based on measured weight/height for calculation of body mass index and percentile (BMIP). Insurance type (public/private) served as a proxy for family income. Multivariate modeling was used to assess associations between dietary behaviors, family income, and child adiposity.
Results Participants were 925 child/parent dyads, (child mean age 10.9 years (range 5-17); 50% boys; 58% publically insured). The sample was diverse in diet healthiness, with healthier diets seen in parents vs. children and higher vs. lower family income. There were significant correlations between parent/child preferences, dyads were most different for vegetables and sweets/sugary drinks. Overweight/obesity was seen in 38% of the children (7.6% with extreme obesity). Overall, parent's likes/dislikes showed greater association with BMIP than the child's, with strongest associations for less healthy (salty, sugary drinks, sweets) broaden to

carbohydrate-rich (salty, high fiber, sugary drinks, sweets, fruits) foods. Via modeling, the general pattern was that higher parent preferences associated with greater child adiposity and some was mediated by low-income status. The modeling and income mediation effects was strongest in younger children (<11 years old) and for carbohydrate-rich foods.
Conclusion(s) Children may be less able or willing to report dietary behaviors associated with risk of obesity. Parent's preferences may be a proxy for foods served in the home, influencing weight status more commonly in younger children. Greater consumption of sugary drinks and refined carbohydrates have been reported in low-income families, shedding light on a greater need for childhood nutrition programs focused on obesity prevention in this population.

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Abstract: 50

Addressing Diagnostic Dilemmas for Appendicitis with Ultrasound, WBC and CRP

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Background Acute appendicitis in children is the most common condition requiring urgent surgery. Ultrasound (US) and laboratory results can aid in the diagnosis of appendicitis. A diagnostic dilemma develops when the appendix is not visualized.
Objective To determine if there are specific US findings or laboratory results predictive for appendicitis in children.
Design/Methods A prospective study was conducted on children (birth-18 yrs) presenting to a pediatric emergency department with suspected acute appendicitis who underwent an appedicial US. Those who eloped, had previous appendectomy, or an US at another facility were excluded. US findings analyzed: appendix diameter, compressibility, increased vascularity, presence of appendicolith, right lower quadrant fluid, lower abdominal fluid, tenderness during US and lymph nodes. Diagnosis were confirmed via pathology reports. Variables were analyzed using logistic regression.
Results 1252 subjects were enrolled: 56% female, 10.5% African American, 34.7% Hispanic, mean age of 10.8 years (SD 4.3), 60.8% (762) had appendix visualized on US and 39.1% (490) did not. Of the 762 patients with visualized appendix, 29.5% (225) had appendicitis confirmed via pathology. In patients where the appendix was not seen, 6.7% (33) were diagnosed with appendicitis. Risk of appendicitis was significantly greater if: diameter ≥7 mm (OR 12.4, 95% CI 4.7-32.7), an appendicolith was seen (OR 3.9, 95% CI 1.5-10.3), inflammatory changes in the RLQ (OR 10.2, 95% CI 3.9-26.1) or WBC > 10 thou/mL (OR 4.8, 95% CI 2.4-9.7). Risk of appendicitis was significantly less likely if duration of abdominal pain was ≥3 days (OR 0.3, 95% CI 0.08-0.99) (table 1). Combined, these factors had a PPV of 94.4%. Among patients with a non-visualized appendix, the likelihood of appendicitis was significantly greater if: inflammatory changes in the RLQ were seen (OR 18.0, 95% CI 4.5-72.1), CRP >0.5mg/dL (OR 2.64, 95% CI 1.0-6.8), or WBC > 10 (OR 4.36, 95% CI 1.66-11.58). Duration of abdominal pain ≥3 days was significantly less likely associated with appendicitis in this model (OR 0.34, 95% CI 0.003-0.395) (table 2). Combined, these factors had a NPV of 94.0%.
Conclusion(s) Our findings demonstrate that when the appendix is visualized, predictors for acute appendicitis are an appendix diameter ≥7mm, presence of an appendicolith, inflammatory changes in the RLQ and a higher WBC. If the appendix is not visualized, predictors for appendicitis include the presence inflammatory changes in the RLQ, an elevated WBC/CRP and abdominal pain < 3 days.

Table 1: Appendix Visualized

	Odd	95% CI
Appendix Diameter ≥7 mm	12.4	[4.7-32.7]
Appendicolith	3.9	[1.5-4.3]
Inflammatory Changes	10.2	[3.9-26.1]
WBC >10,000	4.8	[2.4-9.7]
# days of abdominal pain ≥3	0.3	[0.1-0.9]

Table 2: Appendix Not Visualized

	Odd's Ratio	95% CI
Inflammatory Changes	18	[4.5-72.1]
CRP >0.5mg/dL	2.6	[1.0-6.8]
WBC >10,000	4.4	[1.7-11.3]

# days of abdominal pain ≥3	0.3	[0.003-0.395]

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Patient Safety and Satisfaction with Intranasal Midazolam for Anxiolysis

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Background Procedural sedation is commonly performed in the pediatric emergency department (PED) setting for a number of reasons. Having safe and fast means of providing sedation and anxiolysis to children is important for the child's tolerance of the procedure, parent satisfaction and efficient patient flow in the PED. NPO requirements in sedation are intended to reduce the likelihood of aspiration but may not be necessary for anxiolysis.

Objective To evaluate fasting times (both liquid and solid) associated with the administration of intranasal midazolam (INM) and associated complications. Secondary objectives included assessing both provider and caregiver satisfaction scores with the use of intranasal midazolam for procedures.

Design/Methods A prospective observational study was conducted in children aged 0 to 18 years presenting to an urban pediatric emergency department who received INM for anxiolysis for a procedure or imaging study. Children who received INM for other indications or received more than one medication for sedation were excluded. Data collected included patient demographics, weight, gender, last solid and liquid intake, procedure performed, sedation depth, adverse events and parent and provider satisfaction. Hospital policy does not have specific NPO requirements for children receiving INM for anxiolysis alone.

Results 112 patients were enrolled. Patients were 53.8% male, 52% Caucasian, 32% Hispanic or Latino, 9% Black or African American, with a mean age of 3.8 years (SD 2.7). The median INM dose was 0.4 mg/kg (SD 0.7). There were no adverse events experienced by any patients who received INM. Laceration repair was the most common reason for INM use (83.7%). The median depth of sedation was 2.0 (cooperative/tranquil). The median liquid NPO time was 172.5 minutes (SD 148.3; range 0-720) and the median NPO time for solids was 194.0 minutes (SD 180.6, range 9-946). Of all patients, 29.8% were NPO for liquids ≤2 hours and 62.5% were NPO for solids ≤2 hours. Parent and provider satisfaction was high: 90.4% of parents and 89.2% of providers satisfaction scores were a 4 or 5 on a 5 point Likert scale.

Conclusion(s) Our data suggests that short NPO (<2 hours) of both solids and liquids are safe for the use of INM. Additionally, parent and provider satisfaction scores were high with the use of INM.

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Identifying Risk Factors Associated with Patients Diagnosed with Intussusception who Require Intraoperative Reduction

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Background Intussusception is the most common cause of intestinal obstruction in children and infants. If left untreated, it can result in bowel wall injury, which can ultimately lead to bowel necrosis, perforation, and sepsis. Early detection and prompt treatment can reduce morbidity and mortality. In most cases, treatment of intussusception is accomplished with air enema reduction. If unsuccessful, manual operative reduction is attempted. Although the literature has identified predictors for operative reduction in patients diagnosed with intussusception, there is no recent data that suggests abnormal lab values as risk factors.

Objective To identify factors associated with patients diagnosed with intussusception that are more likely to require manual operative reduction.

Design/Methods We performed a retrospective chart review of patients diagnosed with intussusception at the Women and Children's Hospital of Buffalo from 2000 to 2014. Data was collected and reviewed in order to evaluate associations among presenting signs and symptoms, physical exam findings, laboratory results, and imaging findings.

Results 225 patient charts were reviewed. The ages ranged from 2 to 84 months, with the mean of 16 months. 61% were male. Of the 225 charts reviewed, 137 documented laboratory values and 170 documented length of symptoms prior to presentation. Of the 137 with documented laboratory findings, 23% required operative reduction. Those who required operative reduction had a mean white blood cell (WBC) count of 15,300 cell/μL compared to those reduced successfully with air contrast enema who had a significantly lower ($p=0.005$) mean WBC count of 12,300 cell/μL. Of the 170 patients with documented length of symptoms, 24% of patients requiring operative reduction were also more likely to present to the emergency department with symptoms lasting more than 24 hours in duration, compared to 9% who presented with symptoms lasting less than 24 hours ($p=0.011$).

Conclusion(s) Patients presenting to the emergency department who were diagnosed with intussusception and had a mean WBC count greater than 15,300 cell/μL or presented with symptoms lasting more than 24 hours in duration were more likely to require manual operative reduction. Patients with these findings should be considered for early pediatric surgical consultation.

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Utility of Pediatric Early Warning Score (PEWS) in Predicting Hospital Length of Stay

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Background Emergency Department (ED) is often the first point of contact for medical services. Early identification of patients at risk of clinical deterioration and matching the severity of illness to appropriate level of medical care are integral components of high-quality medical care. Pediatric Observation Units (POU) for monitoring and short treatment course are emerging as alternative sites of care for select diagnoses to minimize non reimbursable hospital admissions. Monaghan's Pediatric Early Warning Score (PEWS) is a 13-point assessment used to identify patients at risk of clinical deterioration and in need of intensive care scored between 0-3 for behavioral, cardiovascular and respiratory. There are limited studies evaluating the utility of PEWS in Pediatric ED (PED), predicting hospital length of stay (LOS) and usage of POU.

Objective To study the utility and correlation of PEWS in predicting LOS in a community hospital PED.

Design/Methods Retrospective chart review of patients between 0-18 yrs seen in the PED of Flushing Hospital Medical Center and admitted from Jan to Dec 2014. Demographic data included age, gender, ethnicity and primary diagnosis. PEWS in PED was calculated and LOS recorded. Patients admitted for psychiatric evaluation awaiting placement and patients with delayed discharge for social reasons were excluded. Data were analyzed using Microsoft Excel and GraphPad Prism test of correlation, $p<0.05$ was considered significant.

Results Of 737 charts reviewed, 18 met exclusion criteria. Of 719, 395 (55%) were male, 31% <12mos, 32% 13mos-3yrs, 19% 4-12yrs, 18%>12yrs and 64% Latin American descent. The most frequent diagnosis was respiratory 28% (pneumonia, asthma, bronchiolitis), followed by fever 12% and gastrointestinal 9% (oral intolerance, abdominal pain). PEWS was 2 and 3 in 33%. The mean LOS was 56.8hrs for PEWS 0-1 and 62.7hrs for PEWS ≥2, $p=0.0043$. LOS was greater by 9hrs in <3yrs compared to >3yrs. Using Spearman test of correlation, PEWS vs LOS [r:0.11,95%CI 0.04 to 0.19, $p=0.0018$], age vs LOS [r:-0.16,95%CI -0.2 to -0.08, $p<0.0001$], PEWS vs age [r:-0.002, 95%CI -0.07 to 0.07, $p=0.96$], respiratory domain vs LOS [r:0.09, 95%CI 0.019 to 0.16, $p=0.0115$].

Conclusion(s) PEWS correlated with LOS. More than half of the patients admitted were<3yrs of age with most frequent diagnosis of respiratory illnesses. PEWS is a useful tool in PED to determine disposition, hospital admission or POU.

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Utility of Leukocytosis in Predicting Serious Bacterial Infections in Children 2 to 5 Years of Age with Acute Emesis

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Background Acute vomiting (AV) is a common nonspecific symptom in children. Leukocytosis (LK) in children is defined as white blood cell count (WBC) >15,000 cells/µl. LK prompts empiric antibiotic therapy and/or hospitalization. LK can be a stress response or dehydration from AV, especially when resolution of LK occurs without medical intervention. There are no studies predicting the value of LK in children presenting with AV for serious bacterial infection (SBI).

Objective To determine utility of LK in predicting SBI in children between 2-5 years with LK and AV.

Design/Methods Retrospective chart review of children aged 2-5 years seen in Flushing Hospital Medical Center Pediatric Emergency Department (PED) between Jan 2012 and Dec 2017 with AV and LK. Charts with recent SBI (within 3 days), antibiotic or systemic steroid use, medications that may cause vomiting and children with underlying chronic conditions that predispose to SBI were excluded. Age matched controls had LK without AV. Data collected included age, gender, ethnicity, presence of fever, presence of other associated symptoms (cough, abdominal pain), culture results (blood, urine, CSF, stool), WBC, BUN and creatinine. Data were analyzed using Microsoft Excel, GraphPad Prism and chi square, $p<0.05$ was considered significant.

Results Of 132 patients identified to have AV and LK, 28 (20.6%) met exclusion criteria. Of remaining 104 (79.4%), mean age was 3.4 years, 50% male, 75% Hispanic. Associated symptoms included abdominal pain 37 (35.6%), fever 30 (28.8%) and cough 19 (18.3%). SBI was in 5 (4.8%), one (20%) had UTI and 4 (80%) pneumonia. BUN/Cr>35 was in 85 (81.7%). Of age matched controls (n=104), mean age was 3.3 years, 58.7% male, 78% Hispanic. Associated symptoms included fever in 61 (58.7%) and cough 38 (36.5%). SBI was in 18 (17.3%), 10 (55.6%) pneumonia, 4 (22.2%) UTI, 2 (11.1%) pharyngitis, 1 (5.6%) each for bacteremia and bacterial enteritis. BUN/Cr >35 was in 30 (28.8%). SBI was greater in control group, $p=0.014$. BUN/Cr>35 was greater in study group, $p<0.0001$.

Conclusion(s) Children with LK and AV had statistically significant lower number of SBI and higher BUN/Cr compared to children with LK without AV. Higher BUN/Cr in children with LK and AV was suggestive of dehydration. LK with AV in children is not a reliable predictor of SBI.

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Predictive Value of Urinalysis in Infants Less Than Two Months with Urinary Tract Infection

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Background Occurrence of first urinary tract infection (UTI) is highest in a male infant between age 0-12 months. American Academy of Pediatrics UTI guidelines of 2011 suggested incorporation of a positive urinalysis (UA) into definition of UTI if the sample collected is positive for nitrites (N), leukocyte esterase (LE), white blood cells (WBC) or bacteria on gram stain in a febrile child <2 months of age. Although UA is predictive of UTI in adults, UA is neither sensitive or specific enough to be used alone to make the diagnosis of UTI in infants <2 months of age. Diagnosis of UTI is based solely on a positive urine culture (UC). There are limited studies on prediction of UTI in infants <2 months of age with altered UA.
Objective To determine predictive value of UA for UTI in children <2 months of age.
Design/Methods A retrospective study of infants aged 0-2 months visiting Flushing Hospital Medical Center Pediatric Emergency Department (PED) between 2012 and 2017 with fever and having UC collected by urinary catheter or suprapubic puncture. Exclusion criteria include infants aged 0 to 2 months without fever, with abnormalities of urinary tract or previous UTI. Data including gender, ethnicity, fever, and reason for PED visit, UA findings, result of UC and other cultures were collected. G1 included UC positive and G2 UC negative infants. Data were analyzed calculating sensitivity, specificity and positive predictive value (PPV) for every component of UA, $p<0.05$ was considered significant.
Results From a sample of 204 patients, 58.3% were male, 74% Hispanic and 25% Asian. There were 72 (35.3%) in G1and 132 (64.7%) in G2. Presence of N, LE, WBC and bacteriuria was compared for G1 and G2, with sensitivity, specificity and PPV for each component of UA
(Table 1).
Conclusion(s) In infants < 2 months of age, detection of N, LE and WBC in UA had higher specificity and PPV was not significant for bacterial growth in UC. WBC alone was detected in less than a half of infants with positive UC, suggestive of lower sensitivity. WBC plus positive LE and N on UA indicated higher specificity.

Table 1

Total (n=204)	N	LE	WBC	Bacteriuria
G1 (n=72)	9 (12.5%)	34 (47%)	34 (47%)	49 (68%)
G2 (n=132)	0 (0%)	11 (8.3%)	9 (6.8%)	41 (31.1%)
Sensitivity (%)	6.38	47.22	79.07	54.44
Specificity (%)	100	91.67	76.40	79.82
PPV (%)	*	62.53	47.22	68.06
p value	< 0.001	<0.001	<0.001	<0.001

$p < 0.05$ was significant

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Using a Modified Pulmonary Index Score to predict hospital and ICU admission in the Pediatric Emergency Department
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Background The Modified Pulmonary Index Score (MPIS) is a validated clinical asthma score developed to quantify illness acuity in children with acute asthma. MPIS includes 3 objective and 3 subjective measures that are added to make a composite score between 0-18: O2 saturation, accessory muscle use, inhalation-exhalation ratio, wheezing, heart rate and respiratory rate. MPIS is highly reproducible and utilized to gauge severity of illness in patients with acute asthma exacerbations in our emergency department (ED).
Objective Our goal was to assess accuracy of the MPIS in determining safe disposition of children with asthma from the ED.
Design/Methods A single site retrospective chart review was completed from 4/2014-2/2017 for patients with a diagnosis of asthma exacerbation in the ED. Data were collected on demographics, treatments, and outcomes. Initial MPIS scores at ED presentation and degree of improvement in MPIS scores during ED stay were analyzed as predictors of ED length of stay and hospital/ICU admission. A multivariate logistic regression, controlling for demographic/acuity variables and medication administration, was performed to

determine if MPIS scores and change in scores predict hospital admission and ED LOS.
Results We collected 4943 patient encounters (Table 1). Median LOS in the ED was 3 hours. Higher initial MPIS is associated with longer LOS in the ED (Table 2). Patients with a larger mean difference of first to last MPIS (more interval improvement) were less likely to get admitted to the hospital ($p<0.01$). Less interval improvement in MPIS scores in the ED and higher MPIS scores at hospital admission are associated with longer hospital LOS ($p<0.01$). A Multivariate logistic regression found that MPIS was a predictor of hospital admission (OR=1.467, 95% CI 1.407-1.530). For patients admitted to the hospital, higher initial MPIS (OR=3.024, CI 2.321-3.939) was associated with ICU admission. More clinical improvement while in the ED (more change in first to last MPIS) was associated with less likely need for ICU admission (OR=0.441, CI 0.354-0.549) and predictive of discharge from the ED (OR=0.783, CI 0.752-0.814).
Conclusion(s) An easily replicable respiratory score obtained at ED arrival may help predict hospital and ICU admission. Interval changes of the MPIS respiratory score while in the ED can further help predict hospital admission and length of stay. The MPIS can be a tool in pediatric EDs to more rapidly determine safe disposition of patients with asthma exacerbation.

Demographics		
	Mean	**Standard Deviation**
Age	5.96 years	4.38
Gender	Female 1874 (37.9%) Male 3069 (62.9%)	
Race	White 1061 (21.5%) Black 1442 (29.2%) Other 2440 (49.3%)	
Language	English 4397 (89%) Other 546 (11%)	
Weight in kg	26.88 kg	20.2
Steroids	Yes 3876 (78.4%) No 1067 (21.65)	
Time to steroids	93.37 minutes	66.8
Alb y/n	Yes 4685 (94.8%) No 258 (5.2%)	
Time to Alb	68.11 min	282.06
CXR y/n	Yes 1584 (32%) No 3359 (68%)	
Insurance y/n	Medicaid 3513 (71.1%) Private 1325 (26.8%) Self-Pay 105 (2.1%)	
ESI level	3.1	0.675
First MPIS	7.06	3.21
Last MPIS	5.78	2.92
Difference MPIS First to Last	1.28	2.38
Admit to Hospital from ER (any)	Yes 1539 (31.1%)	
Admit to ICU from ER	Yes 133 (2.7%)	

Patient Demographics

Multivariate Logistic Regression Analysis		
Outcome	**Odds Ratio**	**Confidence Interval**
Likelihood of Hospital Admission using First MPIS		
First MPIS	1.467	1.407-1.530
Insurance Type		
- Medicaid	2.888	1.336-6.234
- Private	2.334	1.053-5.174
Steroids in ED	1.003	1.001-1.004
Chest X-ray in ED	0.245	0.201-0.299
Emergency Services Index	0.455	0.383-0.540
Likelihood of Hospital Admission to the ICU using First MPIS		
First MPIS	3.024	2.321-3.939
Difference in first to last MPIS (Improvement in MPIS score)	0.441	0.354-0.549
Steroids in ED	1.005	1.001-1.010
Chest X-ray in ED	0.397	1.170-0.927
Likelihood of Hospital Admission using difference in first to last MPIS		
Difference in first to last MPIS (Improvement in MPIS score)	0.783	0.752-0.814
Insurance Type		
- Medicaid	2.314	1.015-5.276
- Private	2.014	0.864-4.696
Chest X-ray in ED	0.230	0.187-0.281
Emergency Services Index	0.223	0.185-0.269
Age	0.949	0.925-0.974

Multivariate Regression Analysis was performed. Controls were gender, language, race, chest x-ray performed, insurance type, age, time to steroids, time to albuterol, emergency services index (level 1-5; 5 is the lowest triage level). Higher first MPIS was the strongest predictor for Hospital Admission as well as admission to ICU. A smaller difference in first to last MPIS was predictive in hospital and ICU admission. Patients with larger difference in first to last MPIS were more likely to be discharged home from the emergency department.

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Frequency of obesity in an urban pediatric emergency department (PED): BMI versus waist circumference percentiles

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Background Pediatric obesity requires multi-tiered prevention efforts. Pediatric emergency departments (PED) can screen for obesity risk, reinforce health messages, and refer for interventions. Overweight/obesity is typically identified by body mass index percentile (BMIP). Waist circumference percentiles (WCP) may provide additional information about the negative health effects of excessive adiposity in children.

Objective To describe the frequency and differences of obesity categorizations in children seen at an urban PED using BMIP and WCP, and compare these to U.S. nationally-representative data.

Design/Methods A convenience sample of children were recruited in the PED. Children aged 5 to 18 years were approached; only those critically ill or with psychiatric emergencies were excluded. BMIP was calculated from measured weight/height, calculating BMI and comparing to the age- and sex-specific 2000 CDC growth charts. Waist circumference percentile was obtained by comparison with the National Health and Nutrition Examination (NHANES) 2009-2014 with regression lines calculated for every 5th percentile across age, sex and racial/ethnic groups.

Results Of 925 children consented, 50% were male, fell equally into three age groups (5-8, 9-12, 13-18 years), and were diverse (39% white, 37% Hispanic, 14% African Am, 10% other). We observed higher rates of obesity than that reported in the NHANES. Using BMIP, 21% were obese (including 7.6% extreme obesity), 17% overweight, 60% normal weight and 2% underweight. These rates exceeded NHANES 2011-2014 with 17% obesity and 5.8% extreme obesity. For our sample and NHANES, WCP assigned lower frequencies of obesity. We observed 10% overweight and 10% obese (68% normal weight, 12% underweight). These rates again exceeded NHANES 2011-2012, which had rates of overweight around 12% and obesity from 5 to 8%. The greatest differences in obesity frequency characterized by BMIP versus WCP in our sample were amongst the 13-18 age group (17.6% versus 5.9%) and for African Americans (26.4 vs. 10%).

Conclusion(s) In this diverse urban population of children, percentiles for BMI and waist circumference identified higher rates of obesity than national rates. Using both BMI and waist circumference percentiles may clarify level of obesity risk in PED settings for tailored prevention messages and treatment referral.

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A Descriptive Study of Widened Pulse Pressure in the Pediatric Emergency Department

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Background Peripheral vasodilation can cause a drop in systemic vascular resistance and thus a drop in diastolic BP. This can lead to a widened pulse pressure (WPP). This effect can be seen with medications such as albuterol and has been associated with illness states such as septic shock or anaphylaxis. However, there have not been any descriptive studies regarding the presence of WPP in the general pediatric population.
Objective The objective of this study is to determine overall rates of WPP, associated diagnoses and outcomes for patients in a pediatric emergency department (PED).
Design/Methods We retrospectively reviewed the charts of all patients aged 3 months –17 years who presented to the PED and had blood pressures recorded over 2 separate 2 week periods, in January and July. We reviewed patient demographics, disposition, diagnosis, medication use, and hospital return rates.
Results A total of 3,135 patient visits met these criteria and there were a total of 8,026 blood pressures recorded for these visits. Of all individual blood pressures recorded 10.8% were widened and 17.7% of all patient visits had a WPP at some point during their ED stay. Albuterol was administered to 232 patients, of which 36% had a WPP.
Thirty percent of patients with WPP were febrile during their ED stay as compared to 19% of patients without WPP (see table 1).
The rates of admission were 30% in patients with WPP as opposed to 9.1% in patients without WPP. The rates of discharge diagnoses categorized as "infectious" were similar between the 2 groups, around 39%. However, in patients with WPP with an infectious diagnosis the admission rate was approximately 33% compared to patients without WPP with an infectious diagnosis who had an admission rate of 8.7%.
Of the patients with WPP, 6.11% returned within 7 days of ED visit compared to 6.9% of patients without WPP (see table 2).
Conclusion(s) Despite physiologic rationale correlating WPP with severe disease processes or specific medication use, WPP is very frequently seen in pediatric ED patients, affecting approximately 18% of patient visits. WPP is seen in approximately 1/3rd of patients who have received albuterol in the ED.
The overall rate of infectious diagnoses does not seem to differ in WPP vs non WPP groups, however, the rates of hospital admission and PICU admission are higher in the WPP group, suggesting that this group may represent a more ill population. If discharged, however, patients with WPP had no higher rates of return to the ER within 7 days.

Table 1: Characteristics of those with Widened Pulse Pressure versus those without a widened pulse pressure

	WPP (%)	Without WPP (%)
Fever	30	19
Albuterol Given	15	5.3
Discharged	69	90
Admitted	30	9.1
Admitted to PICU	6	1.0
Returned within 7 days	6.1	6.9

Infectious diagnoses versus non-infectious diagnoses with their respective disposition in each category of widened pulse pressure versus those without a widened pulse pressure

	WPP, n=544 (%)	Without WPP, n=2514 (%)
Infectious Total:	217 (39.9)	976 (38.8)
Infectious with admission	72 (13.2)	85 (3.4)
Infectious discharged	145 (26.7)	891 (35.4)
Non-Infectious Total:	327 (60.1)	1538 (61.2)
Non-infectious with admission	94 (17.3)	147 (5.8)
Non-Infectious discharged	233 (42.8)	1391 (55.3)

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Mixed-Methods Analysis: Reasons for Head CT in Low and Intermediate PECARN Risk Group
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Background Children with minor blunt head trauma (MBHT) commonly present to an emergency department (ED). While the risk of clinically important traumatic brain injury (ciTBI) in children with MBHT is low, the approach to imaging varies. CT imaging will identify intracranial pathology, but also exposes a child to radiation and increases lifetime risk of malignancy.

In 2009, the Pediatric Emergency Care Applied Research Network (PECARN) published a validated clinical prediction rule to risk stratify children with MBHT. Since their introduction, few studies have examined clinical reasoning for a CT scan in children at low or intermediate risk for ciTBI. Our objective was to determine the rates of CT and the common reasons why such children were scanned.
Objective
Design/Methods This was a multicenter study involving five northeastern Pediatric EDs between July 2014 and December 2017 and using a mixed-methods approach. An institutional review board approved the study at each site. Data was collected on a convenience sample of children presenting with MBHT. Cases were retrospectively collected from a larger database of children presenting to an ED with MBHT. The number of CT scans performed and the qualitative reasons why a CT was done were analyzed.
Results Of 694 patients captured, 39 (5.6%) were deemed PECARN high risk, 288 (41.4%) intermediate risk, and 367 (52.9%) low risk, with 89 (12.8%) undergoing CT: 35 high risk (89.7%), 49 intermediate risk (17.0%), 5 low risk (1.4%). Among the intermediate and low risk, 24 (44.4%) had no stated reason for CT. Of the 30 with reasons stated, 10 (33.3%) were core PECARN criteria, 6 (20.0%) were intermediate risk modifying factors, and 14 (46.7%) fell outside PECARN. Reasons for intermediate risk patients included core PECARN criteria such as “patient not acting normally” and “severe mechanism of injury” in patients under 2 years of age, and “vomiting” in those over 2 years. Of the intermediate risk modifying factors in children under the age of 2, “young age” was most common, and in those 2 years and older, “worsening clinical exam” and “multiple findings” were most noted. No low risk patients had a CT due to PECARN criteria; reasons for imaging these 5 patients are listed in Table 2.
Conclusion(s) Physicians stated reasons for CT in all low risk patients. Reasons were often not stated when a CT was obtained for an intermediate risk child with MBHT; however, when stated, the reason often followed core or additional PECARN criteria.

Table 1: Attending Risk Classification: CT Scan Rate per PECARN Group

High Risk	35/39 (89.7%)
Intermediate Risk	49/288 (17.0%)
Low Risk	5/367 (1.4%)

Table 2: Clinical Reasons Why CT Scans were performed in Low and Intermediate Risk Groups

Low and Intermediate risk	Non-PECARN reasons:	
	Unclear Mechanism	
	Additional, significant medical risk factors (eg. current anticoagulation, hemophilia, seizure disorder	
	Request from consulting service	
	Patient sleepiness	
Intermediate risk only (CT vs. observe)	Age <2 years:	Age > 2 years:
	Core PECARN criteria	
	Not acting normally per parent	Vomiting
	Severe mechanism of injury	Severe Headache
	Other PECARN criteria:	
	Young age	Worsening clinical exam
	Age <3 months	Multiple findings
		Parental preference

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Abstract: 60

Emergency Management of SCD Pain Crises: Current Practices and Playing Variables

Mohamed Almuqamam[1], Josue Diaz-Frias[1], Marium Malik[1], Ali Abdulnabi Mohamed[2], Aziza Sedrak[1]

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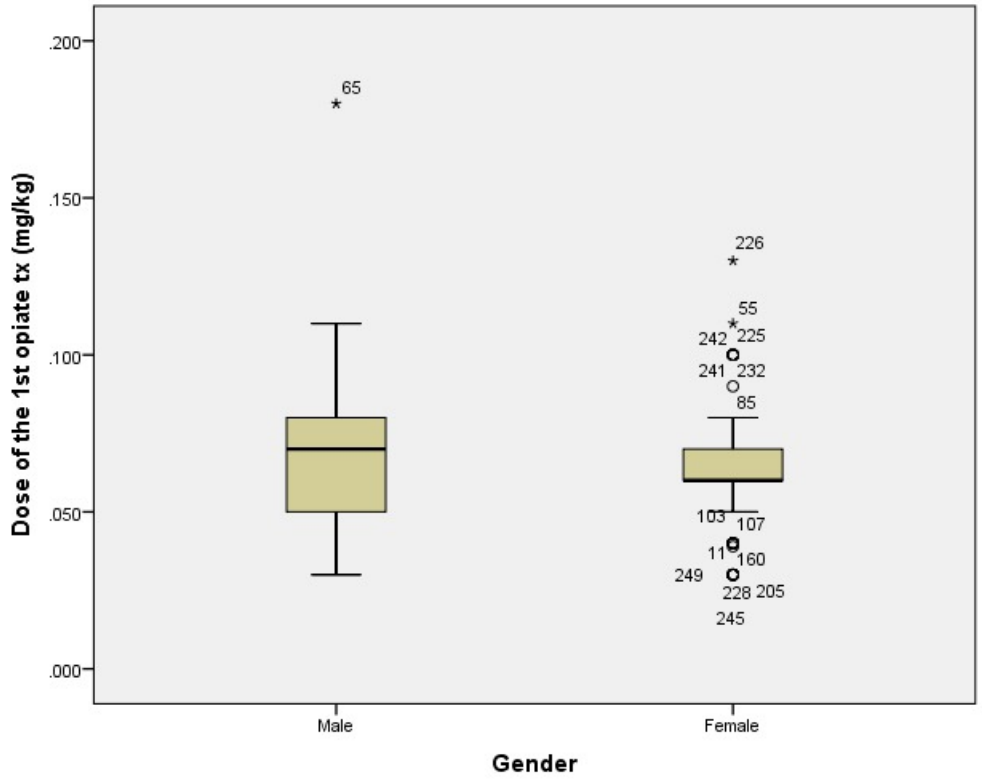
Background Acute pain episode is a common reason for patients with sickle cell disease to present to the Emergency Room. This study is designed to assess the role of multiple factors that might affect the time from Emergency Department triage to the administration of the first opiate pain medication and its dosage, to compare current practices with the American Pain Society Guideline for the Management of Acute and Chronic Pain in Sickle-Cell Disease in the Emergency Department.

Objective By identifying and recognizing some of the factors that delay or affect the proper dosing of the pain medications, we aim to implement suitable and plausible changes to ensure better emergency care for these sickle cell disease patients.

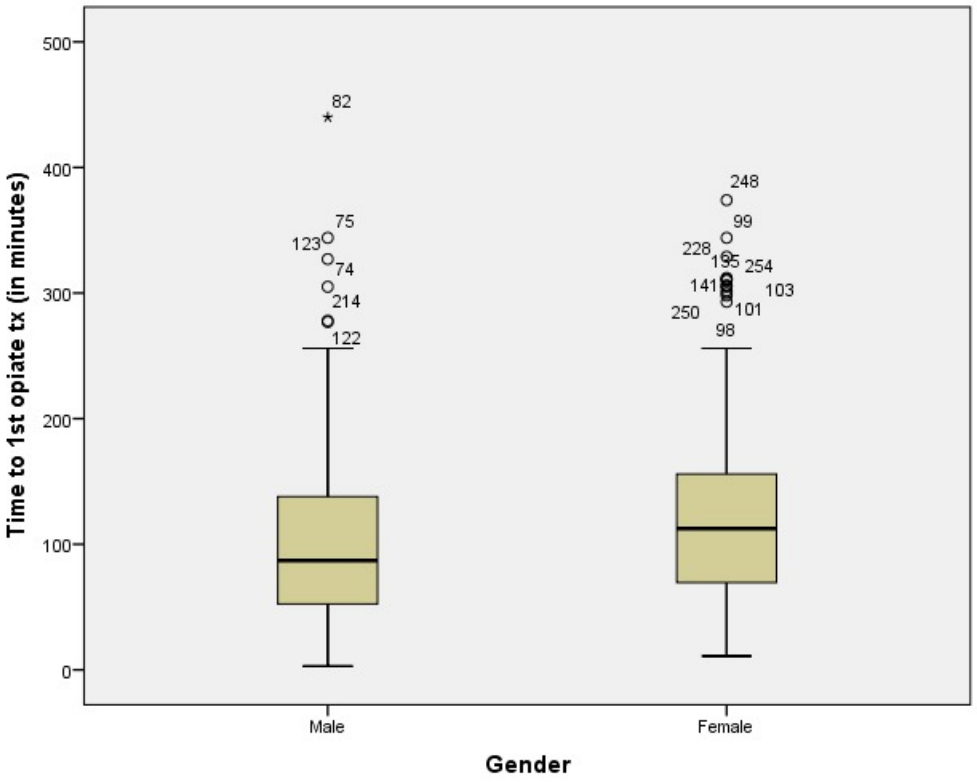
Design/Methods This is a cross-sectional retrospective descriptive study that relied on collecting non-identifiable data from the local Electronic Medical Record to assess for possible relationship between the proposed set of factors/variables and the time to administration of the 1st pain medication and it's dosage. The population in question includes the entire sickle cell disease patients' population (HB-SS, HB-SC, HB-SD, HB-SB^+ and HB-SB^0) that are under the care of our Pediatric Hematology-Oncology clinic with the age range of 1 day to 21 years. The factors include age, gender, pain assessment/scale, time of presentation, mode of arrival, presence or absence of IV access at presentation, and ESI acuity.

Results There were 259 patient Emergency Room visits with 148 unique patients. Mean (SD) age of the entire study population was 15.98 (+/- 4.08) years and 61.8% of the patients were females. Average time to 1st opiate pain medication was 120.27 minutes (SD +/- 78.4) and average doses of Morphine and Hydromorphone were 0.067 mg/kg and 0.053 mg/kg respectively. Longer waiting time to 1st opiate pain medication were found in females with a mean difference of 25.5 minutes (95% CI 20 – 80.5 P value 0.027), older patients and patients with least severity ESI score (correlation coefficient of 0.214 & 0.134 (p values of 0.001 and 0.031) respectively). On the other hand, there seems to be a negative correlation between the time to 1st opiate and the pain score with a negative correlation coefficient of -0.22 (p value of <0.001).

Conclusion(s) Overall, patients with acute SCD pain experienced significant delays when seeking pain relief in the. The followig patients experienced the longest delays: those assigned a lower triage priority level, female patients, patients with lower pain score and older patients.



Dose of 1st opiate treatment vs gender



Time to 1st opiate treatment vs gender

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Abstract: 61

Not so FAST: A potential pitfall of Focused Assessment with Sonography in Trauma

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Background Focused assessment with sonography in trauma (FAST) ultrasounds are frequently used to evaluate for intra-abdominal injury. In hemodynamically stable children, the use of FAST has been studied as a component of trauma evaluation, but the benefit is unclear. One potential confounding factor in interpreting FAST is the presence of physiologic free fluid, which can be indistinguishable from intra-abdominal bleeding. Trace pelvic free fluid is commonly found in female patients although is uncommon in young male children.

Objective

Design/Methods A case series of patients from an academic emergency department from August to November 2017. Ultrasounds were performed using a SonoSite X-Porte ultrasound. Included patients had blunt abdominal injury with hemodynamic stability and a FAST exam that was falsely positive due to trace pelvic free fluid.

Results During a 4-month period, four pediatric patients were identified with positive FAST exams (trace pelvic free fluid on FAST) which were found to be falsely positive on follow-up. The volume of pelvic fluid was <10 mL. The first 3 patients underwent abdominal computed tomography (CT), which revealed no injury or free fluid. The fourth patient was observed and remained asymptomatic. Three of the four patients were young males (<5 years); the positive FAST influenced the decision to obtain CT in these patients.

Conclusion(s) Use of FAST ultrasound in hemodynamically stable children with blunt abdominal trauma can have unintended consequences, including use of CT scan. Further research is indicated to clarify the role for FAST in children.

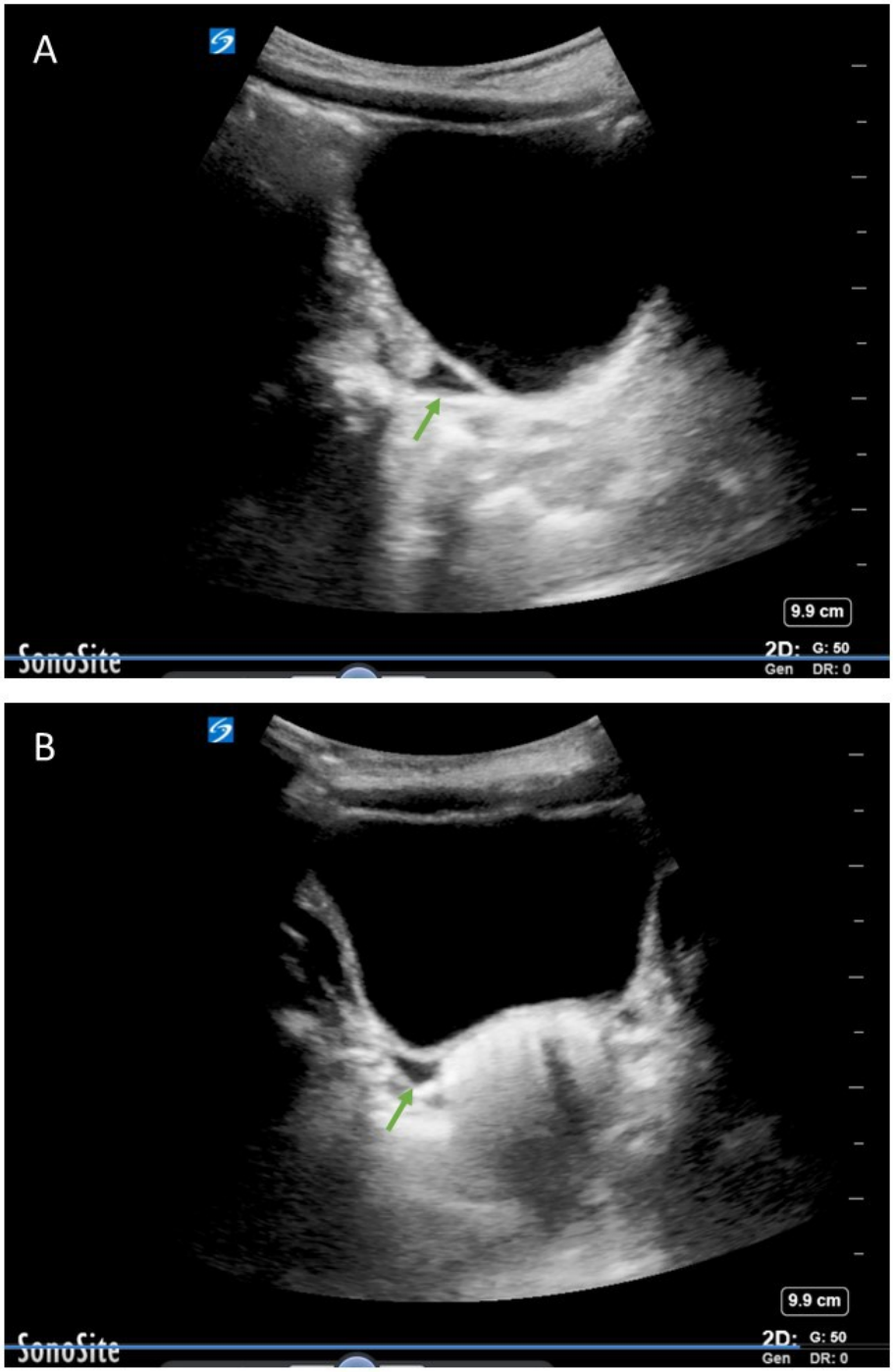

Figure: Positive FAST ultrasound with trace pelvic free fluid. (A) Sagittal and (B) transverse views.

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Abstract: 62

SCHOOL READINESS IN LATE-PRETERM BABIES

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Background The rate of infants born late preterm (34 weeks + 0/7 days to 36 weeks 6 /7 days) in 2016 is 7.09%. At 34 weeks of gestational age, the overall brain weight is only 65% of brain weight at 40 weeks. Potential brain damage as a result of premature birth can occur in the structural maturational processes of the brain and maturation of neurochemical and enzymatic processes. There is contradicting data with developmental delays and ADHD prevalence when later-preterm babies are compared to term babies (born 37 weeks 0/7 days to 41 weeks 6/7 days). And there is very limited data about babies in underserved population where statistics are limited.

Objective To assess differences in school readiness and behavioral concerns reported by parents in late-preterm babies (LPB) when compared with term babies (TB) at 5 years of age, in underserved population.
Design/Methods This is a cross-sectional study in children who were 5 years old by December 2017 who come to Brookdale Family Care Center- New Lots Clinic. Children born with congenital heart disease, TORCH infection, encephalopathy, seizures or CNS problem were excluded from the study. Parents were asked to fill a demographic questionnaire, Ages and Stages Questionnaire and the Vanderbilt Assessment Scale Parent Questionnaire. Test scores from TB and LPB groups were compared.
Results A total of 89 subjects were enrolled in the study after exclusion criteria (27 LPB and 62 TB).
English as primary language at home and the need for special education services were higher in the LPB group (p=0.036 and p=0.03, respectively). There was no other statistical difference in demographics between both groups. Table 1).
LPB group showed Vanderbilt inattention and hyperactivity higher scores; in addition, they scored lower in communication, gross motor, fine motor, problem solving, personal-social and readiness (Table 2).
Conclusion(s) Behavioral problems seem to be more prevalent at age 5 among LPB than among TB. LPB also have more developmental delays in gross motor, fine motor, communication, problem solving, personal-social and school readiness. Due to developmental delays and behavioral problems, LPBs may be at higher risk of lacking school readiness, making it a vulnerable group for having learning problems.

TABLE 1

	Late preterm n-27	Late preterm %	Term n-62	Term %	p values
Gender Male Female	12 15	44.4% 55.6%	32 30	51.6% 48.4%	0.554
Ethinicity Afro-american Latino Middle Eatern Others	24 0 3 0	88.9% 0.0% 11.1% 0.0%	47 1 5 9	75.8% 1.6% 8.1% 14.5%	0.175
Primary Language English Other languages	23 4	85.2% 14.8%	39 23	62.9% 37.1%	0.036
Medical Insurance Medicaid Other	21 6	77.8% 22.2%	50 12	80.6% 19.4%	0.757
Feeding till 6 months Breast milk Formula Mixed	3 15 9	11.1% 55.6% 33.3%	18 31 13	29.0% 50.0% 21.0%	0.147
Mother's level of education Less than high school High school diploma/GED Some college College graduate	0 17 2 5	0.0% 63.0% 7.4% 18.5%	6 26 5 19	9.7% 41.9% 8.1% 30.6%	0.248
Maternal age Less than 20 years 20-30 years 30-35 years Greater than 35 years	3 12 7 5	11.1% 44.4% 25.9% 18.5%	12 29 11 10	19.4% 46.8% 17.7% 16.1%	0.690
Vision problem Yes No	2 25	7.4% 92.6%	7 55	11.3% 88.7%	0.576
Hearing problem	1	3.7%	1	1.6%	0.541

Yes No	26	96.3%	61	98.4%	
Special education Yes No	2 25	7.4% 82.6%	0 62	0.0% 100.0%	0.030
Early intervention services Yes No	4 23	14.8% 85.2%	1 61	1.6% 98.4%	0.103
Single parent Yes No	6 21	22.2% 77.8%	27 35	43.5% 62.5%	0.056
Recorded gestational age	Mean-35.69	SD-1.17	Mean- 39.31	SD-1.30	0.000
Child's age in months	Mean-60.48	SD-1.97	Mean-61.20	SD-2.53	0.148

TABLE 2

	Late preterm (n-27) Mean	Late preterm (n-27) SD	Term (n-62) Mean	Term (n-62) SD	p values
Vanderbilt Inattention score	1.93	1.82	0.58	0.98	0.001
Vanderbilt hyperactivity score	1.52	1.40	0.37	0.98	0.000
ODD score	0.04	0.19	0.03	0.18	0.910
Communication score	36.85	4.19	50.40	6.02	0.000
Gross motor score	41.85	3.15	53.06	4.08	0.000
Fine motor score	36.48	4.77	51.85	3.97	0.000
Problem solving score	36.30	5.82	47.18	5.84	0.000
Personal-Social score	38.15	6.07	47.90	5.62	0.000
Readiness	37.93	2.51	50.08	3.17	0.000

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Abstract: 63

IMPLEMENTING PATIENT HEALTH QUESTIONNAIRE MODIFIED FOR ADOLESCENTS (PHQ-A) TO IMPROVE SCREENING FOR DEPRESSION AMONG ADOLESCENTS IN A FEDERALLY QUALIFIED HEALTH CENTER

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Background Depression is prevalent worldwide, and it is associated with adverse emotional and functional outcomes and suboptimal physical health. United States Preventive Services Task Force (USPSTF) noted that screening tools such as Patient Health Questionnaire modified for Adolescents (PHQ- A) and the primary care version of the Beck Depression Inventory (BDI) can help identify depression.

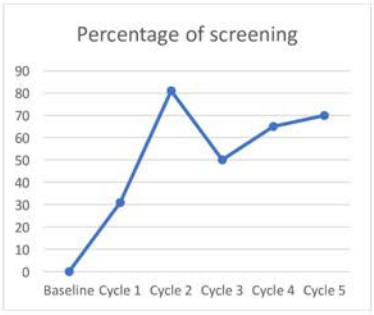
Ninety percent of pediatricians believe that recognition of child and adolescent depression is their responsibility, however 46% lacked confidence that they could recognize depression.

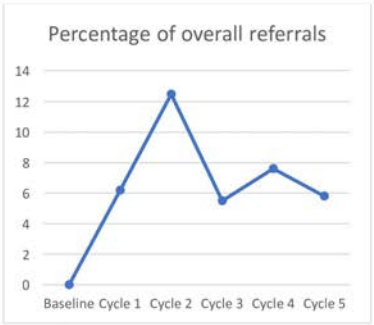
Objective The goal of this quality improvement project, is to implement a standardized questionnaire to improve screening, diagnosis and treatment of depression in children 12 to 17 years of age, in a Federally Qualified Health Center (FQHC).

Design/Methods This study was conducted as a quality improvement project for pediatric residents in a Federally Qualified Health Center (FQHC). Baseline data regarding percentage of patients screened and percentage of referrals to mental health services were obtained before implementation of PHQ-A screening by reviewing all charts for patients aged 12-17 who presented to the clinic for a well visit during one month before the start of the study. Adolescents in this age group were screened during their well visits using Patient Health Questionnaire Modified for Adolescents (PHQ-A). A score of 10 or more would warrant a referral to social worker and psychiatry. Five Plan-Do-Study-Act PDSA cycles were done and monthly data was collected.

Results The adolescent depression screening rate, significantly improved within six months of implementing this quality improvement

project. Screening rate improved to 50% by mid-study (PDSA cycle-3), up to 70% at the end of the six-month period (PDSA cycle- 5). There was also increase in the overall referral rate of all screened patients to mental health services from a baseline of 0% to 5.8% by the end of PDSA cycle-5. Of the patients who had a score of 10 or more, 100% were referred throughout the study period.
Conclusion(s) Improvement in screening for depression among adolescents using a standardized and validated screening tool led to improvement in the rate of referral to mental health services. Standardized screening tests with a scoring system help providers identify depression symptoms using a common language, especially in outpatient clinical setting where the patient may be seen by different providers.





1. Graph showing percentage screened
2. Graph showing percentage of referral

Demographics

Age	Mean	14.74 ± 1.65
	Median	15
	Range	11 - 17
Sex	Male	59

	Female	50
Race	African American	8
	American Native	1
	Asian	1
	Caucasian	17
	Hispanic	77
	Other	5
Language	Aragonese	1
	English	27
	Portugese	13
	Spanish	66
	Urdu	1
	Other	1

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Abstract: 64

Cautionary Tale of the Posterior Pneumomediastinum

Jessica E. Shui[1], Mary Rosenblatt[2], David A. Bateman[1], Rosanna G. Abellar[2], Alexis B. Rothenberg Maddocks[3], Jen-Tien Wung[1]

[1]Neonatology, Columbia University Medical Center, New York, New York, United States, [2]Pathology, Columbia University Medical Center, New York, New York, United States, [3]Pediatric Radiology, Columbia University Medical Center, New York, New York, United States

History (including chief complaint, history of present illness and relevant past and family medical history) Please see attached Word file.

Physical examination findings (including vital signs) Please see attached Word file.

Laboratory or Diagnostic imaging or Procedures Please see attached Word file.

Final Diagnosis Please see attached Word file.

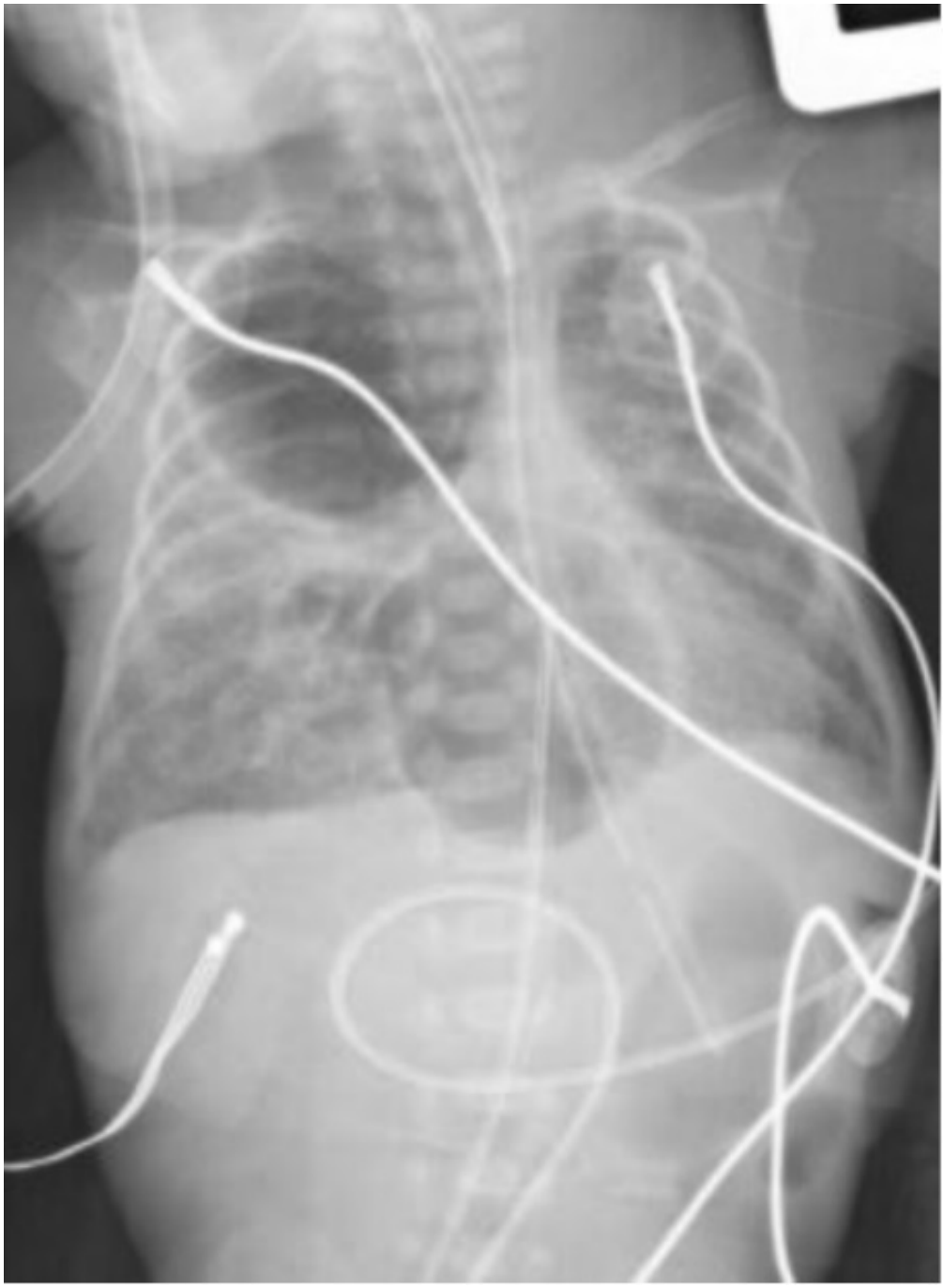

Figure 1: Day of life 7 routine x-ray

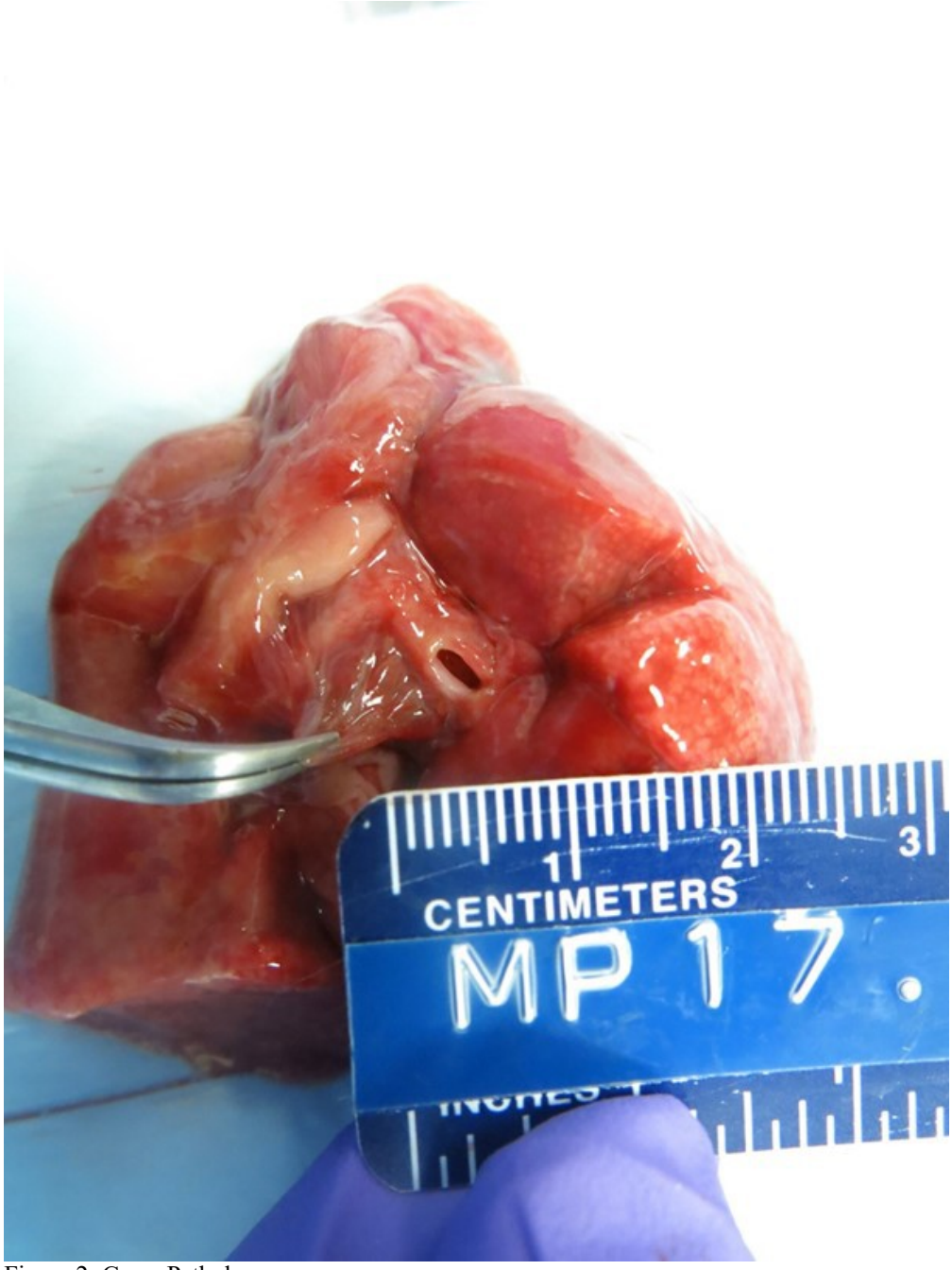

Figure 2: Gross Pathology

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Abstract: 65

MASSIVE UPPER GASTROINTESTINAL BLEED WITH GASTRITIS IN A TERM INFANT WITH STOOL ANTIGEN POSITIVE FOR HELICOBACTER PYLORI

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History (including chief complaint, history of present illness and relevant past and family medical history) A term male infant was born to a multigravid 38 yr old woman at 37 weeks of gestation.

Prenatal history was significant for chronic hypertension with superimposed pre-eclampsia and heartburn. Peripartum electronic fetal monitoring was Category I and infant was delivered vaginally with good Apgar scores. Placental pathology later showed acute chrorioamnionitis.

Infant was observed in the Intensive Care Unit for any impending respiratory events in view of high maternal Magnesium use. When

formula feed was initiated, there was brown gastric residuals later evolving into frank bleeding through orogastric tube on Day 2 of life. Intravenous Ranitidine and booster Vitamin K were given.
There was a significant drop in Hematocrit from 59.4% to 34.9% (decrease by 24.5%) by the end of the bleeding episodes on Day 3. No family history of bleeding disorders was present.
On Day 4 of life, the infant tested positive for Helicobacter Pylori Stool Antigen (HpSA) and an upper gastrointestinal endoscopy revealed significant erythema above gastro-oesophageal junction and patchy erosions noted at body, antrum and fundus with moderate inflammation. No active bleeding/massive ulcers noted. Bulbar duodenitis, proximal and distal gastritis were evident. Infant completed 7 days of antibiotics (Ampicillin+Gentamycin) in view of suspected early onset sepsis. Repeat HpSA test on Day 11 was negative. Ranitidine was continued for 2 weeks.
Physical examination findings (including vital signs) Vitals on admission: Heart Rate:146/min, Respiratory Rate: 52/min, Afebrile, Blood Pressure: 98/55 mmHg.
Examination: Abdomen was soft, non distended during NICU stay.
Laboratory or Diagnostic imaging or Procedures Labs: HpSA test was positive, Coagulation profile normal. Platelet count was within normal limits.
Endoscopy: Bulbar duodenitis, proximal and distal gastritis revealed on upper gastrointestinal endoscopy. Delayed gastric emptying evident with presence of curdled milk even after adequate pre-requisite fasting.
Final Diagnosis We report a rare occurrence of massive Upper Gastrointestinal Bleeding (UGIB) in a healthy, term infant with HpSA positive in the absence of other risk factors.The role of H pylori in healthy, term newborns presenting with UGIB remains to be established. The sensitivity and specificity of HpSA ranges from 85-100% and 82-99% respectively. This case illustrates that in term newborns with UGIB with no apparent risk factors, HpSA should be considered to understand its pathogenicity and causality in newborn UGIB.

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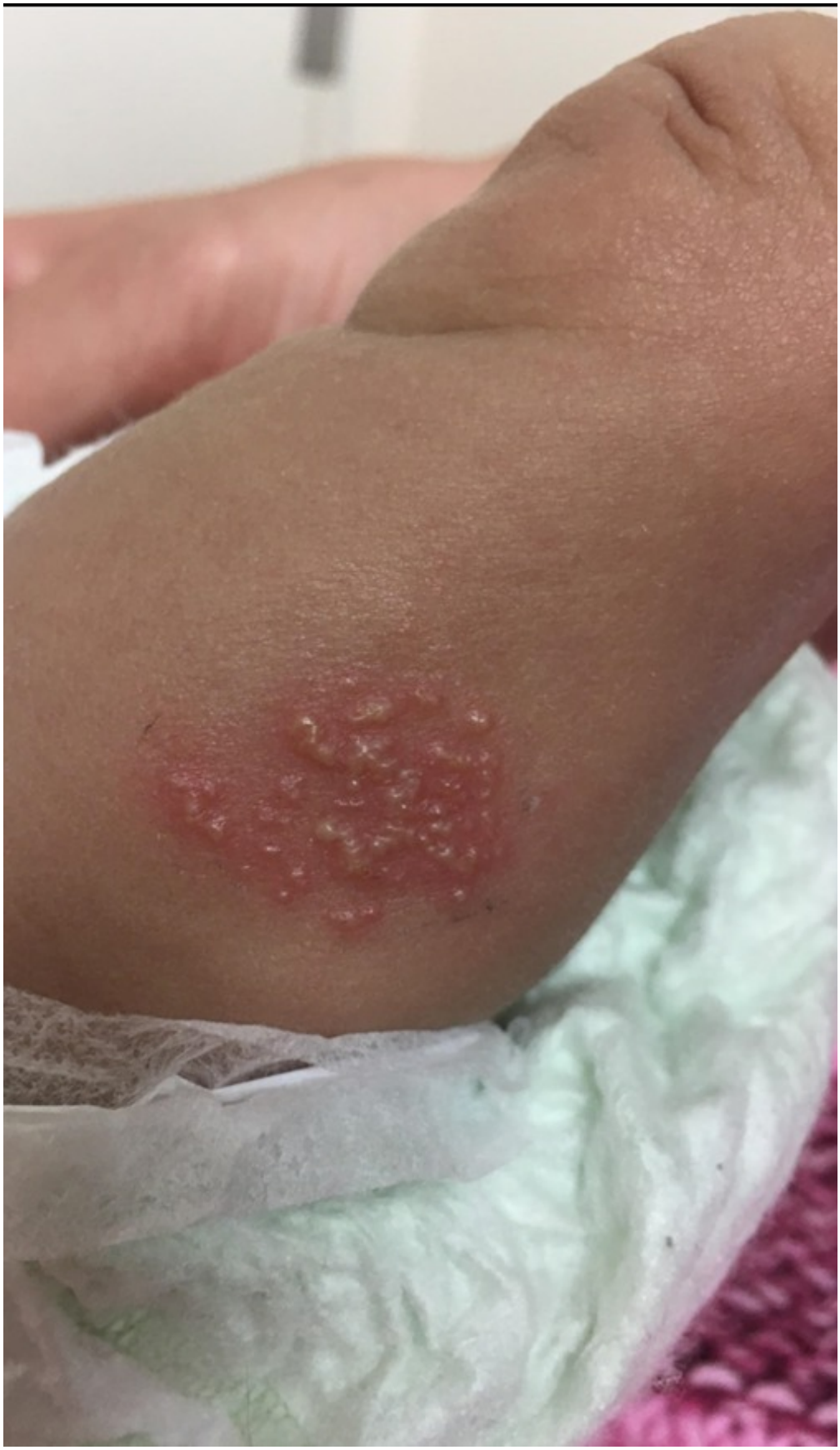
Abstract: 66

Just another infantile rash?

Milissa U. Jones[1], Michelle S. Flores[1], Rasheda J. Vereen[1], Sabrina R. Szabo[2], Nicholas F. Logemann[2], Matthew Eberly[3]
[1]Pediatrics, Walter Reed National Military Medical Center, Bethesda, Maryland, United States, [2]Dermatology, Walter Reed National Military Medical Center, Bethesda, Maryland, United States, [3]Pediatrics, Uniformed Services University of the Health Sciences, Bethesda, Maryland, United States

History (including chief complaint, history of present illness and relevant past and family medical history) See attachment
Physical examination findings (including vital signs) See attachment
Laboratory or Diagnostic imaging or Procedures See attachment
Final Diagnosis See attachment



Lesion at initial clinic visit

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Abstract: 67

Rare cause of maternal virilization and ambiguous genitalia in neonates.

Mahdi Alsaleem[1], Dianna E.Miller[2], Vasantha H. Kumar[1], Indrajit Majumdar[2]
[1]Pediatric/Neonatal Perinatal Medicine, University at Buffalo, Buffalo, New York, United States, [2]Pediatric/Endocrinology, University at Buffalo, Buffalo, New York, United States

History (including chief complaint, history of present illness and relevant past and family medical history) 6-hour old born at 41 weeks of gestation by normal vaginal delivery at home to a 28-year old G7P4 mother who received care through her midwife. Prenatal labs were within normal limits. Mother was on prenatal vitamins. No exposure to topical medications within the family. Mother was noted to have hoarseness of voice, coarse facial features, excess facial hair growth and significant nasal enlargement during the second trimester. Infant was born active, pink with good respiratory effort. Midwife noted ambiguous genitalia and was not able to visualize the urethral meatus. This prompted a transfer to our level 4 NICU for further evaluation. Family history is significant for a double first cousin (mother's sister married father's brother) with a similar genital abnormality. Infant has four older sisters and mother did not have symptoms with her other pregnancies.
Physical examination findings (including vital signs) Vitals were within normal limits for age.External genitalia showed enlarged phallus, complete fusion of the labioscrotal folds, urethral meatus at the base of the enlarged phallus, absence of vaginal opening, and non-palpable gonads, Figure 1. Rest of physical examination was within normal.
Laboratory or Diagnostic imaging or Procedures Infant remained hemodynamically stable throughout the admission. Pelvic ultrasound revealed the presence of ovaries and uterus. Voiding cystourethrogram showed normal urethral anatomy. baby had 46,XX karyotype. Cord Blood analysis showed Estradiol 2120 pg/mL (9,000-34,000pg/mL) , Androstenedione: 24840ng/dL (nl <80 ng/dL) DHEA-S 1420 mcg/dL (nl <360 mcg/dL). At 12 hours of life , FSH: 0.264 mIU/mL and LH: 0.147 mIU/mL were normal with elevated total Testosterone (90 ng/dL (16-44ng/dL)).

At 72 hours, 17OHP was 24 ng/dL (nl <78) Androstenedione 52 ng/dL (Day 1-7 20-290 ng/dL) DHEA-S 290 mcg/dL. Maternal labs drawn 6 hours' post-partum were notable for Estradiol 2200 pg/mL (Third trimester 3460- 6137 ng/dL,), high Testosterone concentration 1307 ng/dL (Third trimester 63-309ng/dL). On post-partum day 4, Estradiol (726 pg/mL) and Testosterone (599 ng/dL) were much lower. Infant remained hemodynamically stable throughout the admission. A tentative diagnosis was made and the infant was discharged on day of life 6 with follow up appointments arranged with pediatric endocrinology, pediatric urology, genetics, and psychology.
Final Diagnosis Aromatase Enzyme Deficiency (CYP191A1)

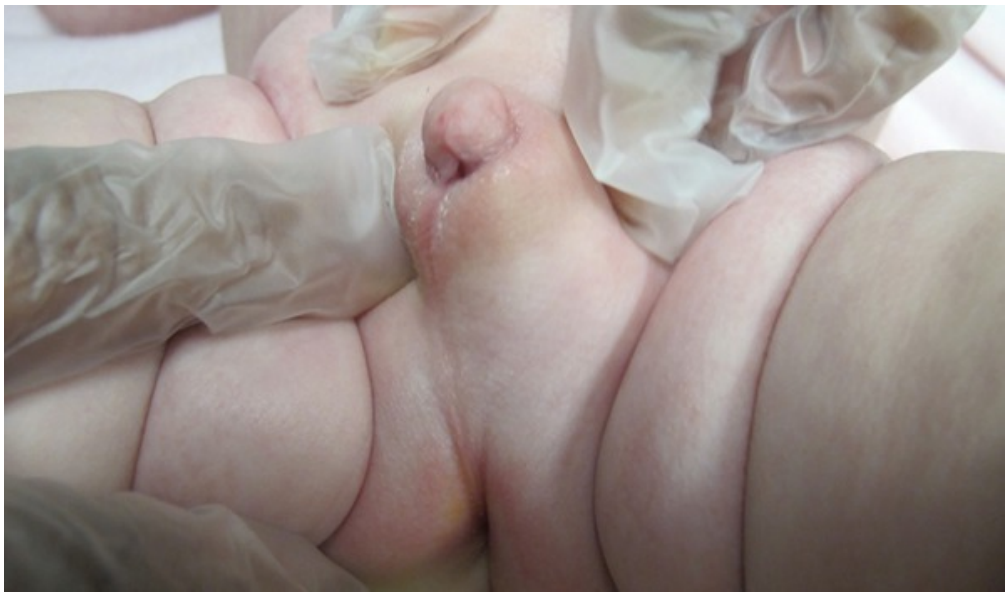
Figure 1: Infant's external genitalia

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Abstract: 68
Widespread Infection Seeding Multiple Systems
Sarah Kollar[1], Olga Toro-Salazar[2], Brooke Davey[2], Frederic Bernstein[2]
[1]Pediatrics, Connecticut Children's Medical Center, Hartford , Connecticut, United States, [2]Pediatric Cardiology, Connecticut Children's Medical Center, Hartford, Connecticut, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A 10-year-old male, presents with fever, vomiting, and profuse watery diarrhea. Usual state of health until 3 days prior, developed mouth pain after losing a tooth. Very sleepy and confused. No recent travel, raw meat intake, exposure to reptiles/animals. Labs showed hyponatremia;

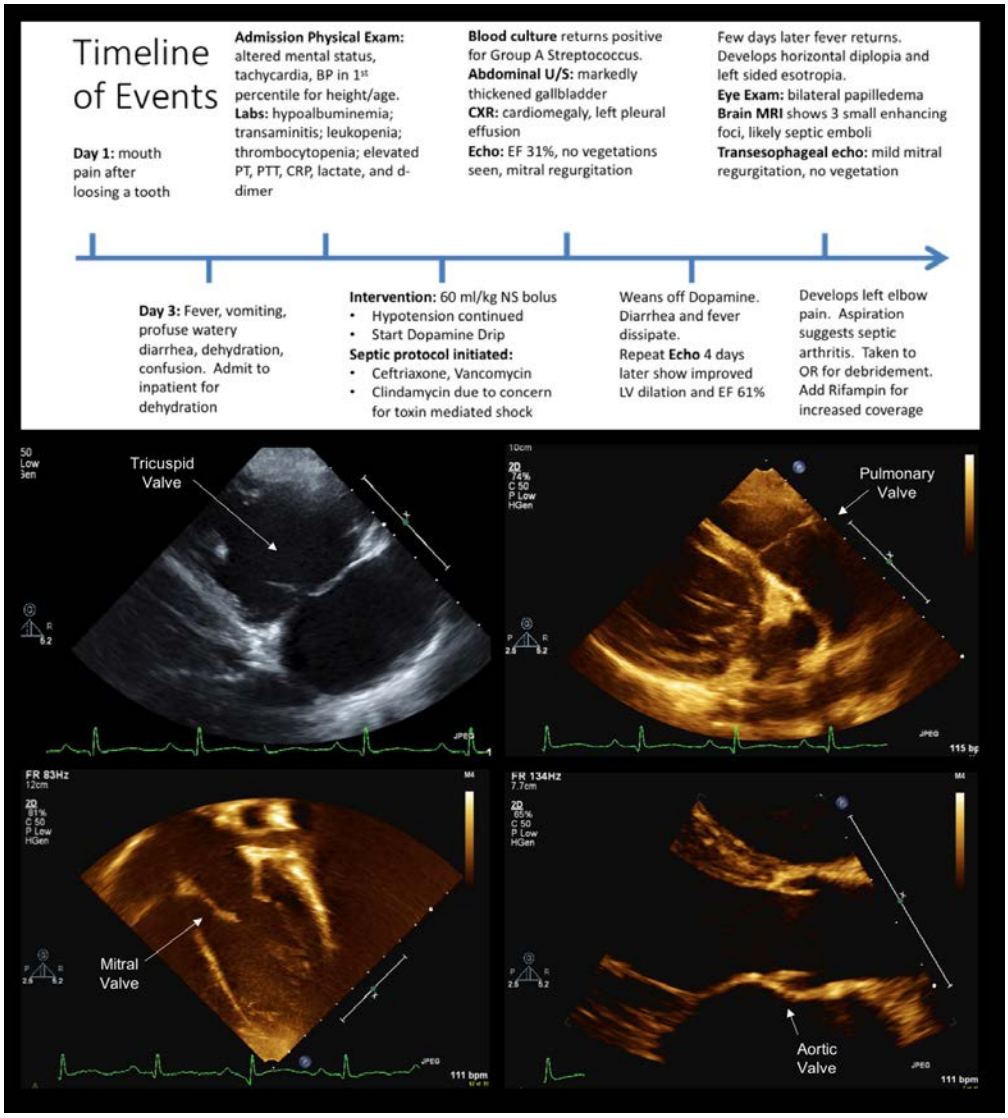
hypoalbuminemia; transaminitis; thrombocytopenia; elevated PT, PTT, CRP, lactate, and d-dimer. Received 60 ml/kg of normal saline. Started ceftriaxone, vancomycin, clindamycin, and dopamine drip. Blood culture positive for Group A Streptococcus. Abdominal ultrasound noted markedly thickened gallbladder. CXR noted left pleural effusion and cardiomegaly. ProBNP 10,226. Echo significant for EF of 31%, mitral regurgitation, and PFO.

Clinically improved, more alert and off dopamine. Diarrhea improved and fever abated for a few days. Repeat echo four days later showed improved EF to 61%.

Fever returned, with new onset horizontal diplopia and left sided esotropia. Brain MRI showed three small enhancing foci suggesting septic emboli. Eye exam noted bilateral papilledema. LP negative for infection. Transesophageal echo revealed mild mitral regurgitation, but still no vegetation.

New complaint of left elbow pain and stiffness. Aspiration of the elbow suggested septic arthritis, debrided in the OR. Remains on adequate coverage for GAS, but added Rifampin.
Physical examination findings (including vital signs) Very sleepy. Confusion with commands
HEENT: Tacky MM. No nasal discharge. Normal conjunctivae and pharynx
Neck: No rigidity or adenopathy
Cardio: RRR. Normal S1/S2. No murmur
Pulm: Normal breath sounds and effort. No wheeze, rhonchi, or rales
Abdomen: +epigastric, RUQ, periumbilical pain. No hepatosplenomegaly, rebound, guarding
MSK: + tenderness lower legs
Skin: +erythematous blanching macule on palms and soles. 4-6 petechiae on dorsolateral aspect of feet bilaterally
Laboratory or Diagnostic imaging or Procedures Labs:
Factor VIII normal
ANCA negative
Rocky Mountain Spotted Fever, Adenovirus, CMV, EBV, RSV, influenza: Negative

Imaging:
Transthoracic Echo 11/3: Mild LV dilation, EF 32%. Moderate mitral insufficiency. No vegetations
Transthoracic Echo 11/7: Improved EF of 63%
Transesophageal Echo 11/10: Mild mitral valve prolapse of anterior leaflet with thickened posterior leaflet. No vegetations
Brain MRI 11/15: Three small enhancing foci in the right frontal lobe and cerebellar hemisphere. Most likely etiology is septic emboli
Final Diagnosis A second TEE showed 1 x 1.6 cm vegetation with perforation of the posterior leaflet and moderate mitral regurgitation. Diagnosed with infective endocarditis. Discharged home with Lovenox and PICC line for 6 weeks of ceftriaxone.



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Abstract: 69

A Preterm Infant with In Utero Small Bowel Obstruction

Ramya Natarajan

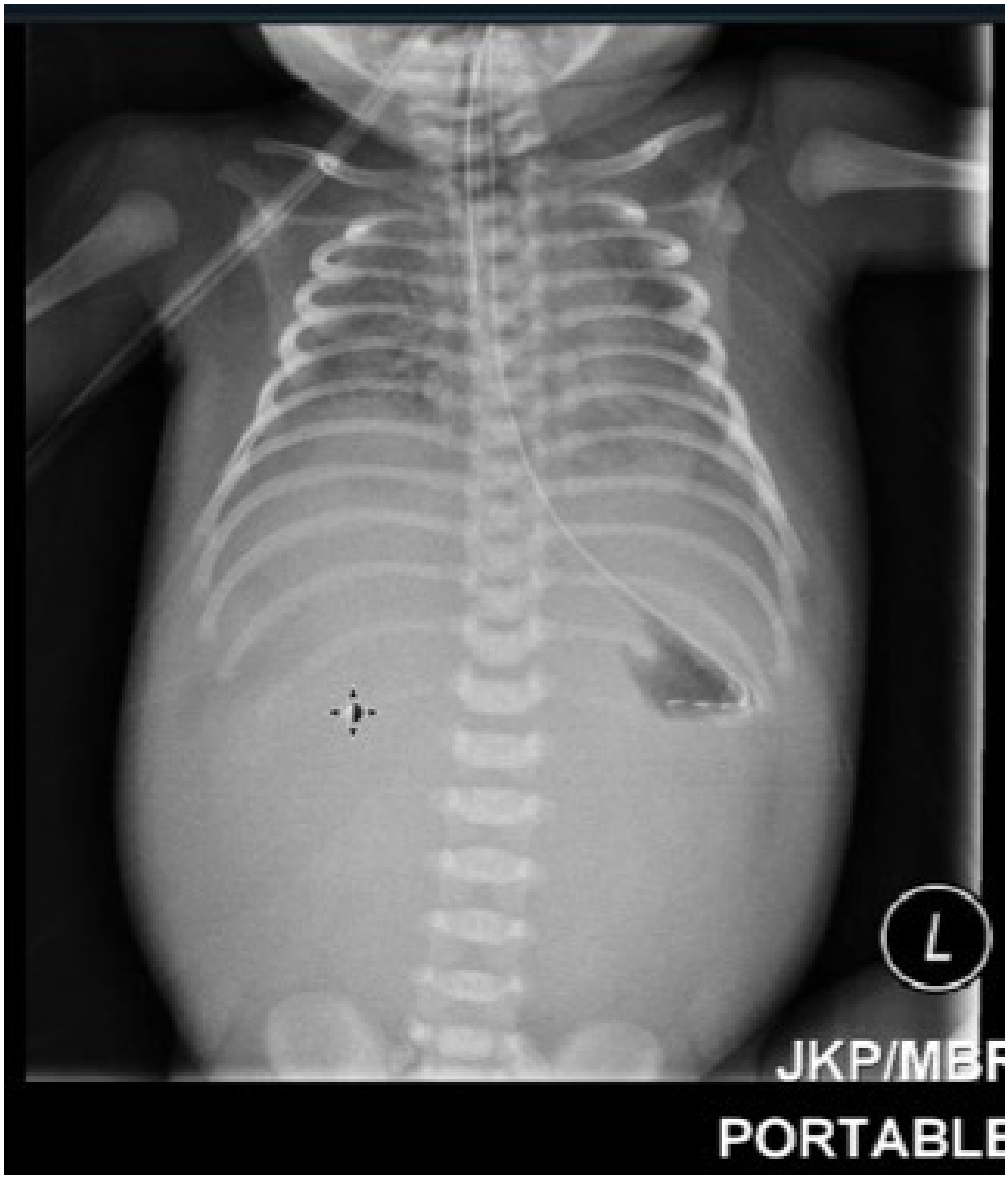
Newborn Medicine, Tufts Medical Center - The Floating Hospital for Children, Boston, Massachusetts, United States

History (including chief complaint, history of present illness and relevant past and family medical history) See attached word document.

Physical examination findings (including vital signs) See attached word document.

Laboratory or Diagnostic imaging or Procedures See attached word document.

Final Diagnosis See attached word document.



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Abstract: 70

18-day old male with fever and rash

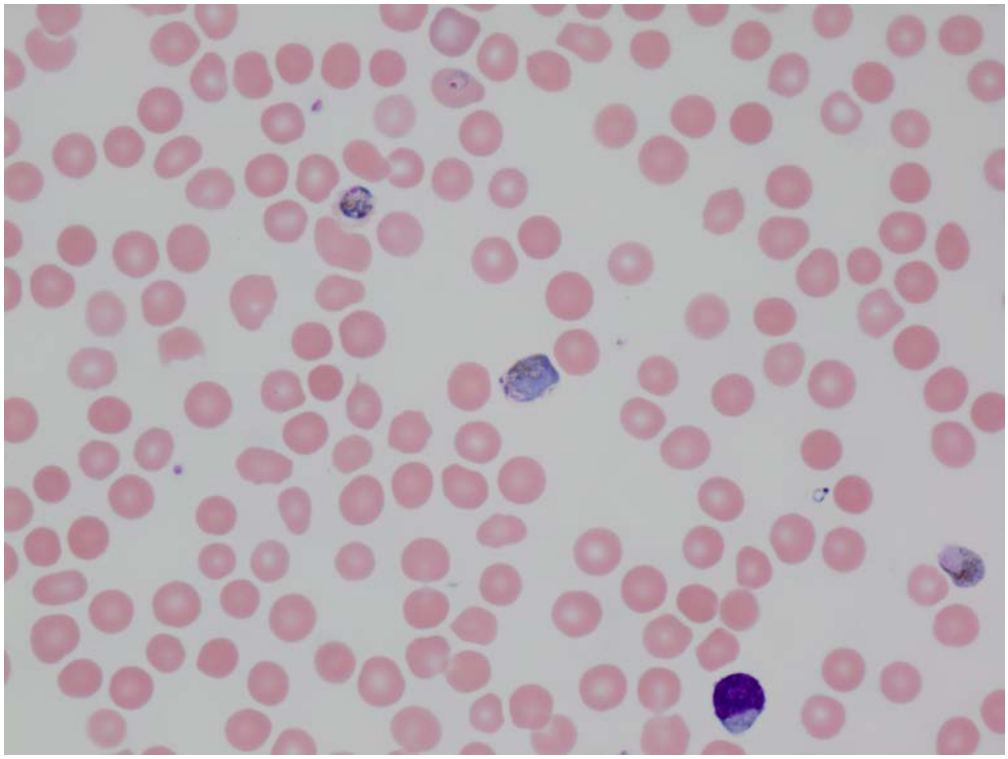
Saba Fatima, Malgorzata Skarzynska

Pediatrics & Adolescent Medicine, Einstein Medical Center, Philadelphia, Pennsylvania, United States

History (including chief complaint, history of present illness and relevant past and family medical history) An 18-day old boy born at full term to a 25-year old primigravida mother, presented to a local emergency department with fever. He was in his usual state of health until the day of admission when the mother reported he felt warm, with decreased oral intake and urine output. Temperature at home was 100.3 degrees Fahrenheit. The child was also reported to be sleepier than usual. The child was seen the day before in the pediatric clinic, was noted to have a scant pustular rash and was sent home with topical mupirocin.

Prenatal history includes regular prenatal care, with oligohydramnios at 39-week ultrasound. Prenatal laboratory results including GBS, HIV, RPR, Gonorrhea and Chlamydia were negative. The child was born via spontaneous vaginal delivery, and was discharged home on day two of life. Social history includes maternal migration from Pakistan a year before delivery and no other travel history since.
Physical examination findings (including vital signs) On physical examination on day of admission, patient was febrile to 100.9°F, but appeared well. Other vital signs were normal. Exam findings included a left parietal cephalohematoma, syndactyly of right second and third toes, grade 2/6 holosystolic murmur at left lower sternal border and erythematous papules and pustules in bilateral inguinal creases. There were some areas of skin with ruptured pustules. Lungs were clear to auscultation and abdominal exam revealed no hepatosplenomegaly.
Laboratory or Diagnostic imaging or Procedures Given patient's age and skin exam suspicious for staphylococcal pustulosis, the appropriate work -up for fever in neonate was initiated. Complete blood count revealed a white count of 6800/uL with 6% Neutrophils, 66 % lymphocytes and 2 bands. Hemoglobin was 12.6 mg/dL and platelet count was 79000/uL. Urinalysis and electrolytes were

obtained which were normal. A blood culture, HSV 1 and 2 serum PCR were obtained and were negative. A chest x-ray revealed no abnormality. Wound culture was obtained from the pustules, results showed methicillin resistant staphylococcus aureus A lumbar puncture was attempted but was unsuccessful. Review of the routinely ordered peripheral smear for complete blood count revealed an incidental finding.
Final Diagnosis Peripheral smear revealed numerous intracellular and extracellular malarial parasites (Fig 1). Binax test performed confirmed an infection with Plasmodium Vivax with 2.4 % parasitemia. On further history, mom did not reveal any febrile illnesses or fatigue during pregnancy and does not remember ever being treated for malaria. A diagnosis of congenital malaria was made and treatment with chloroquine was initiated.



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Abstract: 71
Prescription Opioid Misuse Among Adolescents Presenting to the Pediatric Emergency Department
Meghan R. Beucher[1], Frederico Vaca[2], Deepa Camenga[3]
[1]Pediatrics, Yale School of Medicine, New Haven, Connecticut, United States, [2]Emergency Medicine, Yale School of Medicine, New Haven, Connecticut, United States, [3]Pediatrics and Emergency Medicine, Yale School of Medicine, New Haven, Connecticut, United States

Background Misuse and non-medical use of prescription medications has fueled the major public health crisis of the opioid epidemic in the United States. The pediatric emergency department (PED) is a source of prescription medications and a setting for patient education and prevention. However, it is unknown how adolescents presenting to the PED perceive the risk of non-medical use of prescription opioids.
Objective To determine prevalence of use and perceptions of short- and long-term risks of prescription opioid use among adolescents presenting to a tertiary care PED.
Design/Methods Adolescents age 13-22 (n=383; 57.8% Female; 36.6% White, 23.5% Black, 29.5% Hispanic, mean age 15.76) presenting to a large urban PED completed an anonymous self-administered survey between July and December 2017. Established survey measures of tobacco risk perceptions were adapted and used.
Results Overall, 27% of participants reported having ever received a prescription for an opioid. When asked, “Have you ever used a prescription medication on its own, that is without a doctor telling you to take them or taking them in a different way than the doctor prescribed?”, 12% reported prescription opioid misuse. When asked, “How addictive do you think the following substances are?”, 44% rated prescription opioids as extremely addictive and nearly 1 in 5 adolescents (17%) were unsure if prescription opioids were addictive. In contrast, heroin (74%), cocaine (68%), tobacco/cigarettes (59%), and marijuana (33%) were respectively rated as extremely addictive. 14% of participants believed that it was “not likely” that short-term use of prescription opioids could result in overdose (Figure 1), and 8% believed it was “not likely” that long-term use of prescription opioids could result in addiction (Figure 2).
Conclusion(s) Adolescents presenting to the PED report a higher prevalence of prescription medication misuse than those in the general population. Knowledge about short and long-term risks of opioid misuse was low. These findings have important implications for prevention activities and programs that aim to educate adolescents in the PED about the risks of prescription opioid misuse.

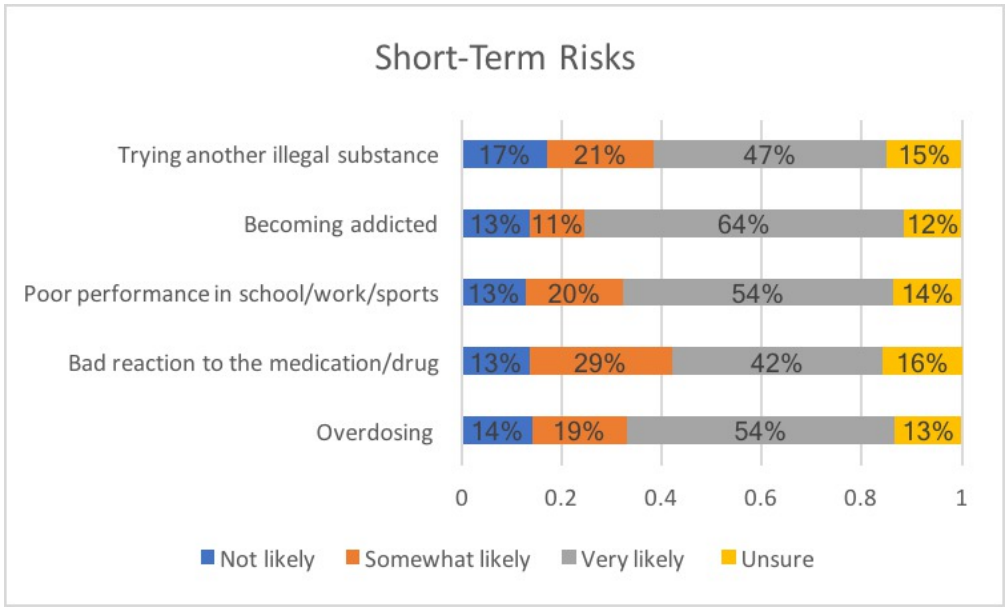

Figure 1

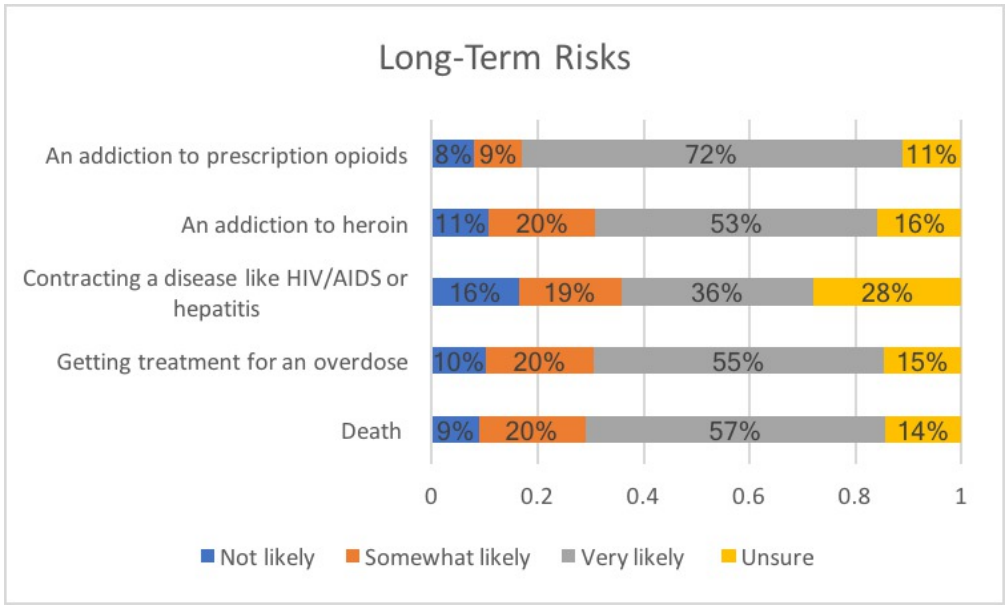

Figure 2

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Abstract: 72

Identifying Healthy and Unhealthy Dietary Patterns in Ethnic Minority Adolescents at-risk for Type 2 Diabetes

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Icahn School of Medicine at Mount Sinai, New York, New York, United States

Background Type 2 diabetes in youth is an increasing public health concern, especially in racial/ethnic minority populations. Dietary behaviors are important modifiable risk factors in diabetes prevention. However there is limited understanding of the possible cumulative effect of the clustering of behaviors and how these behavioral clusters differ by sociodemographic and other indicators. Objective We aimed to 1) Identify heterogeneous dietary behavior subgroups in a sample of overweight/obese adolescents and 2) Identify demographic, cognitive, social, and environmental factors to predict membership in the observed diet subgroups. Design/Methods We used latent class analysis (LCA) to identify distinct dietary behavior subgroups using baseline survey data from adolescents enrolled in a diabetes prevention program in a low income urban community. We identified 5 variables (portion control, breakfast consumption, nutrition label reading, family meals, and general unhealthy eating behaviors over the past month) which we dichotomized based on medians to develop the LCA model. We then conducted regression analyses to identify predictors of latent class membership.

Results Survey data was available from 73 adolescents (62% female, 57% ages 13-15, 43% ages 16-19, 71% Hispanic, mean BMI 32). The LCA model resulted in participants being grouped into two distinct classes ["unhealthy/poorly controlled diet" (48.6%) and "healthy/well controlled diet" (51.4%)] as summarized in Table 1. Predictors of latent class membership are included in Table 2. In unadjusted analyses, higher perceived barriers to healthy diet, emotional eating and negative dietary environment at home were significantly associated with higher odds of membership in the "unhealthy/poorly controlled diet" class. In contrast, higher diet self-efficacy, healthy weight control behaviors, and positive family influence were significantly associated with lower odds of membership in this class. When including all of these predictors in a multivariate analysis, only healthy weight control behaviors remained significant.
Conclusion(s) We used LCA to identify diet behavior clusters among adolescents at-risk for type 2 diabetes. As influences on lifestyle behaviors such as diet are interactive and complex, this approach allows us to better understand predictors of these behaviors. Future work includes further examination of these relationships with a larger sample size and of the impact of our diabetes prevention program based on clustering of dietary behaviors..

Table 1. Results of a Two-Latent-Class Model with probability of baseline dietary behaviors for each subgroup, TEEN HEED study (n=73)

		Latent Class (loading)	
Behavior Variables	N (%)	Unhealthy/ poorly controlled (48.6%)	Healthy/well controlled (51.4%)
Recent unhealthy diet			
≤Median	45 (62)	0.34	0.87
>Median	28 (38)	0.66	0.13
Food label reading			
≤Median	49 (67)	0.56	0.78
>Median	24 (33)	0.44	0.22
Portion control			
≤Median	38 (52)	0.95	0.11
>Median	35 (48)	0.05	0.89
Regular breakfast			
≤Median	47 (64)	0.54	0.74
>Median	26 (36)	0.46	0.26
Family meal times			
≤Median	38 (52)	0.60	0.45
>Median	35 (48)	0.40	0.55

*Item-response probabilities >0.6 in bold, healthy behavior item in italic and bold to facilitate interpretation

Table 2. Predictors of latent class membership (Unhealthy/poorly controlled diet vs Healthy/well controlled diet)

Covariate	N (%) in Unhealthy/ poorly controlled diet group	Crude ORs (95% CI)	Adjusted ORs (95% CI)
Sex			
Male	18 (64)		
Female	20 (44)	0.47 (0.16 – 1.33)	
Age (years)			
13-15	17 (41)		
16-19	21 (68)	2.89 (0.97 -8.59)	

Hispanic ethnicity			
No	14 (67)		
Yes	18 (35)	0.32 (0.09 -1.20)	
Parent education			
≤High school	11 (44)		
>High school	21 (55)	1.42 (0.42 -4.75)	
Parents born in US/PR			
No	21 (50)		
Yes	16 (53)	1.20 (0.41 – 3.55)	
	N (Mean ± SD) in Unhealthy/ poorly control group		
Diet self-efficacy	39 (41.2 ± 8.5)	0.94 (0.90 – 0.99)	0.98 (0.94 - 1.03)
Perceived barriers to healthy diet	39 (37.7 ± 6.4)	1.09 (1.02 – 1.16)	1.00 (0.92 - 1.08)
Perceived benefits of healthy diet	38 (15.9 ± 2.5)	1.16 (0.98 - 1.37)	
Unhealthy weight control behaviors	35 (1.6 ± 1.2)	0.74 (0.49 – 1.11)	
Healthy weight control behaviors	40 (3.4 ± 1.8)	0.46 (0.28 -0.74)	0.72 (0.57 – 0.90)
Emotional eating	36 (9.0 ± 3.9)	1.19 (1.02 – 1.40)	1.11 (0.98 – 1.26)
Negative dietary environment at home	30 (25.8 ± 5.0)	1.20 (1.07 – 1.34)	1.08 (0.99 - 1.17)
Positive influence from family	36 (30.6 ± 4.9)	0.89 (0.80 – 0.98)	0.94 (0.87 – 1.02)
Positive influence from friends	37 (17.8 ± 4.7)	0.91 (0.82 – 1.00)	

*Statistically significant ORs in bold. Single covariate was used in each crude model; multivariable model simultaneously adjusted for diet self-efficacy, perceived barriers to healthy diet, healthy weight control behaviors, emotional eating, negative dietary environment at home, and positive influence from family.

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Abstract: 73

Adolescents and Marijuana, Do We Know What Our Teenagers Are Thinking?

Albert Shan, Yun-Kuang Lai, Dalan S. Read
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Background Current literature reveals that early use of marijuana, particularly for adolescents, is associated with higher risks of addiction, cognitive deficits, poor educational attainment and increased the risk of psychosis. While detrimental effects have been widely recognized, recent changes in the legal status of marijuana have brought new challenges and opportunities to the medical community. Legalization reforms the criminal justice system that disproportionately affects disadvantaged groups, but may also improve the quality of research due to destigmatization. Pediatricians, involved the most in the care of adolescents, are facing this ever-changing social and legal climate. There has not been any research done regarding pediatric residents' understanding and perceptions of adolescents' attitude toward marijuana.

Objective To explore, assess and compare pediatric residents' perception versus adolescents' attitude toward adolescent marijuana use.

Design/Methods We collected the data at the pediatric department by inviting the adolescents received health care and the pediatric residents to fill out the adolescent's and resident's anonymous survey, respectively. The surveys are designed to collect demographic information and were combined with the resident or adolescent versions of The Adolescent Marijuana Attitude Questionnaires (Table 1). Chi-square tests were used to assess the differences
between residents' perception and adolescents' attitude.
Results We collected the data at the pediatric department by inviting the adolescents received health care and the pediatric residents to fill out the adolescent's and resident's anonymous survey, respectively. The surveys are designed to collect demographic information and were combined with the resident or adolescent versions of The Adolescent Marijuana Attitude Questionnaires (Table 1). Chi-square tests were used to assess the differences
between residents' perception and adolescents' attitude.
Conclusion(s) The study focuses on a more vulnerable inner-city youth population and a unique, diverse-cultured resident body which has over 80% of people reside in the U.S. less than 10 years. We found out that adolescents think they are not affected by environmental factors, have a poorer understanding of the effect of the usage and need more counseling. These are significantly different from what our resident thinks. While the underlying causes of the discrepancies should be further explored, the findings highlight opportunities to improve resident education, adolescent counseling, and patient care.

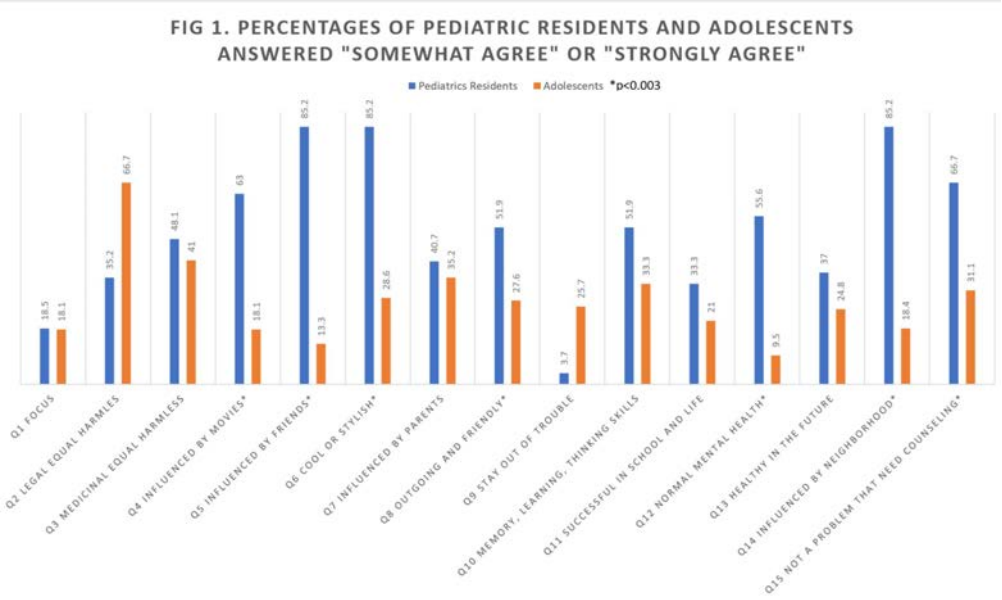

Table 1. Adolescent Marijuana Attitude Questionnaire - Resident Version

Q01. Adolescents perceive marijuana to be helpful with focus and concentration
Q02. Adolescents perceive marijuana to be harmless because it is legal in some states
Q03. Adolescents perceive marijuana to be harmless because it is used to treat some health problems
Q04. Adolescents’ attitude toward marijuana is affected by how it is shown in movies
Q05. Adolescents’ attitude toward marijuana is affected by their friends’ attitude toward it
Q06. Adolescents think smoking marijuana is considered cool or stylish
Q07. Adolescents’ attitude toward marijuana is affected by their parents’ thought about it
Q08. Adolescents perceive that marijuana helps people to be more outgoing and friendly in social situations
Q09. Adolescents believe that teens who use marijuana are more likely to stay out of trouble and stay out of jail
Q10. Adolescents believe that teens who use marijuana have normal memory, learning, and thinking skills
Q11. Adolescents believe that teens who use marijuana are successful in school and in life
Q12. Adolescents believe that teens who use marijuana have normal mental health
Q13. Adolescents believe that teens who use marijuana will be generally healthy in the future
Q14. Adolescents’ attitude toward marijuana are affected by marijuana use in the neighborhood

Q15. Adolescents believe that marijuana is NOT a problem that need counseling and treatment

Table 2. Enrolled Adolescents and Residents

Enrolled Adolescents (N = 105)	
Age	
13-15 Y	20 (18.9%)
16-21 Y	75 (70.8%)
Gender	
Male	33 (31.4%)
Female	64 (61.0%)
Ethnicity	
Afro Caribbean	11 (10.5%)
African American	59 (56.2%)
Hispanic	22 (21.0%)
Caucasian	1 (1.0%)
Others	4 (3.8%)
Marijuana Usage (Past 6 months)	
Yes	29 (27.6%)
No	67 (63.8%)
Enrolled Residents (N = 27)	
Resident Year	
PL1	11 (40.7%)
PL2	7 (25.9%)
PL3	9 (33.3%)
Years Residing in the US	
≦ 5 Years	17 (63.0%)
6-10 Years	6 (22.2%)
≧ 20 Years	4 (14.8%)
Age	
25-30 Y	15 (55.6%)
31-35 Y	6 (22.2%)
≧ 36 Y	6 (22.2%)

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Abstract: 74

Improving Inpatient Adolescent HIV Screening Rates in an Academic Urban Children's Hospital

Jonathan Albert[1], Michelle Clark[1], Angela Wang[1], Christina Lee[1], Jennifer Talley[1], Minal Patel[1], Clint Steib[2], Nicholas Kuzma[2], David Cooperberg[2]

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Background Routine testing for HIV helps identify patients in the early stages of illness and reduce morbidity and mortality. In areas of high HIV prevalence, the CDC recommends screening all patients age 13 or older once per year, with additional testing after every new potential exposure. Philadelphia, Pennsylvania remains a city of high HIV prevalence with increasing infection rates each year.
Objective Our goal is for at least 40% of all patients age 13 years or older admitted to St. Christopher's Hospital for Children (SCHC) to have documented HIV screens by April 30, 2018.
Design/Methods An observational time series with multiple planned sequential interventions was carried out by a resident-led quality improvement team (Baseline: January -- June 2017; Study period: July 2017 -- present). Three major changes were implemented as part of the quality improvement effort to increase HIV screening rates: (1) addition of mandatory HIV screening status on the resident handoff document in the medical-surgical unit, (2) monthly Plan-Do-Study-Act meetings with house staff working in the medical-surgical unit, and (3) installation of a survey app on senior resident team phones to track resident progress and enhance data collection. A Statistical Process Control P chart was used to display monthly screening rates over time. Established rules for detecting special cause variation were applied. Third generation rapid HIV testing was utilized in the Emergency Department (ED), while fourth generation testing was performed for any admitted patients who were not previously screened in the ED. Figure 1 highlights aim, key drivers, and interventions.
Results After six months of baseline data, interventions were made by the quality improvement team starting on July 1, 2017. Within four months, there was special cause improvement with an increase in HIV screening rates from 24.8% to 45.9% (Fig 2).
Conclusion(s) The inpatient HIV screening rate of patients age 13 years and older admitted to SCHC significantly improved within several months of implementing changes. Keys to success included: resident leadership to spark culture change, integrating screening into new intern orientation and senior resident daily workflow, and integrating technology using a smartphone app to collect data. Establishing HIV screening as a shared priority among hospitalists and residency program leadership was also imperative. These methods may prove beneficial for other academic children's hospitals in high risk areas seeking to improve their rate of HIV screening.

Figure 1. Key Driver Diagram

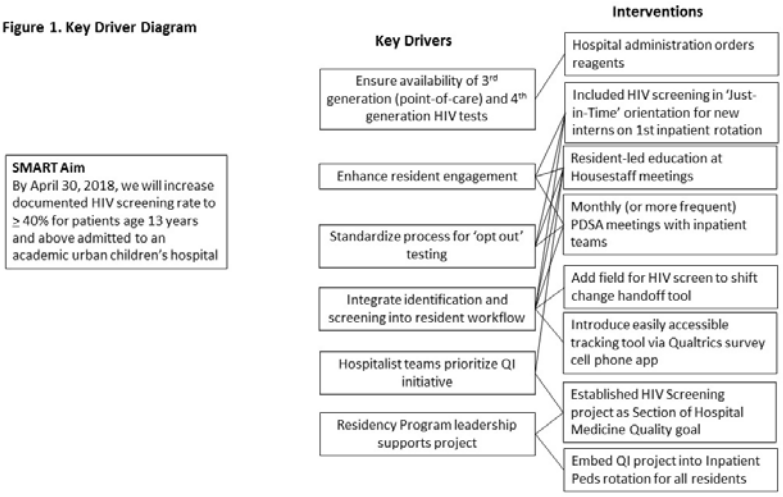
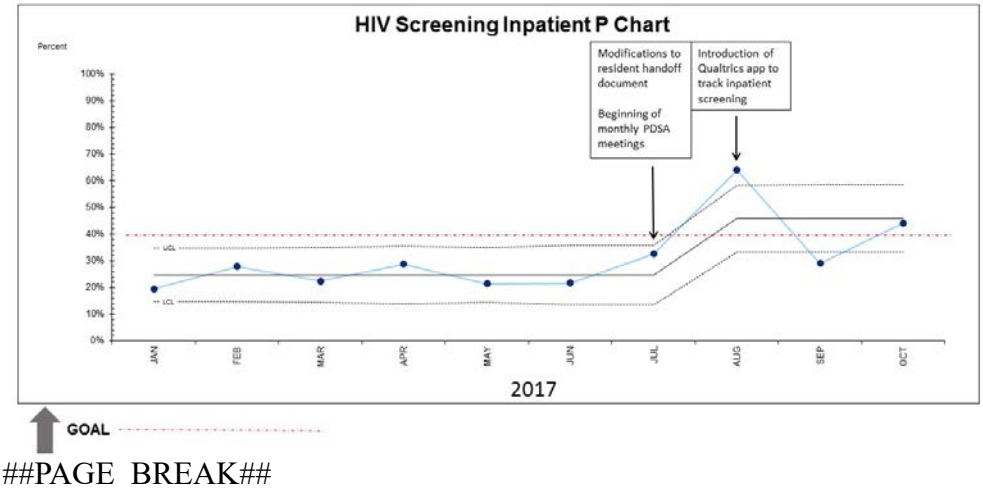


Figure 2. Inpatient HIV Screening Rates



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Abstract: 75

The impact of serum cotinine-verified tobacco smoke exposure on vitamin D deficiency in US children and adolescents

Philip Kum-Nji[1], Benjamin U. Nwosu[2]

[1]Division of General Pediatrics, Children's Hospital of Richmond of the Commonwealth University School of Medicine , RICHMOND, Virginia, United States, [2]Department of Pediatrics, , University of Massachusetts Medical School, Worcester, Massachusetts, United States

Background Although sociodemogaphic factors have been previously shown to be associated with low vitamin D levels among children in the United States, the role of tobacco smoke exposure remains to be clearly elucidated.
Objective We hypothesized that tobacco smoke exposure would result in increased prevalence of vitamin D deficiency among US children even after controling for various sociodemographic confounders.
Design/Methods Representative national data were accessed from NHANES 2009-2010 databank. Descriptive and multiple logistic regression analysis were conducted to determine the effect of cotinine-verified tobacco smoke exposure on vitamin D deficiency after controlling for key sociodemographic confounders. Vitamin D deficiency was defined as 25(OH)D <20 ng/mL, insufficiency as 25(OH)D of 20-29 ng/mL, and sufficiency as 25(OH)D of ≥30 ng/mL. Tobacco smoke exposure status was defined by serum cotinine level as follows: unexposed and non-smoking (<0.05 ng/mL) and exposed (+>0.05ng/mL). Furthermore, passive and active smoking were respectively defined as serum cotinine 0.05 - 10 ng/mL and >=10ng/mL.
Results The prevalence of second hand smoke exposure was 42% (95% CI, 36.7%-47.5%); while the prevalence of active smoking among teenagers was 9% (95% CI, 6.2%-12.5%). The Table below shows results of multiple logistic regression analysis. Significant predictors of low vitamin D levels were by order of importance: race, age, sex, obesity, and tobacco smoke exposure.

Conclusion(s) Tobacco smoke exposure was an independent predictor of vitamin D deficiency in US children and adolescents and resulted in increased prevalence of vitamin D deficiency after controlling for key sociodemographic confounders.

Variable	Adjusted OR (95% CI)	p value
Race (Non-white vs whites)	8.3 (5.7 – 12.1)	<0.001
Age (years) (≥10 vs <10)	4.6 (3.6 – 6.0)	<0.001
Sex (female vs male)	1.9 (1.5 – 2.4)	<0.001
BMI (Overweight/obese vs normal weight)	1.7 (1.3 – 2.2)	<0.001
Tobacco smoke exposure (cotinine >0.05ng/mL) vs non-exposure (cotinine <0.05ng/mL)	1.5 (1.1- 1.9)	0.002
Annual Family income ($) <55,000 vs >55,000	1.2 (0.9 - 1.7)	0.14
Maternal Education (no College vs some College education +)	1.2 (0.9 – 1.5)	0.23

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Abstract: 76

Oral Injuries in Young Children Presenting to a Pediatric Emergency Department

Seth Woolf[1], John Leventhal[3], Julie Gaither[3], Priyanka Hardikar[2], Melissa Langhan[1], Kirsten Bechtel[1], Marc Auerbach[1], Gunjan Tiyyagura[1]

[1]Department of Pediatrics, Section of Emergency Medicine, Yale University, Danbury, Connecticut, United States, [2]New York Medical College, Valhalla, New York, United States, [3]Pediatrics, Yale University, New Haven, Connecticut, United States

Background Oral injuries in young children may indicate physical abuse. No prospective data exist about the prevalence of oral injuries in young children and which of these children are evaluated for abuse.
Objective Our primary aim was to determine the prevalence of oral injuries in children <24 months old presenting to a pediatric emergency department (PED). Secondary aims were to compare the prevalence of oral injuries based on chief complaint and to determine the frequency of abuse evaluations in children with oral injuries.
Design/Methods We performed a prospective, cross-sectional study in an urban, tertiary care PED for 6 months. Twelve physicians (7 attendings and 5 fellows) who were trained to perform a comprehensive oral examination, consecutively enrolled children presenting to the PED for any reason. Enrolled children underwent a complete oral examination. Providers recorded demographics, type of chief complaint (i.e. traumatic or medical), details about the oral injury, the patient's developmental ability (i.e. crawling, cruising or walking, or non-mobile), and whether there was an abuse evaluation, defined as consultation with a social worker, the hospital child abuse team or the state's child protective service agency.
Results A total of 1,303 patients were enrolled. The overall prevalence of oral injuries was 36/1,303 (2.8%, 95% CI 1.9-3.8%). The

frequencies of oral injuries in patients presenting with traumatic chief complaints was 26/200 (13%) and with medical chief complaints 10/1,103 (0.9%). In the 36 patients with oral injuries, 28 (78%) were mobile. Table 1 lists patient demographics and prevalence of oral injuries by age and type of chief complaint.

Nine children (25%) with oral injuries were evaluated for abuse. Six of these children were non-mobile. Figure 1 shows abuse evaluations among children with oral injuries stratified by age. Oral injuries in children 0-11 months old were more likely to be evaluated for abuse than older children ($p < .001$).

Conclusion(s) In the first prospective study to date, the prevalence of oral injuries in children <24 months old presenting to a PED who were enrolled in our study was low (2.8%). Most injuries occurred in children who were mobile or had traumatic chief complaints. Children 0-11 months of age with oral injuries had a higher likelihood of being evaluated for abuse. Our findings may be useful to clinicians deciding whether to obtain a physical abuse evaluation in children <24 months with oral injuries in the PED setting.

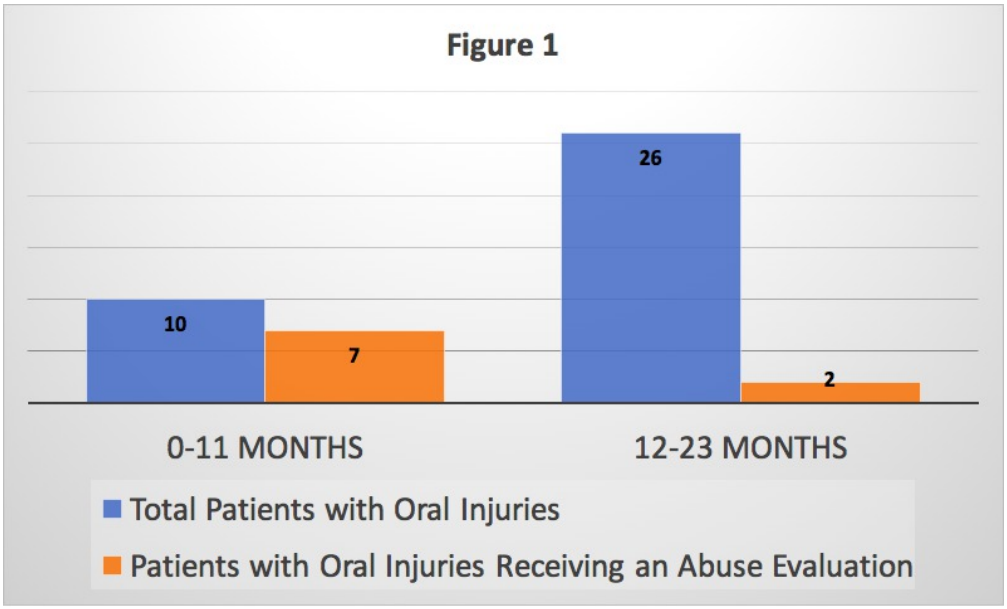

Table 1

	Overall	Oral Injury		
Characteristic	(n=1,303)	Yes (n=36)	No (n=1,267)	P
Age, mo.,median (IQR)	9.0 (3.0-15.0)	15.0 (8.5-21.0)	9.0 (3.0-15.0)	<.001
Age group, mo., n (%)				<.001
0-5	434 (33.3)	6 (16.7)	428 (33.8)	
6-11	347 (26.6)	4 (11.1)	343 (27.1)	
12-23	522 (40.1)	26 (72.2)	496 (39.1)	
Male Sex, n (%)	701 (53.8)	22 (61.1)	679 (53.6)	.37
Non-white race, n (%)	887 (67.5)	20 (55.6)	867 (68.4)	.12
Hispanic, n (%)	451 (34.8)	11 (30.6)	440 (34.9)	.59
Insurance, n (%)				.40
Private	316 (24.3)	9 (25.0)	307 (24.2)	
Public	926 (71.1)	27 (75.0)	899 (71.0)	
Other	61 (4.7)	0 (0.0)	61 (4.8)	
Medical Chief Complaint, n (%)	1,103 (84.6)	10 (27.8)	1,093 (86.3)	
Traumatic Chief Complaint, n (%)	200 (15.4)	26 (72.2)	174 (13.7)	

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Abstract: 77

Validation of the Violence Prevention Emergency Tool Score

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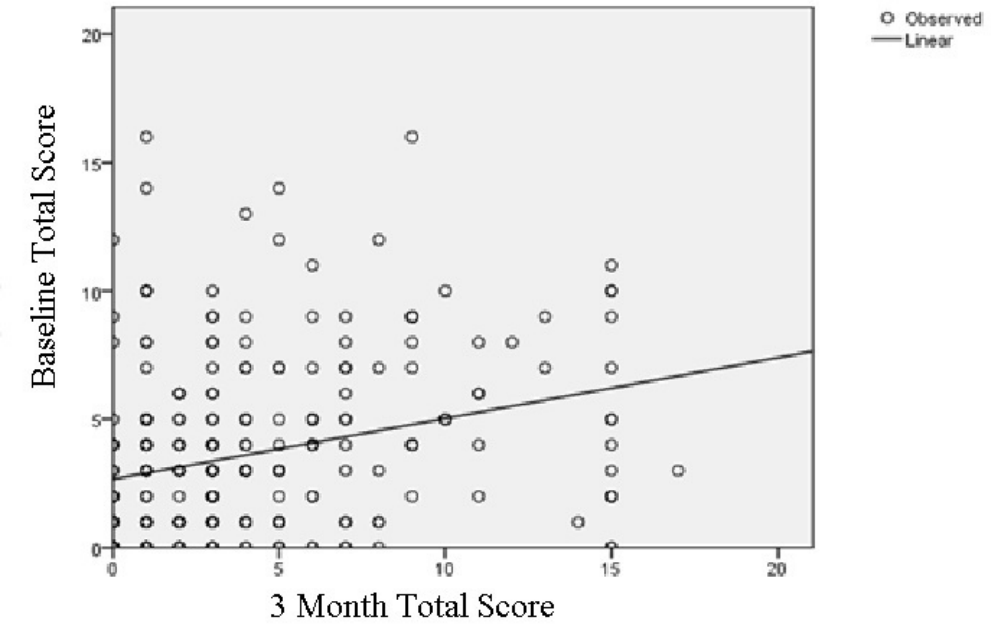
Background In the United States, violence is a leading cause of morbidity and mortality among children. Many children presenting to Emergency Departments (ED) are at risk for future exposure to violence. A 7-item ED-based survey tool called VPET (Violence Prevention Emergency Tool) was developed to identify youth at risk for future exposure to violence. Developing a scoring system to identify high risk children may allow for targeted interventions to decrease subsequent exposure.

Objective Validate that the previously refined 7-item VPET scoring tool appropriately identifies children at risk for future violence exposure.

Design/Methods English- and Spanish-speaking children ages 8-17 years were prospectively enrolled in an urban pediatric ED. The VPET questionnaire was administered at the time of enrollment by trained research assistants in a private location. A 6-item follow-up questionnaire was administered by telephone 3 and 6 months later. Risk level at enrollment and follow up was determined by summing the incidence of any violent exposure for each item (none=0, one time=1, few times =2, lots of times=3) with ranges 0-21 at enrollment and 0-18 at 3 and 6 months. Validation of VPET score was confirmed by assessing internal reliability (Cronbach's alpha), construct (histograms, demographics) and concurrent criterion validity (Person's correlation coefficients comparing enrollment to 3 and 6-month follow-up).

Results 672 children were enrolled; 51.7% were female, 60.3% Hispanic, 30.0% African American, 8.3% white; mean age was 12.2 years (SD=3.1); 42.8% were 11 years or younger. Parents were 24.1% less than high school educated, 34.6% high school/GED, 27.4% some college/technical, and 12.8% college graduates. 40% were contacted for 3 month follow-up. There were no significant differences in demographics from the enrollment population. VPET scores were: Baseline: mean 3.7, median 3.0, range 0-16; Cronbach's alpha 0.63 for baseline; 3 month score: 4.0 mean, 3.0 median, range 0-17; and 6 month score: mean 3.5, median 3.0, range 0-12; all with expected left kurtosis. Person's correlation coefficient comparing basleline to 3 months was r=.28 and p<0.001.

Conclusion(s) The 7-item VPET scoring tool appears to be a valid measure of future exposure to violence and may be useful in identifying children at risk for future violence exposure. Therefore, limited resources can be focused on these children to reduce the risks of violence exposure. Future studies should focus on identifying effective means of reducing exposure for those identified by VPET.



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Abstract: 78

Improved Concussion Discharge Instructions in a Pediatric Emergency Department

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Background There are an estimated 3.8 million annual youth sport and recreational concussion injuries in the U.S. Clear and concise concussion management recommendations should be given to all youth and parents upon Emergency Department discharge. Previous research demonstrates that standardized post-concussion recommendations increase patient compliance and improved patient outcomes.
Objective To determine if the use of the Acute Concussion Evaluation Discharge Instructions (ACE-DI) improves caregiver's understanding of symptom management and follow-up recommendations.
Design/Methods This was a quasi-experimental study that took place in an urban Level 1 Pediatric Emergency Department (PED) during July-October 2017. A convenience sample of caregivers of children, ages 5-18 years old diagnosed with either a concussion or closed-head injury were recruited and consented to participate. In phase one, parents were provided standard written instructions about concussion management, reviewed with the nurse, and offered the opportunity to ask questions. Using an iPad, caregivers were then asked to complete a 25-item survey to obtain demographic information, assess overall understanding of instructions, and explanation of instructions. All questions used a 5-point Likert scale. In phase two, another cohort of parents followed the same discharge process with the addition of the ACE-DI. Descriptive statistics were used for demographic variables and t-test to compare responses between the two groups.
Results 63 of 68 (93%) parents agreed to participate; 30 in standard group and 33 in standard plus ACE-DI group. The parents were 63% Caucasian, 25% Black, and 10% Hispanic/Latino; 75% were females and 25% were males; majority were 35-44 years of age; 75% mothers and 21% fathers. There were no statistical differences in the demographic characteristics between either group. Compared to the caregivers who received standard discharge instruction, caregivers who received the ACE-DI reported a 24% increase in the helpfulness of written materials (P<.001), a 25% increase in perceived understanding about concussion injury and management (P<.001), a 23% increase in understanding about returning back to school activities (P<.001), and were 17% more likely to follow up with their primary care provider or concussion specialist (P<.001).
Conclusion(s) The ACE-DI used in a PED, was found to be more effective at increasing caregivers' perceived understanding about post-concussion symptom management and follow up recommendations.

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Abstract: 79

Epidemiology of Invasive Bacterial Infection in Infants ≤60 Days Treated in Emergency Departments

Christopher Woll[1], Mark Neuman[2], christopher pruitt[3], Marie Wang[4], Eugene Shapiro[5], Samir Shah[6], Russel McCulloh[7], Lise Nigrovic[2], Sanyukta Desai[6], Adrienne DePorre[7], Rianna Leazer[8], Richard Marble[9], Frances Balamuth[10], Elana Feldman[11], Laura Sartori[12], Whitney Browning[12], Paul Aronson[1]

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Background Febrile infants ≤60 days old routinely undergo extensive diagnostic evaluation and often receive parenteral antibiotic therapy for suspected bacteremia and/or bacterial meningitis (invasive bacterial infection [IBI]). Understanding the epidemiology and antimicrobial susceptibilities of IBIs in these infants could inform optimal management, including empiric antimicrobial selection.
Objective Our objective was to describe the pathogens and their antimicrobial susceptibilities in infants ≤60 days old with IBI.
Design/Methods We identified infants ≤60 days old with IBI evaluated in the emergency departments (EDs) of 11 children's hospitals between 7/1/2011 and 6/30/2016 by querying each site's microbiology laboratory database or electronic medical record system for blood or cerebrospinal fluid (CSF) cultures positive for a bacterial pathogen. Medical records were reviewed to confirm the presence of a pathogen and to extract demographic, clinical, and laboratory data including in vitro antimicrobial susceptibilities. Bacteremia and bacterial meningitis were defined as growth of a pathogen from blood culture or from CSF culture, respectively.
Results Of the 442 infants with IBI, 366 (82.8%) had bacteremia without meningitis, 51 (11.5%) had bacteremia with bacterial meningitis, and 25 (5.7%) had bacterial meningitis without bacteremia. Group B streptococcus was the most common pathogen identified (36.7%), followed by Escherichia coli (30.8%), Staphylococcus aureus (10.0%), and Enterococcus spp. (6.6%) [Table 1].

Three infants had bacterial meningitis due to Listeria monocytogenes. Overall, 98.6% of infants with IBI had pathogens susceptible to a combination of ampicillin plus gentamicin and 89.4% of infants with IBI had pathogens susceptible to third-generation cephalosporins (specifically, cefotaxime or ceftriaxone) alone [Table 2]. Among infants with bacterial meningitis, 98.6% had pathogens susceptible to ampicillin plus a third-generation cephalosporin and 91.8% had pathogens susceptible to a third generation cephalosporin alone.
Conclusion(s) Nearly 11% of pathogens in infants ≤60 days old with IBI were resistant to third-generation cephalosporins. Combination therapy with ampicillin plus either gentamicin or a third-generation cephalosporin is a better choice than third generation cephalosporin alone for empiric antimicrobial treatment of IBI.

Pathogens Isolated in Infants with Invasive Bacterial Infection

Pathogen	Total N (%) (n=442[1])	Bacteremia without meningitis N (%) (n=366)	Bacterial Meningitis[2] N (%) (n=76)
Group B Streptococcus	162 (36.7)	120 (32.8)	42 (55.2)
E. coli	136 (30.8)	122 (33.3)	14 (18.4)
S. aureus	44 (10.0)	41 (11.2)	3 (3.9)
Enterococcus spp.	29 (6.6)	27 (7.4)	2 (2.6)
Other Gram Negative[3]	16 (3.6)	13 (3.6)	3 (3.9)
Klebsiella spp.	14 (3.2)	13 (3.6)	1 (1.3)
Enterobacter spp.	11 (2.5)	11 (3.0)	0
Group A Streptococcus	11 (2.5)	11 (3.0)	0
Other Gram Positive[4]	9 (2.0)	3 (0.8)	6 (7.9)
Salmonella spp.	6 (1.4)	5 (1.4)	1 (1.3)
S. pneumoniae	6 (1.4)	5 (1.4)	1 (1.3)
L. monocytogenes	3 (0.7)	0	3 (3.9)

[1]Some cultures grew >1 organism. [2]Infants with bacterial meningitis with or without bacteremia [3]Includes Citrobacter spp. (3), Pseudomonas aeruginosa (2), Neisseria meningitidis (2), Moraxella spp. (2), Haemophilus influenzae non-typeable (2), Haemophilus parainfluenzae (1), Proteus spp. (1), Serratia spp. (1), Pasteurella spp. (1), Acinetobacter spp. (1) [4]Includes Streptococcus gallolyticus (4), Streptococcus bovis (4), Paenibacillus spp. (1)

Antimicrobial Susceptibilities of Isolates

Antimicrobial(s)	Total N (%)[1,2]	Bacteremia without meningitis N (%)	Bacterial Meningitis[3] N (%)
Individual			
Ampicillin	305/430 (70.9)	240/357 (67.2)	65/73 (89.0)
3rd generation cephalosporin	388/434 (89.4)	321/361 (88.9)	67/73 (91.8)
Combination			
Ampicillin/gentamicin	421/427	350/355 (98.6)	71/72 (98.6)[4]

	(98.6)		
Ampicillin/3rd generation cephalosporin	421/435 (96.8)	349/362 (96.4)	72/73 (98.6)
Vancomycin/ampicillin/gentamicin	429/434 (98.9)	357/361 (98.9)	72/73 (98.6)[4]
Vancomycin/3rd generation cephalosporin	424/432 (98.2)	353/360 (98.1)	71/72 (98.6)

[1]Denominators represent infants with available susceptibility testing [2]N (%) susceptible [3]Infants with bacterial meningitis with or without bacteremia [4]Gentamicin has poor cerebrospinal fluid penetration

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Abstract: 80

Is Cognitive Rest Following a Head Injury Associated with Prolonged Concussion Symptoms?

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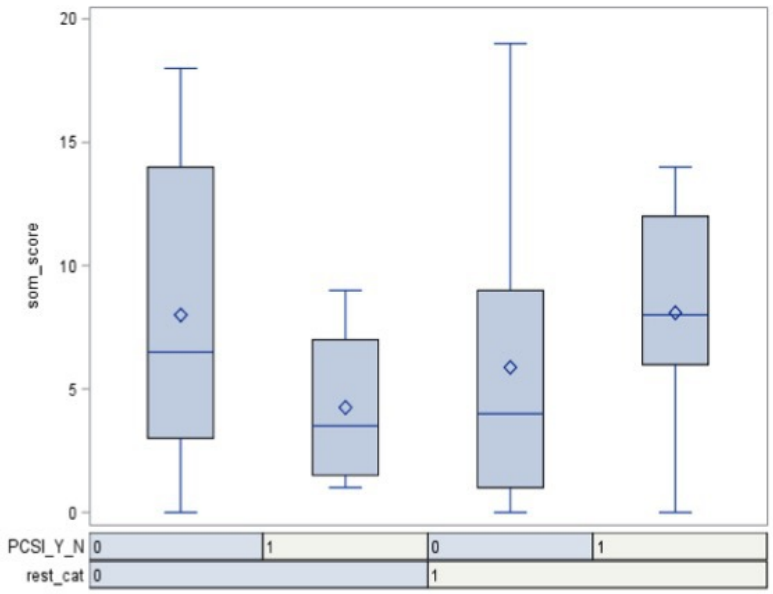
Background Recent studies have suggested that cognitive rest may not lead toward a faster recovery from acute concussions. Furthermore, the latest international consensus concussion guidelines note the appropriate amount of cognitive rest remains undetermined. Additionally, somatization has recently been shown to be a risk factor for prolonged concussion symptoms (PCS).
Objective Our objective was to determine the relationship between cognitive rest and PCS. Additionally, we sought to determine the relationship between somatization and PCS, while also considering the interaction with cognitive rest.
Design/Methods A prospective cohort study of 5-18 year olds diagnosed with an acute concussion in a tertiary care children's hospital emergency department was conducted from January through December 2017. Participants completed the post-concussion symptom inventory (PCSI) and Children's Somatization Inventory (CSI) at diagnosis. Emergency department provider recommendations on rest from school were collected. Follow-up calls were completed at 1 week to determine time off from school as a proxy of cognitive rest. Rest was categorically analyzed. PCSI scores were re-assessed at 4 weeks.
Results A total of 89 patients have been enrolled with a median age of 10.0 (IQR: 8.5-13.0). 58% of the patients are male. 82.0% (N=73)) completed 7-day follow-up. 24.7% (N=18) of patients took no time off from school; 42.5% (N=31) took 1-2 days off; and 32.9% (N=24) took 3 or more days off from school. 24% had prolonged concussion symptoms. Logistic regression analysis was used to compare the rest tertiles to PCS, with no time off as the reference category. When compared to the shortest rest tertile, the longest rest tertile had a 1.35 fold increase in prolonged concussion symptoms, which was not statistically significant (95% CI: 0.31 – 5.91). When compared to the shortest rest tertile, the medium rest tertile had a 0.50 fold decrease in prolonged concussion symptoms, which was also not statistically significant (95% CI: 0.10 – 2.42). In the longer rest tertiles, somatization scores trended higher in the group with PCS (p = 0.15).
Conclusion(s) In our preliminary pilot data, patients who took more time off from school did not show decreased likelihood of prolonged concussion symptoms. Furthermore, patients with somatization may be at particular risk of rest associated with prolonged concussion symptoms. Further larger scale studies, including randomized trials, are necessary to determine the risk of rest on prolonged concussion symptoms.



In the longer rest tertiles (rest_cat = 1), somatization scores trended higher in the group with PCS (p = 0.15)

Odds Ratio of Prolonged Concussion Symptoms (PCS) by Rest Tertile

Rest Tertile	Odds Ratio of PCS	95% CI
No Rest	-	-
1-2 Days Off	0.50	0.10 - 2.42
>=3 Days off	1.35	0.31 - 5.91

Odds Ratio of Prolonged Concussion Symptoms (PCS) by Rest Tertile

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Abstract: 81

Pre-Hospital Intervention in Pediatric Firearm Injury

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Background While firearm violence remains a significant cause of pediatric mortality, there are little data describing prehospital interventions performed on these patients which may have important implications on EMS training, resource utilization and patient outcome.

Objective Characterize the resources utilized by prehospital providers in pediatric firearm injury, describe demographics and clinical presentations and compare clinical characteristics of those who survived the prehospital setting versus those who died.

Design/Methods Retrospective chart review of pediatric firearm patients (≤21 years) managed by paramedics in the largest advanced life support system in New Jersey between 2009-2014. Demographics, clinical presentation variables, and prehospital interventions were recorded and presented as descriptive statistics. Fisher's exact and Wilcoxon rank sum tests were performed to compare the odds of presentation (dead or alive) upon hospital arrival among demographic and clinical factors.

Results Of 74 pediatric firearm cases, the mean age was 18.5 years, 87.8% were male and 83.8% were black. Victims were most often found on a street (67.6%) or home (24.3%) and the majority of EMS activations were for assault (86.5%). Nearly one-third of patients (31.0%) were found unresponsive by arriving paramedics, 31.9% were pulseless, 24.7% were apneic. CPR was performed in 18.9% of all pediatric encounters for firearm injuries. Intravenous access was obtained in 36.5% of patients, 32.4% of total cases received at least one fluid bolus while 8.1% received at least one dose of epinephrine. Only half of all patients (52.7%) were placed on cardiac monitor and 29.7% were found in normal sinus rhythm or sinus tachycardia, 14.9% in asystole and 8.11% in pulseless electrical activity. Nearly

all patients (96.7%) were taken to a level I or II trauma center. In total, 16.2% were pronounced dead in the prehospital arena and, of these, 100% were male, 91.7% were black, and every case presented with cardiac arrest on scene. None of the patient demographics or pre-hospital interventions were significantly associated with presenting dead or alive.
Conclusion(s) Pediatric patients who died of injuries caused by a firearm were more likely to be young, black, and victims of assault. Advanced trauma life support procedures are rarely performed and no procedures were found to have statistically significant outcomes on mortality.

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Abstract: 82

Digital Device Diversity: Prevalence and Autonomy of Digital Device Usage in Children Aged 0-3 Years

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Background In 2016, the American Academy of Pediatrics (AAP) revised their policy of 15 years on a healthy media diet to say that children < 18 months old should avoid screen media other than video chatting, that parents can introduce co-watched high quality programming (HQP) with their child of 18-24 months, and that children 2-5 years old should co-watch < 1 hour a day of HQP. However, it is unclear how current toddler digital device usage (TDU) adheres to these guidelines. To this end, this study will examine the prevalence and autonomy of current TDU by digital device (DD).
Objective To identify the prevalence of TDU through types of DD used, frequency and duration of usage for each DD, and autonomy of DD feature usage.
Design/Methods In an anonymous survey distributed via Amazon Mechanical Turk, parents of children aged 0-3 years were asked to identify which DD were present in the home, which DD were used by their child, the frequency of usage for each DD in times per week, and duration of each usage session for each DD. Parents were then asked about the level of parental supervision during TDU and their child's independence in navigating various DD.
Results There was an 80.2% effective response rate out of 637 respondents (n=511, 43.6% female children, 29.7 month average child age), of which 90.6% of children used at least one household DD. Household DD presence and frequency of TDU are shown in Table 1, while Table 2 shows TDU duration. 56.8% of smartphone and/or tablet-using children knew how to unlock the DD and 70.2% knew how to get to their favorite apps. 37.5% of TV watching children knew how to turn on and navigate the TV. 44.9% of children using Laptops or Desktops knew how to get to their favorite sites or games.
Conclusion(s) While the most common duration of individual DD usage was within the AAP's limits, there was an alarming tendency for a cumulative DD usage time far higher than current recommendations. It is essential for the AAP to structure new guidelines addressing the wide variety of DD used by children and emphasizing limits for cumulative DD usage. With substantial rates of parent-reported DD child autonomy, clinicians must encourage parents to carefully supervise and limit their child's cumulative DD usage.

Table 1: Presence of DD and Frequency of usage in children by DD

	DD Present in House	DD Used by Child	Less than once a month	Once a month	Several times a month	Once a week	Several times a week	Once a day	Multiple times a day
TV	90.0%	73.7%	0.3%	1.5%	1.5%	3.8%	15.8%	29.3%	47.8%
Laptop	76.0%	10.6%	10.2%	12.2%	10.2%	14.3%	22.4%	20.4%	10.2%
Desktop	43.6%	9.5%	4.5%	6.8%	11.4%	2.2%	29.5%	25.0%	20.5%
Tablet	83.8%	70.8%	3.7%	3.4%	9.1%	7.3%	27.1%	20.1%	29.3%
Smartphone	87.0%	51.8%	6.3%	2.9%	16.7%	9.2%	29.2%	15%	20.8%
Gaming System	58.7%	15.3%	16.9%	11.3%	12.7%	12.7%	22.5%	7.0%	16.9%

Table 1: Presence of DD and Frequency of usage in children by DD

Table 2: Duration of child DDU session by digital device								
	1-30 min	**30m-1 hr**	**1h-2h**	**2h-3h**	**3h-4h**	**4h-5h**	**5h-6h**	**6h+**
TV	15.9%	30.0%	28.8%	13.8%	7.4%	2.4%	0.3%	1.5%
Laptop	50.0%	26.1%	13.0%	6.5%	4.3%	4.3%	0%	0%
Desktop	40.0%	20.9%	16.3%	16.3%	2.3%	2.3%	0%	2.3%
Tablet	34.5	28.6%	21.8%	10.5%	2.8%	0.9%	0.6%	0.3%
Smartphone	67.1%	15.2%	11.0%	3.0%	1.3%	1.3%	0.4%	0.8%
Gaming System	45.1%	28.2%	11.3%	5.6%	5.6%	2.8	1.4%	0%

Table 2: Duration of child DDU session by DD

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Abstract: 83

An Objective Approach to Identifying Opportunities for Preventing Ingestions Among Youth in Connecticut

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Background Preventable injuries are the leading cause of death amongst children. Greater than one million children present to emergency departments (EDs) secondary to ingesting toxins each year in the United States. More than 85% are unintentional and the majority of children are younger than six years old.
Objective As state health agencies attempt to reduce the number of preventable pediatric injuries secondary to ingestions, our study sought to determine the demographic trends where injury prevention should be targeted at ingestions in the state of Connecticut.
Design/Methods Data was analyzed from the Connecticut Hospital Association data reporting system from 2011-2014 to identify epidemiologic and geographic trends for pediatric ingestions.
Results Analyzing all ingestions (n = 1961) it was found that 59% occurred in children aged 12-17 years followed by 34% in the 0-4 range and 7% in the 5-11 range. For all ingestions children were primarily of Caucasian ethnicity (61%) and from urban areas (90%). Counties of Hartford (28%), Fairfield (26%), and New Haven (21%) accounted for 75% of all ingestions in the state. Most (86%; 1685/1961) of these children were not treated in pediatric emergency departments.
In the 12-17 years range, the ingestions occurred most often in those of female gender (73%; 841/1154) and most were likely intentional. There was a total of 661 reported incidents in the 0-4 year range with slight male overrepresentation (52%). For these presumed unintentional ingestions, children were primarily of Caucasian ethnicity (50%) and from non-rural areas (92%). A majority (65%) of ingestions in this range involved 1 and 2 year olds.
Conclusion(s) This study provides a framework for objectively identifying target populations for ingestion prevention activities at a state level. Our state data suggests a bimodal age distribution. Therefore, our state healthcare initiatives should largely focus unintentional prevention efforts (i.e. anticipatory guidance) on parents of toddlers and intentional ingestion prevention efforts (i.e. suicide prevention) on adolescent females. Most efforts should be focused in non-rural areas. Family and medical provider education should focus on non-pediatric emergency departments. Further studies should assess specific ingestion agents, response to interventions (i.e., effective education for targeted populations) and national trends to allow state benchmarking.

Emergency Department Visits for Poisonings in CT children ages 0-17 years, 2011-2014, by rural classification, N=1,961

Rural	Frequency	Percent	Cumulative Frequency	Cumulative Percent
no	1,759	89.7	1,759	89.7
yes	202	10.3	1,961	100

Emergency Department Visits for Poisonings in CT children ages 0-17 years, 2011-2014, by sex, N=1,961

Age group	0-4 years	5-11 years	12-17 years

Sex	Frequency	Percent	Frequency	Percent	Frequency	Percent
Female	319	48	59	40	841	73
Male	342	52	87	60	313	27

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Abstract: 84

Developing & Piloting a Text Message-based Positive Parenting Advice Program for Primary Care

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Background Text messaging is a convenient way for caregivers to receive parenting advice from physicians. Little is known about how multiethnic caregivers accept & utilize text messages from their child's physician.

Objective To investigate the receptivity of a text message-based positive parenting & discipline program for an inner-city pediatric clinic population.

Design/Methods Mixed method study:

Phase 1: Focus groups conducted by culturally concordant leaders with African-American (AA), Latino/a (L) & adolescent (T) caregivers. Inclusion criteria: English-speaking primary caregiver of a child 12 months - 5 years-old seen in a large inner-city pediatric clinic. Participants were provided selected parenting themes from the Bright Futures toolkit & asked to edit message wording to increase personalization & acceptability. Sessions were audiotaped & transcribed. Two individuals analyzed the transcripts.

Phase 2: 15 English-speaking caregivers of a child 12 months - 5 years old were recruited to participate in the pilot text messaging program. Text messages with Bright Futures-based parenting advice from Phase 1 were sent to caregivers 3 afternoons per week for 5 weeks. Caregivers completed a 27-item survey to determine the efficacy of the program.

Results Focus groups (N=8) & semi-structured interviews (N=2) were completed with 3 AA moms, 2 L moms, 2 T mothers & 3 fathers. Participants ranged in age from 16-41 years-old & 9/10 send >10 text messages per day. Caregivers found Bright Futures toolkit advice acceptable & edited messages minimally.

Eleven caregivers completed the 5-week text-messaging program. Eight completed the survey. 100% of caregivers utilized the text message-based parenting advice directly with their child & agreed with each text. 88% of respondents read all the text messages & would use this program for more than a month. 63% affirmed the program fostered parental confidence. Age, number of children, education, marital status, race, ethnicity & gender were not predictive of preference for the program. The preferred text messages included those about giving two good choices to children & the importance of self-care among caregivers. Participants suggested using longer messages & illustrative pictures to improve comprehension of advice.

Conclusion(s) Caregivers in our economically disadvantaged sample use text messaging frequently & perceive text messages provided as acceptable & useful. Future directions include implementation of the text message-based parenting advice program across a wider sample.

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Abstract: 85

Underdiagnoses of High Blood Pressure [HTN] Readings in Children with Multiple Risk Factors in a Large Ambulatory Setting

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Background Pediatric hypertension [HTN] prevalence is estimated to be 3.5% in the US, with higher prevalence among African Americans [especially those with overweight or obesity & low socioeconomic status]. HTN has been noticed to be underdiagnosed by primary care providers, primarily because individual readings are not being titrated based on guidelines, as pediatric HTN cut offs are complex.

Objective To evaluate whether there are differences in the actual vs. diagnosed high blood pressure [HTN and pre-HTN] readings measured in a large pediatric ambulatory care setting

Design/Methods Our dataset consisted of demographics like age, height, gender, race, & blood pressure [BP] readings [systolic (SBP) and diastolic (DBP)] as documented in EPIC, which were collected from well child visits during October 2013 to September 2016 at 6 ambulatory care centers for subjects aged 2 to 20 years. If a subject had more than one reading during a visit, a mean BP was obtained. BP was classified as Normal BP, Pre-HTN, Stage 1 & Stage 2 HTN based on "The 4th report on diagnosis, evaluation & treatment of high BP in children and adolescent."

SAS & SPSS software were used for statistical analyses. Descriptive statistics included percentages, means & standard deviation. Comparison of differences in the diagnosis of pediatric high BP was analyzed using the Chi square test.

Results Dataset consisted of 20,421 SBP and 20,426 DBP readings of children between 2-20 years of age (Boys Mean = 6.5 years, SD= 3.8; Girls Mean =6.0 years, SD=3.2). Abnormal BP readings (HTN and pre-HTN) were identified in 14.2 % for boys and 14.7% for girls of SBP readings and on 11.5% for boys and 11.9% for girls of DBP readings. Normal BP were appropriately diagnosed (≥

99.9%).
Less than 1% of those with high BP measurements were appropriately diagnosed. In boys, only 11 of 1,460 (0.8%) high SBP, and 6 of 1,186 (0.5%) high DBP, were accurately recognized as abnormal. In girls, the percentage of appropriate recognition was 0.8% for both SBP and DBP high readings. Diastolic HTN was slightly less accurately recognized than Systolic HTN in males(table1). There was no statistically significant difference found in appropriately HTN diagnosis by sex [p = 0.9].
Conclusion(s) There is a wide gap in the accurate diagnosis of high BP readings measured in a large pediatric ambulatory setting sample with multiple risk factors. It improves with severity of HTN among SBP readings. Severe (Stage 2) HTN is more likely to be undiagnosed for SBP than for DBP.

Boys	Systolic		Diastolic	
	Number [%] n =10,310	Appropriately diagnosed n [%]	Number [%] n= 10,322	Appropriately diagnosed n [%]
Normal BP	8,850 [85.8%]	8,762 [99.9*] *	9,153[88.7%]	9,143 [99.9%] *
Pre-HTN	674 [6.5%]	3 [0.5%]	726 [7%]	1 [0.3%]
Stage 1 Hypertension	571 [5.5%]	6 [1.1%]	378 [3.7%]	5 [1.3%]
Stage 2 Hypertension	215 [2.1%]	2 [0.9%]	65 [0.6%]	0 [0%]
Total abnormal BP[Pre-HTN, stage 1 HTN and stage 2 HTN]	1,460 [14.2%]	11 [0.8%]	1,169 [11.3%]	6 [0.5%]
Girls	Systolic		Diastolic	
	Number [%] n= 10,111	Appropriately diagnosed n [%]	Number [%] n =10,104	Appropriately diagnosed n [%]
Normal BP	8,635[85.4%]	8,635 [100%]	8,917 [88.3%]	8,911 [99.9] *
Prehypertension	676[6.7%]	3 [0.4%]	717[7.1%]	6 [0.8%]
Stage 1 Hypertension	584 [5.8%]	5 [0.9%]	389 [3.9%]	4 [1%]
Stage 2 Hypertension	216 [2.1%]	4 [1.9%]	81 [0.8%]	0 [0%]
Total abnormal BP[Pre-HTN, stage 1 HTN and stage 2 HTN]	1,476[14.6%]	12 [0.8%]	1,187 [11.7%]	10 [0.8%]
*0.1% was wrongly diagnosed as HBP besides having a normal BP				

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Abstract: 86
Diversion of Prescription Antibiotics: Should You Take from Peter to Treat Paul
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Background Prescription medication borrowing and sharing, a practice known as diversion, is widespread for many medications including stimulants and analgesics, despite possible consequences such as adverse medical effects. A preliminary review of online blogs indicated that a substantial number of people engage in antibiotic diversion, despite warnings regarding the emergence of antibiotic resistant bacteria. However, to date, no studies have investigated the extent to which parents divert antibiotics prescribed for their children.
Objective To determine the prevalence of antibiotic diversion among parents, to whom the antibiotics are given, and how parents estimate the dosage of antibiotics to administer.
Design/Methods An anonymous online questionnaire was distributed to parents via Amazon Mechanical Turk. After indicating that they have reused antibiotics prescribed for their children, parents specified the formulation of antibiotics that were reused (liquid, drops, cream, tablet), the people to whom they have given their children's antibiotics, and how they determined the dosage of antibiotic

to administer. Finally, parents stated whether they have given medications prescribed for adults to their child.
Results A total of 496 parents (n=550; avg age=34.2; 39% male; 15% Hispanic/Latino; 69% White, 17% Asian, 8% Black, 6% Other) met inclusion criteria. Of 454 parents who had leftover antibiotics (of any formulation), 219 (48.2%) reported saving them instead of disposing of them. Of those, 159 (72.6%) stated that they subsequently diverted those antibiotics. Antibiotic diversion predominated for liquids (80.4% of parents whose children used this formulation) and drops (73.8%) compared to creams (69.7%) and tablets (55.6%). Antibiotics were most often diverted from the child to whom the antibiotic was prescribed to the child's siblings and parents (Table 1). The dosage of antibiotic that was administered was typically the prescribed dosage, though the recipient of the antibiotic had changed, or was estimated based on the age of the child (Table 2). Overall, 16% of participants stated that they had given their child adult medications.
Conclusion(s) An alarming percentage of parents reported diversion of antibiotics both within and outside the family. This practice is dangerous not only for the new recipients of the antibiotics but for the population that will likely endure the consequences of drug resistant bacteria. It is imperative that clinicians emphasize the risks of antibiotic diversion and encourage proper disposal of antibiotics.

Table 1. Percentage of parents who saved leftover antibiotics prescribed for their children and later diverted them to the child's siblings, unrelated children and unrelated adults or who used the leftover antibiotics themselves. Results are displayed by antibiotic formulation.

	Liquid (n=363)	Drops (n=193)	Cream (n=364)	Tablets (n=363)
Siblings	22.2%	29.7%	24.8%	18.5%
Unrelated children	15.6%	14.1%	7.1%	7.1%
Unrelated adults	11.1%	7.8%	7.8%	33.3%
Participant themselves	28.9%	31.3%	21.3%	40.7%

Table 1. Percentage of parents who saved leftover antibiotics prescribed for their children and later diverted them to the child's siblings, unrelated children and unrelated adults or who used the leftover antibiotics themselves. Results are displayed by antibiotic formulation.

Table 2. Methods through which parents determined the dosage of leftover antibiotic to administer. Results are displayed by antibiotic formulation.

	Liquid (n=363)	Drops (n=193)	Cream (n=363)	Tablet (n=354)
Estimate based on child age	13.3%	4.7%	7.1%	25.9%
Estimate based on child weight	15.6%	6.3%	2.8%	11.1%
Estimate based on severity of symptoms	6.7%	0%	7.1%	7.4%
Look online	2.2%	3.1%	3.5%	7.4%
Same dosage as prescribed	60%	81.3%	77.3%	48.1%
Contacted medical professional	0%	4.7%	1.4%	0%
Other	5%	0%	0.7%	0%

Table 2. Methods through which parents determined the dosage of leftover antibiotic to administer. Results are displayed by antibiotic formulation.

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Abstract: 87
Factors associated with increased parental vaccine hesitancy and intent to vaccinate against influenza in an urban, Latino population.
Vanessa P. Scott[1], Douglas Opel[2], Jason Reifler[3], Sharon Rikin[4], Angela Barrett[5], Melissa Stockwell[6]
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Background While vaccine hesitancy (VH) is historically associated with affluence, less is known about VH in low-income and predominantly Latino populations.
Objective To examine the relationship between parental VH and 1) demographics and 2) intent to vaccinate against influenza.
Design/Methods A convenience sample of parents with children ≥6 months old was approached during Fall-Winter 2016 at an urban academic general pediatrics clinic. Participants completed a survey regarding demographics, vaccine refusal history, vaccine information sources (TV/internet vs. healthcare providers vs. family/friends), and intent to vaccinate against influenza. Parental VH was assessed using the 5-question short scale of the validated 15-item Parent Attitudes about Childhood Vaccines survey (PACV). Each PACV-5 item was scored (0, 1, 2) and summed (0-10 scale). Consistent with prior studies, PACV-5 scores were grouped into low (0-3), moderate (0-6) and high (7-10) vaccine hesitancy, and dichotomized into low/moderate (0-6) and high (7-10). Parental intent to vaccinate was dichotomized as unlikely (somewhat/very unlikely) and likely (somewhat/very likely) to vaccinate on the visit day. Chi square analysis and multivariable logistic regression assessed the association of 1) demographics with PACV-5 scores after controlling for vaccine information sources, parent education and parent-child relationship, and 2) PACV-5 scores with intent to vaccinate after adjusting for vaccine information sources, parent education, child sick on visit day, and English proficiency.
Results Of 501 eligible parents approached, 400 (80%) were surveyed. Median child and parent age was 4.3 (IQR 1.5-9.4) and 33.0 (IQR 28.0-41.0) years. Most children were Latino (88%) and publicly-insured (96%), and 51% of parents had ≤high school education. Among parents, 15% had high VH, 24% moderate VH, and 61% low VH. Parents with excellent English proficiency (aOR 1.9, 95% CI: 1.0, 3.5) or who obtained vaccine knowledge from TV or internet (aOR 2.7, 95% CI: 1.4, 5.1) had greater odds of high VH. High VH was also associated with a history of ever refusing the influenza vaccine for the child or parent (aOR 4.9, 95% CI: 2.7, 8.9) and being unlikely to vaccinate their child (aOR 2.7, 95% CI: 1.5, 5.1) at that visit.
Conclusion(s) Among this low-income, Latino population, over a third of parents had moderate or high VH. High VH was associated with decreased intent to vaccinate and history of ever refusing the influenza vaccine.
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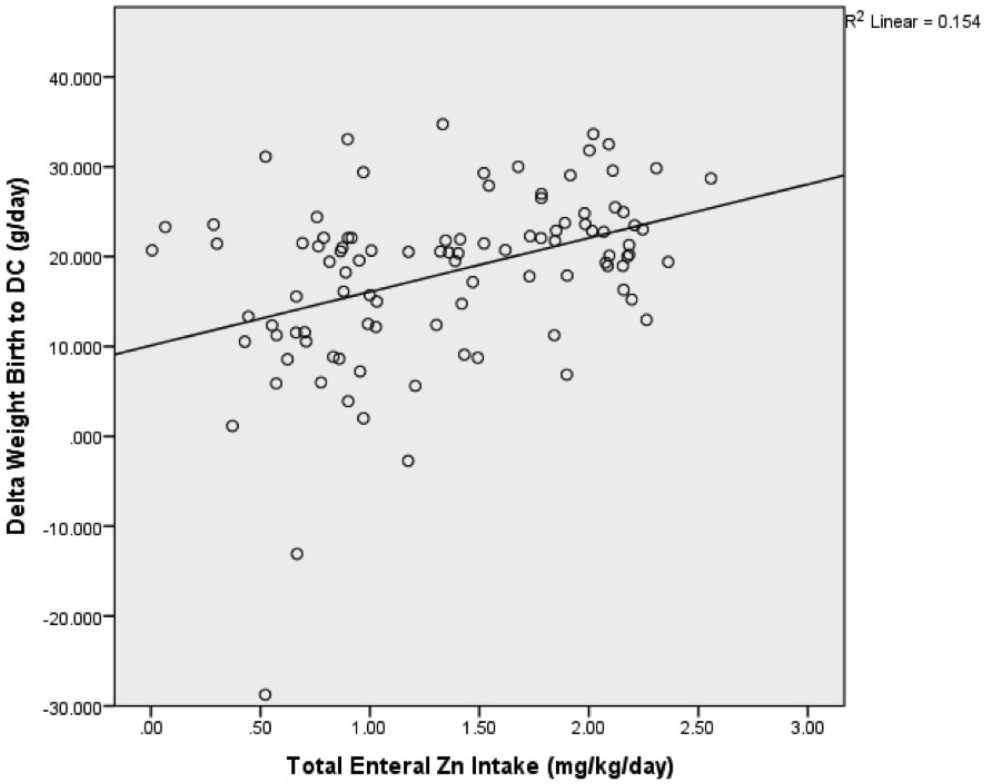
Abstract: 88
Increased Early Enteral Zinc Intake Improves Weight Gain and Head Growth in Hospitalized Preterm Neonates
Tracey Harris[1], Fumiyuki Gardner[1], Abigail Podany[3], Shannon Kelleher[2], Kim K. Doheny[1]
[1]Division of Neonatal-Perinatal Medicine, Penn State Hershey Children's Hospital, Hershey, Pennsylvania, United States, [2]Department of Biomedical and Nutritional Sciences, University of Massachusett Lowell, Lowell, Massachusetts, United States, [3]Department of Surgery, Penn State Hershey Medical Center, Hershey, Pennsylvania, United States

Background Zinc is the second most abundant trace element in the human body and the predominant intracellular element. Zinc is essential as a structural component of hormones, nucleotides, and proteins, as a cofactor in enzymes involved in metabolic pathways, and is required for many physiologic processes including growth and development. However, fetal zinc acquisition primarily occurs via placental transfer during the third trimester; therefore, preterm infants are born with insufficient zinc stores. While zinc supplementation is associated with improved growth in preterm neonates, true zinc intake from breast milk, fortifier and formula is difficult to quantify. For this study, we calculated zinc intake from breast milk, fortifier and formula to determine neonatal enteral zinc intake in the first two weeks of life and its impact on later growth.
Objective To test the hypothesis that higher enteral zinc intake would be associated with improved neonatal growth during NICU hospitalization.
Design/Methods A cohort of 101 neonates (26-37 wks PMA) excluding those with cardiovascular defects, congenital anomalies, or surgical conditions involving the GI tract were studied from admission to discharge. At ~2 wks of life, a sample of breast milk was obtained and zinc concentration was measured via atomic absorption spectroscopy. Total daily zinc intake, including that from breast milk, fortifier and formula was calculated at DOL 14. Growth parameters were monitored weekly. Delta (discharge minus birth) WT, ΔL, ΔHC was used to assess growth. Nonparametric tests comparing relationships among enteral zinc intake and Δ WT, Δ L, Δ HC were performed. In addition, partial correlations were done to control for the contribution of baseline health status on growth.
Results Subjects were 51% male and predominantly white, non-Hispanic with a mean (SD) birth weight of 1.77 (0.62) kg. Thirty-two percent were delivered vaginally and the median 5 min APGAR was 8 IQR (7-9). Total enteral zinc intake was positively associated

with ΔWT (g/day) (r=0.40, p<.001) (Figure 1) and ΔHC (cm/day) (r=0.35, p<.001) between birth and discharge; these findings remained statistically significant when 5 minute APGAR was used as a control variable. Enteral zinc intake was not associated with ΔL (cm/day) (r=.12, p=.22).
Conclusion(s) Increased early enteral neonatal zinc is associated with improved weight gain and head circumference growth during NICU hospitalization.



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Abstract: 89
Human Milk With a Cherry on Top: Achieving Adequate Growth for Infants with Congenital Diaphragmatic Hernia (CDH) Utilizing Human Milk
K. Taylor Wild[1], Dana Bartholomew[2], Taryn Edwards[3], Elizabeth Froh[4], Diane Spatz[4], Cynthia Villasis[5], Holly Hedrick[6], Ursula Nawab[7]
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Background Prior evidence has shown that infants with CDH are at increased risk for malnutrition and require higher than standard caloric density feedings to achieve optimal growth velocity. Since human milk (HM) is the optimal diet for infants, this review specifically evaluates the need for earlier fortification to prevent malnutrition.
Objective To describe the enteral feeding requirements, including caloric provisions, of infants with CDH from admission to discharge in relation to growth patterns.
Design/Methods Retrospective case review of infants admitted to the CHOP NICU with a diagnosis of CDH between 8/2012 and 3/2017. Infants who died or were withdrawn from care prior to initiating feeds were excluded. Medical records were reviewed to determine feeding choice, caloric provision, and growth patterns. Data points evaluated were weight, length, and head circumference. Z-scores were evaluated utilizing peditools.org, including the weight for length.
Results 149 infants born with CDH admitted to the CHOP N/IICU were evaluated. Maternal HM was initiated in 67% babies as their first feed. 39% required formula fortification to achieve appropriate growth while 14% received additives (microlipid was most common 10%). 8% of infants feeding HM required hind milk. Majority (60%) of infants were started on continuous feeds. Average daily weight gain (ADWG) was not affected by continuous (ND/NJ) vs. bolus feeds (NG/PO), P=0.189 and P=0.555, respectively.

Of the 149 infants, 118 infants were feeding HM at discharge. 55% were discharged feeding unfortified HM with 11 requiring hind milk. These infants had an ADWG of 21±20 g/d prior to discharge. Weight for length z-scores were -0.97 ± 1.6. 40% were feeding PO ad lib. Babies requiring tube feeds were receiving 112 Kcal/k/day at discharge.
Conclusion(s) Provision of HM is important for the myriad of benefits in infants. Critically ill infants are less likely to receive HM; however, they may derive greatest benefits. While high rates of human milk feeds can be achieved in babies with CDH, nearly 60% require additional calories in the way of fortification, additives, or hind milk for adequate growth. Prompt recognition of malnutrition and growth failure with aggressive supplementation may improve the overall growth of infants with CDH while in the intensive care unit. These data will help to establish standards for initial caloric goals and higher calorie feeding regimes to improve growth velocity in these patients at high risk for malnutrition.

Table 1. Demographics (Continuous)

	n	Mean ± SD	Median (IQR)	Range
Gestational age, weeks	149	37.73 ± 1.73	38.0 (37.0, 39.0)	(31, 41)
Birth weight, kg	149	3.13 ± 0.51	3.1 (2.8, 3.5)	(1.5, 4.4)
Birth length, cm	144	49.08 ± 3.38	49.5 (47.5, 51)	(34.5, 57)
Day of life of admission, days	149	2.03 ± 6.21	1 (1, 1)	(1.0, 63)
TPN, days	149	33.74 ± 25.52	28 (16, 43)	(4, 161)
Duration of ventilation, days	149	26.99 ± 26.18	21 (9, 35)	(0, 202)
Length of stay, days	149	69.18 ± 58.71	58 (28, 86)	(6, 343)

Demographics (Categorical)

	n(%)
Gender	
Male	95 (63.8)
Female	54 (36.2)
Birth Hospital	
Outborn	23 (15.4)
Inborn	126 (84.6)
Requir ed ECMO	
No	115 (77.2)
Yes	34 (22.8)
Human Milk	
No	31 (20.8)
Yes	118 (79.2)

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Abstract: 90
Exclusive human milk diet is associated with a decreased incidence of severe IVH in ELBW infants
Amanda Rahman, Katherine Carome, Boriana Parvez
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Background Intraventricular hemorrhage (IVH) is a major cause of morbidity, mortality, and long-term neurodevelopmental disability in the extremely low birth weight infant (ELBW). An exclusive human milk (EHM) diet has many known benefits, including a decreased incidence of NEC, ROP, and sepsis. Breast milk and colostrum contain a myriad of vasoactive factors, including VEGF,

epidermal growth factor, and cytokines, as well as growth factors; however, the impact of an EHM diet on the incidence of severe IVH has not been evaluated.
Objective The primary goal was to compare the incidence of severe IVH in two groups of ELBWs (≤1000 grams) based on their diet until 34 weeks corrected gestational age (CGA): a) exclusive human milk (EHM) or b) predominantly formula (BOV). The secondary objectives were to look at differences in anthropometric measurements and other prematurity-associated morbidities: ROP, NEC, sepsis, PDA ligation, death, length of stay, and oxygen at discharge.
Design/Methods This is a retrospective study of ELBWs between Jan 2012-March 2017 who were divided into two groups based upon feeding until 34 weeks CGA - EHM only versus those that received mostly BOV. All infants in the EHM group received colostrum oral care starting within the first 24 hours. Severe IVH was defined as grade III/IV or PVL using Papille's classification. Data analysis used chi-square and student's t-test as appropriate. Logistic regression was done to correct for differences in antenatal steroids and NEC.
Results Of 306 eligible infants, 126 (41%) received EHM and 180 (59%) received BOV. Maternal and neonatal characteristics and major morbidities were similar between groups except for higher antenatal steroid use in EHM (Table 1). As expected, the incidence of NEC was lower in the EHM group (5% vs. 17%, p=0.001). The rate of severe IVH was lower in the EHM group (7% vs. 18%, p=0.004) (Table 2), which remained significant after correction for differences in NEC and antenatal steroids (p=0.012, OR 2.72, CI 1.2-6.0). Infants in the EHM group had slower weight gain, but similar rate of head growth, based on change in z-scores.
Conclusion(s) This is the first study to report the effect of an EHM diet on the incidence of IVH. Although further work into the physiology is needed, our study suggests that an EHM diet may be protective against IVH. Although infants in our EHM cohort had slower weight gain, head growth was spared. This study supports the need for increased support of breastfeeding and the use of an EHM diet for this population.

Table 1: Maternal and Neonatal Demographics and Morbidities

	EHM n=126	BOV n=180	p
Maternal age, years, mean (±SD)	30 (±7)	30 (±6)	NS
White race, n (%)	49 (39)	49 (27)	NS
Antenatal steroids, n (%)	113 (89)	142 (79)	0.032
Preeclampsia, n (%)	26 (21)	30 (17)	NS
PPROM, n (%)	32 (25)	54 (30)	NS
Chorioamnionitis, n (%)	21 (17)	23 (13)	NS
C-section, n (%)	79 (62)	114 (64)	NS
Multiple gestation, n (%)	34 (27)	47 (26)	NS
Male, n (%)	64 (50)	81 (45)	NS
Inborn, n (%)	109 (86)	146 (82)	NS
5 min APGAR <7, n (%)	14 (11)	18 (10)	NS
GA in weeks, mean (±SD)	26 (±2)	26 (±2)	NS
CGA at DC in weeks, mean (±SD)	39 (±6)	39 (±7)	NS
BW in grams, median (IQR)	770 (630-880)	770 (660-880)	NS
SGA, n (%)	16 (12)	22 (12)	NS
HC in cm at birth, mean (±SD)	22.6 (±1.8)	22.7 (±1.7)	NS
DC weight in grams, median (IQR)	2920 (2288-3516)	2775 (2280-3560)	NS
DC HC in cm, mean (±SD)	32.9 (±4.1)	32.8 (±4.4)	NS
Change in weight birth to DC, mean z-score (±SD)	-0.95 (±0.81)	-0.60 (±1.06)	0.002
Change in HC birth to DC, mean z-score (±SD)	-0.65 (±1.70)	-0.45 (±2.05)	NS
Avg weight gain, g/kg/day, mean (±SD)	10.7 (±7.8)	13.3 (±4.3)	<0.001
Severe ROP, n (%)	10 (8)	9 (5)	NS
PDA ligation, n (%)	21 (17)	27 (15)	NS
Oxygen at DC, n (%)	48 (38)	68 (38)	NS

Sepsis, n (%)	17 (13)	31 (17)	NS
Survival to DC, n (%)	113 (89)	153 (86)	NS

Table 2: Significant Neonatal Outcomes

	EHM n=126	BOV n=180	p
Severe IVH, n (%)	9 (7)	33 (18)	0.004
NEC, n (%)	6 (5)	31 (17)	0.001

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Abstract: 91

Human milk to prevent morbidity and mortality in the NICU: how much and when?

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Background The benefits of human milk (HM) feeding are well known for very low birthweight (VLBW) infants and those born <32 weeks (PT).

HM feeding has a dose-dependent effect. There may be a critical time when optimized volume of early HM is protective.

Objective Determine HM exposure in mean daily volume and percent of total intake for a cohort of PT or VLBW (<1500g) infants admitted to our NICU 2014-2015

Identify if PT/VLBW infants with a composite outcome of necrotizing enterocolitis (NEC), late onset sepsis (LOS) or death have lower HM exposure overall, during the first 14 and 28 days of life

Design/Methods Patients born 1/1/2014 to 12/31/2015 were included. Outborn patients and those who died before 1st enteral were excluded. Daily enteral intake (volume and type), gestational age, postnatal diagnoses and procedures were collected. For each patient, HM proportion of total intake (percent) and mean HM daily volume (ml/kg/day) were determined for the first 14, 28 days and entire hospitalization.

The cohort was divided into two groups: those with NEC (any stage), LOS (clinical or culture-proven >72hrs of life) or died before NICU discharge (NEC+Sepsis); and those without (No NEC+Sepsis). Continuous and categorical variables were utilized as described in Table 1 and 2. Logistic regression and survival analysis with log-rank test using a HM volume cutoff of 50ml/kg/day were performed. P value <0.05 was statistically significant. All statistical analyses were performed in SAS.

Results 229 patients were included. 47 had NEC, LOS or died. 21 had NEC. 37 had LOS. 7 died; cause of death for all was NEC or LOS. Subjects with NEC+Sepsis were more premature (Table 1). NEC+Sepsis had lower median HM volume over 14, 28 days and hospitalization ($p<0.001$) (Fig 1). There was no difference in HM volume and HM% over all time periods when adjusted for variables associated with NEC+Sepsis (Table 2). Subjects who receive >50ml/kg/day of HM on average over hospitalization compared to those receiving less had a significantly longer time to NEC+Sepsis ($p<0.001$) (Fig 2).

Conclusion(s) In this cohort, HM exposure alone did not appear to be protective against sepsis/NEC/death when adjusted for time to full feeds. Survival analysis supports a dose-dependent impact of HM. Failing to feed infants early and/or for a prolonged period of time is associated with NEC, LOS and death. PT/VLBW feeding guidelines should promote HM usage as well as early and consistent feeding.

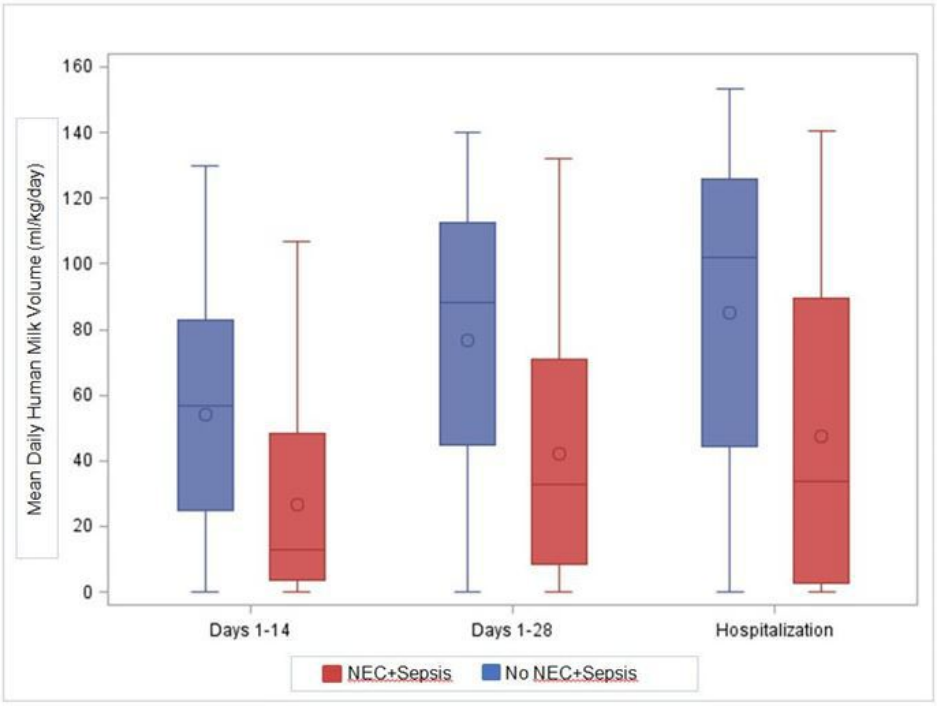

Figure 1. Mean Daily HM Volume by time period

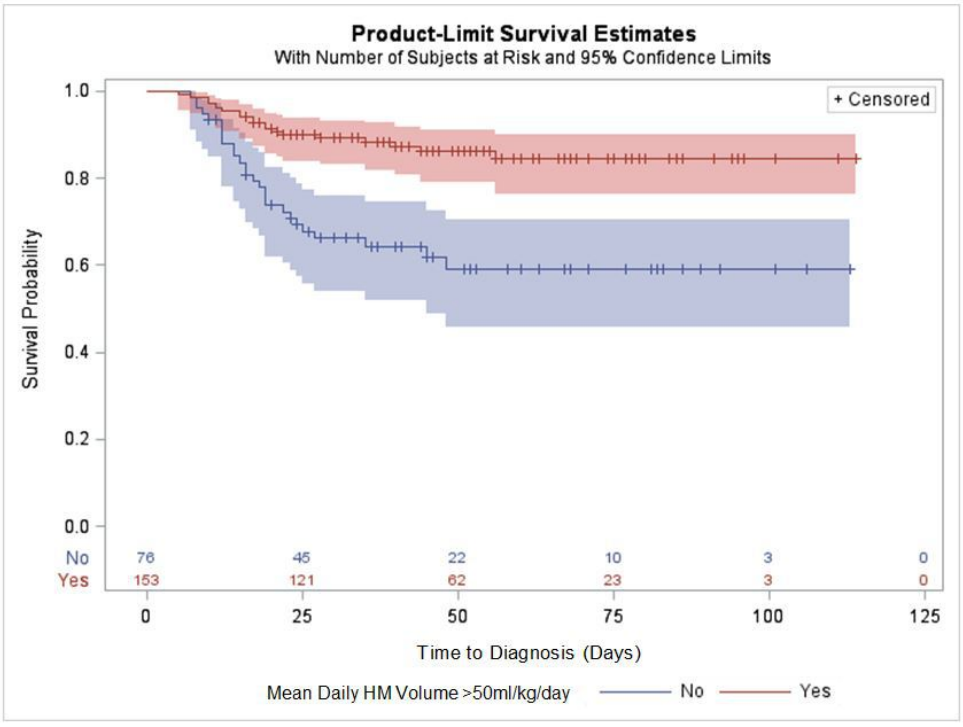

Figure 2. Survival Analysis for Time to Diagnosis of NEC+Sepsis. P<0.001. Type of diagnosis (NEC vs Sepsis) had no effect on time to diagnosis (p=0.51).

Table 1. Patient Characteristics

	NEC+Sepsis N=47	No NEC+Sepsis N=182	p-value
	n (%), Mean+/-SD or Median	n (%), Mean+/-SD or Median	

	(IQR)	(IQR)	
Gestational age (wks)	28.0 +/- 2.7	30.0 +/- 2.3	<0.001
Birth weight (g)	997.0 +/- 358.5	1239.5 +/- 306.1	<0.001
Birth weight percentile	41 (13, 55)	39 (15, 64)	0.59
Small for gestational age	9 (19.1)	33 (18.1)	0.87
Multiple gestation	14 (29.8)	68 (37.4)	0.33
Age when regained birth weight (days)	10.0 +/- 4.4	9.1 +/- 3.7	0.17
Age at first feed (days)	3 (2, 4)	2 (1, 3)	0.002
Age at full feeds (days)	22 (14, 38)	12 (10, 16)	<0.001
Central line days	21 (8, 47)	8 (0, 13)	<0.001
Respiratory Distress Syndrome	41 (87.2)	119 (65.4)	0.004
Transient Tachypnea of Newborn	4 (8.5)	69 (37.9)	<0.001
Air Leak Syndrome	4 (8.5)	2 (1.1)	0.02
Hypotension	28 (59.6)	37 (20.3)	<0.001
PDA with medical treatment	19 (40.4)	33 (18.1)	0.001
PDA ligation	7 (14.9)	3 (1.6)	<0.001
Spontaneous intestinal perforation	2 (4.3)	2 (1.1)	0.19

Categorical measures are given as number observed (%) while continuous measures are presented as mean +/- standard deviation or median (IQR), depending on normality of variable's distribution. Categorical measures are compared using Chi-Square or Fisher's exact tests, and continuous measures are compared using t-test or Wilcoxon Rank-Sum test, depending on normality of variable's distribution.

Table 2. Logistic Regression Model Results

	OR (95% CI) for NEC+Sepsis	Adjusted p-value
HM% for Hospitalization	1.00 (0.98, 1.01)	0.41
HM% for first 14d	1.00 (0.98, 1.01)	0.45
HM% for first 28d	1.00 (0.98, 1.01)	0.5
Mean Daily HM Volume for Hospitalization (10ml/kg/day)	0.93 (0.85, 1.02)	0.1
Mean Daily HM Volume for first 14d (10ml/kg/day)	0.97 (0.82, 1.15)	0.76
Mean Daily HM Volume for first 28d (10ml/kg/day)	0.92 (0.82, 1.04)	0.2

Model is adjusted for the following variables found to be associated with composite variable NEC+Sepsis through simple logistic regression: birth weight (p<0.001), birth head circumference (p<0.001), birth head circumference percentile (p=0.04), respiratory distress syndrome (p=0.01), transient tachypnea of newborn (p=0.001), air leak syndrome (p=0.02), hypotension (p<0.001), patent ductus arteriosus (p<0.001), PDA medical treatment (p=0.002), PDA ligation (p=0.001) and age at full feeds (p<0.001).

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Abstract: 92

Salivary FOXP2 and CNTNAP2 Expression Levels Serve as Noninvasive Biomarkers to Predict Oral Feeding and Speech Outcomes in the Premature Newborn

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Background Oral feeding and speech development share muscles and cranial nerves essential for oral motor coordination, planning and execution. Preterm infants may be impaired in these pathways due to disruptive development, placing them at risk for poor oral feeding and speech delays. Our group has shown that neonatal salivary concentrations of Forkhead box P2 (FOXP2), a gene associated with speech and language emergence, is inversely proportional to the number of days required to achieve full oral feeds. FOXP2 is bound to and regulates Contactin associated protein like 2 (CNTNAP2), a gene that is associated with language processing. However, its association with oral feeding and speech emergence remains unknown.
Objective To examine the clinical utility of salivary FOXP2 and CNTNAP2 levels in preterm newborns for predicting oral feeding attainment and speech emergence.
Design/Methods In this prospective study, saliva from 34 premature infants (GA: 30-34 6/7 weeks) were collected at the start of oral feeding. Salivary RNA was extracted and analyzed for expression levels of the target genes with RTqPCR. Expression of each gene was considered in a binary fashion (+/- expression); only samples that amplified all reference genes, GAPDH, HPRT1 and YWHAZ were considered in the analysis. FOXP2 and CNTNAP2 expression profiles were correlated, alone and in combination, to days required to achieve full oral feeds and to speech assessment at 9 months corrected age.
Results Infants expressing FOXP2+ (n=28) achieved full oral feeds 4 days sooner than infants not expressing FOXP2- (n=2; 10.5 v. 14.5 d). Conversely, infants expressing CNTNAP2+ (n=6) achieved full oral feeds 1.9 days later than infants who were CNTNAP2 - (n=24; 12.3 v. 10.4 d). Infants exhibiting the combination of FOXP2+/CNTNAP2 (n=21) achieved full oral prior to infants with the expression profile of FOXP2+/CNTNAP2+ (n=7; 9.8 d v. 12.6 d) and FOXP2-/CNTNAP2- (n=2; 9.8 d v. 14.5 d). No infant expressed FOXP2-/CNTNAP2+. Preliminary speech follow-up testing at 9 months (n=8) suggests that child vocalization count is inversely correlated with days to achieve full oral feeds (p=0.039).
Conclusion(s) The salivary expression profile FOXP2+/CNTNAP2- at the start of oral feeding predicts a shorter duration to achieve full oral feeds. This study is the first to demonstrate the presence of CNTNAP2 in neonatal saliva which, with FOXP2, may serve as an informative biomarker of oral feeding and speech development in the newborn.

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Abstract: 93

Different Growth Curves are Needed for Extremely Low Birth Weight (ELBW) Infants on Exclusive Fortified Human Milk Diet

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Background Optimal postnatal growth of preterm infants is currently defined as equivalent to the growth of ‘the reference fetus’ and extrauterine growth restriction (EUGR) in the past has been associated with poor neurodevelopmental (ND) outcomes. The most commonly used growth curve (Fenton 2013) is constructed based on cross-sectional data reflecting both intrauterine and postnatal growth without taking into account postnatal diet. Exclusive human milk diet (EHM) with mother’s own or donor breast milk fortified with human milk derived fortifier may lead to slower weight gain and increasing the risk of being classified as EUGR. The correlations between EHM, EUGR as currently defined, and ND have not been assessed.
Objective We sought to develop a longitudinal-based, extrauterine growth curve for weight, length and head circumference in ELBW infants feeding EHM.
Design/Methods We obtained serial longitudinal anthropometric data as well as demographic and medical information for all ELBWs born between February 2015 – Dec 2017 who were fed EHM. We excluded those with hydrops, HIE, congenital malformation or those who died within 2 weeks of life. Weekly measurements of weight, head circumference and length for each gestational week between 23 and 28 were collected from birth until discharge or 40 weeks postmenstrual age (PMA). Separate longitudinal growth charts for each gestational age were constructed using the Least Mean Square (LMS) Algorithm. We defined EUGR for each GA cohort as weight < 10% at discharge or 40 wks PMA. EUGR rates using the Fenton 2013 curve were also assessed.
Results 149 ELBW infants met inclusion criteria: BW 754 ± 160 g, GA 25.8 ± 1.8 wks (Mean ± SD). Rates of EUGR on Fenton vs. our growth charts were compared for each gestational week. Overall combined rate of EUGR was 41% vs. 9%. GA specific EUGR rates (%) were: 62 vs. 15, 50 vs. 9, 19 vs. 6, 32 vs. 7, 50 vs. 8, 75 vs. 12.5 for each GA week from 23 to 28 respectively. Length and Head circumference for each gestational age were also plotted and compared.
Conclusion(s) We have generated longitudinal, postnatal, gestational age specific growth charts for ELBW infants on exclusive human milk diet. Rates of EUGR for each GA on our growth charts were lower than the rates on the Fenton Chart. Whether EUGR defined by diet specific longitudinal growth curve will lead to different neurodevelopment outcome remains to be determined.

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Abstract: 94

Comparison of Outpatient Antibiotic Prescribing Patterns between Pediatric Academic and Community Practices

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Background Most inappropriate antibiotic prescribing occurs in outpatient settings. Little is known about differences in prescribing patterns among academic and community practice settings.
Objective To compare antibiotic prescribing compliance with IDSA/AAP guidelines for otitis media (OM), pharyngitis, and sinusitis in an academic practice and affiliated community practices.
Design/Methods We conducted a retrospective chart review of all encounters of patients with diagnoses of otitis media (OM), sinusitis, and pharyngitis who received an antibiotic prescription in an urban pediatric academic practice, staffed by residents and faculty, and 3 community pediatric clinics, staffed by pediatricians and nurse practitioners, 08/2014–03/2015. The primary outcome was compliance with 2012-13 IDSA/AAP prescribing guidelines (indication, antibiotic choice, dose, frequency and duration by disease). We collected data on patient demographics, practice and provider type (NP vs MD/DO), history and physical exam, and point of care testing.
Results 396 patient encounters were evaluated. Guideline compliance in the academic practice was 67% (95% CI, 61-74%) compared to 21% (95% CI, 16-27%) in community practices. Common antibiotic prescribing errors included: antibiotics were rarely withheld in cases of OM for which observation was indicated (18% academic vs 5% community practice); many cases of sinusitis did not fulfill diagnostic clinical criteria; and patients with pharyngitis and negative Rapid Strep were treated with antibiotics without either sending or awaiting throat culture results (39% academic vs 100% community). No significant differences were found in prescribing based on provider type, patient ethnicity or insurance.
Conclusion(s) Antimicrobial stewardship in the outpatient setting is greatly needed, particularly in community-based practices. Efforts should focus on differentiating viral upper respiratory infections from sinusitis and pharyngitis, encouraging observation for OM and awaiting testing results for pharyngitis prior to antibiotic prescribing.

Compliance with IDSA/AAP guidelines in outpatient encounters (N=396)

Patient encounters for:	Academic Practice N=188	Percent Compliance (95% CI)	Community Practices N=208	Percent Compliance (95% CI)
Otitis Media	66/104	63% (53-73%)	19/79	24% (14-32%)
Sinusitis	21/25	84% (64-95%)	5/69	7% (1-14%)
Pharyngitis	39/59	66% (53-78%)	20/60	33% (21-46%)
Overall	126/188	67% (61-74%)	44/208	21% (16-27%)

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Abstract: 95
Misuse of Previously Prescribed Antibiotics: When Are Parents Serving “Leftovers” to Children?
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Background The American Academy of Pediatrics (AAP) recommends that parents give children antibiotics exactly as they are prescribed, clarifying that they take the entire course and dispose of “leftover” antibiotics. The reuse of leftover antibiotics is clearly discouraged. While many parents may assume that antibiotics are virtually interchangeable and useful for almost all childhood illnesses, childhood illnesses due to viruses do not necessitate antibiotic use. In addition, partial or incorrect treatment of bacterial illnesses using leftover antibiotics may adversely affect diagnosis and treatment.
Objective To assess the extent to which parents reuse their child’s leftover antibiotics and to explore the primary motivations for this practice.
Design/Methods An anonymous online survey was distributed to parents via Amazon Mechanical Turk. Respondents reported, for four different formulations of antibiotics (creams, liquids, tablets, drops), the setting in which the antibiotic was prescribed and the duration for which they had saved any leftover antibiotics prescribed for their children, if applicable. Subsequently, parents indicated whether they reused their child’s leftover antibiotics and their reasoning for doing so.
Results In total, 496 parents completed the survey (M=34.2 years; 39% Male; 15% Hispanic or Latino; 69% White, 17% Asian, 8% Black, 6% Other). The majority of antibiotics, 78.5%, were prescribed in primary care settings. Most parents (90.1%) reported that their children used the antibiotic for the amount of time prescribed. Of 454 instances where parents indicated that they had leftover antibiotics, parents saved them instead of disposing of them 48.2% of the time (Table 1). The leftover antibiotics were often saved for months and were reused by the child for whom the antibiotic was originally prescribed. The most commonly cited reasons for reusing antibiotics included saving money, saving time, and avoiding a doctor’s visit (Table 2). When analyzed by prescription setting, those who received antibiotics in an emergency room setting were 1.2 times more likely to save the antibiotic compared to those who received antibiotics in a primary care setting.
Conclusion(s) Despite warnings by the AAP, a substantial number of parents reported that they saved leftover antibiotics for an extended period of time and later reused the antibiotic. Pediatricians must advise parents regarding methods of disposing of all antibiotic formulations and stress the dangers of storing and subsequently reusing leftover antibiotics.

Table 1. Parental habits regarding saving and reusing leftover antibiotics.

	Creams (n=354)	Liquids (n=363)	Tablets (n=363)	Drops (n=193)
Used antibiotics for amount of time prescribed (as a percentage parents whose children were prescribed the formulation)	86.3%	94.7%	91.8%	87.6%
Did not throw out antibiotics when finished (as a percentage parents whose children were prescribed the formulation)	48.9%	12.4%	39%	33.1%
Saved leftover antibiotics for days (as a percentage of parents who saved the antibiotics)	14.2%	33.3%	33.3%	12.5%
Saved leftover antibiotics for months (as a percentage of parents who saved the antibiotics)	63.1%	64.4%	55.6%	48.4%
Saved leftover antibiotics for years (as a percentage of parents who saved the antibiotics)	11.3%	2.2%	3.7%	31.3%
Would save leftover antibiotics indefinitely (as a percentage of parents who saved the antibiotics)	11.3%	0%	7.4%	7.8%

Table 1. Parental habits regarding saving and reusing leftover antibiotics.

Table 2. Parental habits regarding reusing leftover antibiotics, displayed as a percentage of the parents who saved the antibiotic of that formulation.

	Creams (n=354)	Liquids (n=363)	Tablets (n=363)	Drops (n=193)
Reused leftover antibiotics on the same child, for a similar issue	58.9%	46.7%	29.6%	59.4%
Reused leftover antibiotics on the same child, for a different issue	39%	40%	25.9%	35.9%
Reused leftover antibiotics to save money	12.1%	13.3%	11.1%	12.5%
Reused leftover antibiotics to save time	5.7%	8.9%	33.3%	4.7%
Reused leftover antibiotics to avoid a doctor's visit	14.9%	15.6%	14.8%	18.8%
Could not get appointment with doctor so reused leftover antibiotics	1.4%	4.4%	7.4%	1.6%
Reused leftover antibiotics to treat symptoms similar to original issue	36.9%	26.7%	11.1%	35.9%
Reused leftover antibiotics after consulting medical professional	0%	0%	0%	3.1%
Have not reused leftover antibiotics yet	24.1%	31.1%	22.2%	21.9%
Other	5%	0%	0%	1.6%

Table 2. Parental habits regarding reusing leftover antibiotics, displayed as a percentage of the parents who saved the antibiotic of that formulation.

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Specificity of Surveillance Endotracheal Tube Cultures in Relation to Late-Onset Sepsis

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Background The role of endotracheal tube (ETT) cultures in the management of neonatal intensive care unit (NICU) patients remains unclear. There is concern about distinguishing infection from colonization and antimicrobial overuse. Historical studies report poor ability to predict risk for late-onset sepsis (LOS) or the etiologic agent. Our single center NICU has routinely obtained surveillance ETT cultures as part of an infection prevention strategy to monitor colonization trends but the clinical significance of these has not been identified.

Objective To evaluate the specificity of routine endotracheal tube (ETT) cultures in relation to late-onset sepsis (LOS) in a single center NICU over an 11-year period.

Design/Methods We assembled an 11-year retrospective cohort of mechanically ventilated infants in our NICU who subsequently developed LOS (lab confirmed bacteremia post 72 hours admittance). Infants were eligible for inclusion if they had at least one weekly surveillance ETT culture as part of routine NICU care prior to development of LOS (n=63). Specificity of the ETT and blood isolates were then calculated with the interval between the ETT cultures and blood isolates ranging from 7, 14, to 21 days.

Results Between 2006-2016, 1300 infants had at least one surveillance ETT culture. Of the 1300 neonates, a subset of 63 (4.8%) developed LOS and 54 of the 63 neonates with LOS (85.7%) had a pathogenic bacteria in the ETT culture. For the subset the median gestational age was 25 weeks (IQR: 2 weeks), median birthweight (BW) was 710 grams (IQR: 302 grams) and median ventilator days were 42 (IQR: 52 days). Specificity was greater than 90% (see tables) for ETT cultures predicting blood culture results.

Conclusion(s) In our cohort, having a positive ETT culture was unlikely to be associated with development of LOS and represented colonization in most patients. However, we saw that infants who developed LOS were likely to be colonized with the same organism present in the ETT cultures proximal to the development of LOS. As a result, routine ETT cultures may be beneficial with respect to initial empiric antibiotic selection in the setting of suspected LOS.

Specificity of Endotracheal Tube Cultures and Late-Onset Sepsis

Organism	Specificity ≤ 7 days	Specificity ≤ 14 days	Specificity ≤ 21 days
Staphylococcus Aureus	95	96	96
GBS	96	96	96
CoNS	74	73	73
E. Coli	100	100	100
Enterobacter	98	98	97
Klebsiella	94	95	95
Pseudomonas	100	100	100
Serratia	100	100	100

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Abstract: 97

Influenza Vaccine Recommendations: Effect on Healthcare Outcomes in the Pediatric Population from 2005-2015

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Background Influenza vaccine recommendations are made yearly by the Advisory Committee on Immunization Practies (ACIP). Significant recommendations were made in 2006, 2008, and most remarkably 2010. In 2010, the ACIP recommended all children 6 months and older to receive the influenza vaccine. Since influenza vaccine recommendations have become more universal, limited data exist to determine whether or not these changes have impacted pediatric healthcare outcomes.

Objective We aimed to determine whether or not changes to influenza vaccine recommendations over the past ten years have impacted the number of ED visits and inpatient admissions (ICU and non-ICU), as well as the severity of these hospital visits.

Design/Methods We performed a retrospective chart review and identified all influenza-positive patients ages 6 months to 18 years that were diagnosed in the ED or inpatient at the University of Maryland Children's Hospital from 2005-2015. We collected demographic information, duration of illness and illness severity, as well as common respiratory or cardiac co-morbidities of these patients. The data were grouped together to reflect each major change in vaccine recommendations, i.e. 2005-2006 (group one), 2006-2008 (group two), 2008-2010 (group three), and 2010-2015 (group four).

Results 243 out of 17,506 (0.14%) pediatric patients evaluated in the ED or admitted inpatient were positive for influenza from 2005-

2015. The average (mean) number of influenza-positive patients per year for group one, two, three, and four were 11, 18, 20, and 20.4, respectively. 45% of the influenza-positive patients in group one were admitted inpatient, as compared to 27% of the influenza-positive patients in group four. The average (mean) length of stay is 3.6 days for group one patients and 2.7 days for group four patients. 27% of group one patients had a diagnosis of asthma, whereas 55% of group four patients had that diagnosis.
Conclusion(s) Changes to influenza vaccine recommendations from 2005-2015 did not decrease the frequency of influenza diagnoses in the pediatric population at our hospital, but as vaccine recommendations became more universal, there were fewer inpatient admissions and shorter lengths of stay. In addition, a greater percentage of influenza-positive patients diagnosed after vaccine updates had a pre-existing respiratory condition, suggesting that the influenza vaccine may help prevent previously healthy children from needing hospital evaluation.

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Abstract: 98

Microbiome research recruitment and participation in longitudinal cohort studies: Methods and Metrics

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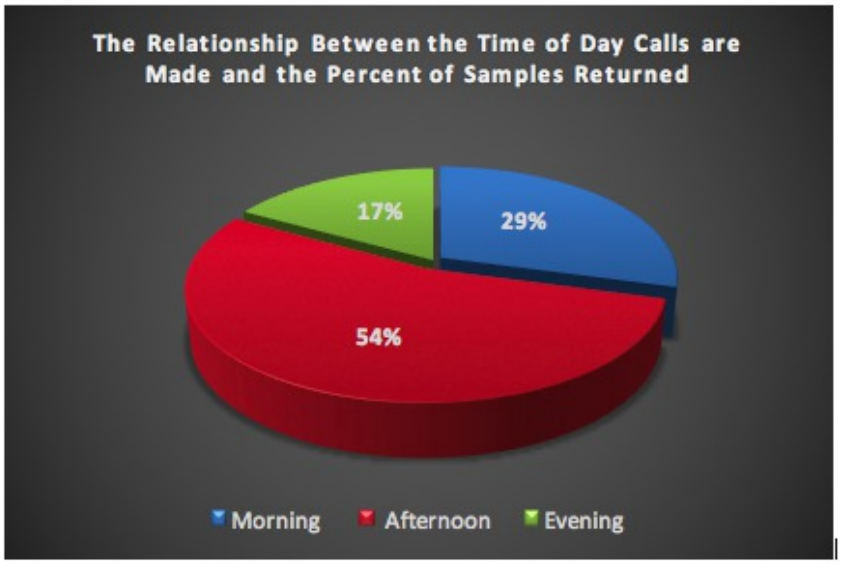
Background When conducting longitudinal cohort studies, continued subject participation and efficient sample collection outside a hospital setting has been a challenge. For microbiome research, fecal occult cards could be an effective solution for sample collection as it requires a low volume, no application training, and ships easily.
Objective 1. To assess if mailing fecal occult cards, with minimum instructions and contact, would result in an efficient return rate of samples. 2. To identify the most effective and efficient manner to obtain specimens for microbiome research.
Design/Methods Two sets of 500 kits containing a fecal occult card, stool applicator, sample collection instructions, survey, and a mailer were sent to qualifying participants selected from a longitudinal microbiome and genomic study. An initial call was made informing participants the kit was mailed. The first 500 (Group 1) had two follow up calls: the 1st, two weeks after mail date; the 2nd between 15 and 30 days after mail date. The second 500 (Group 2), had one follow up call 2 weeks after mail date. Samples were returned via USPS and stored at -80°C until extraction, when trained personnel evaluated each sample for correct application. Downstream processes were completed using a modified EZ1 DNA extraction protocol and the Illumina 16S Metagenomic Sequencing Library Preparation protocol for analysis on the Miseq.
Results For the 1000 kits mailed, 29% were returned in an average of 30 days. Regarding sample application, it was found that 78% of cards were sufficient, 17% were low, 4% were too much, and 1% was abnormal. Only 1 sample failed QC and sequencing.

Out of the samples returned; 71% were from participants ≤ 36 months of age, 46% were female, and 54% were male. When contacting participants who returned the samples; 47% were exclusively left messages, 49% answered at least once, and 4% were not reached. During weekdays, 54% of all the calls were answered between 12:00 to 15:00. In Group 1, 35% of samples were returned after an initial call and two follow ups, in Group 2, 23% of samples were returned after an initial call and one follow up.
Conclusion(s) Increased follow-up resulted in greater participation. Direct discussion with participants did not influence specimen return rates. The rate of return was greatest in participant's ≤ 36 months of age. Fecal occult mailers proved to be an effective manner to continue participation and sample collection in microbiome studies.


The Relationship Between the Time of Day Calls are Made and the Percent of Samples Returned
17%
29%
54%
Morning
Afternoon
Evening

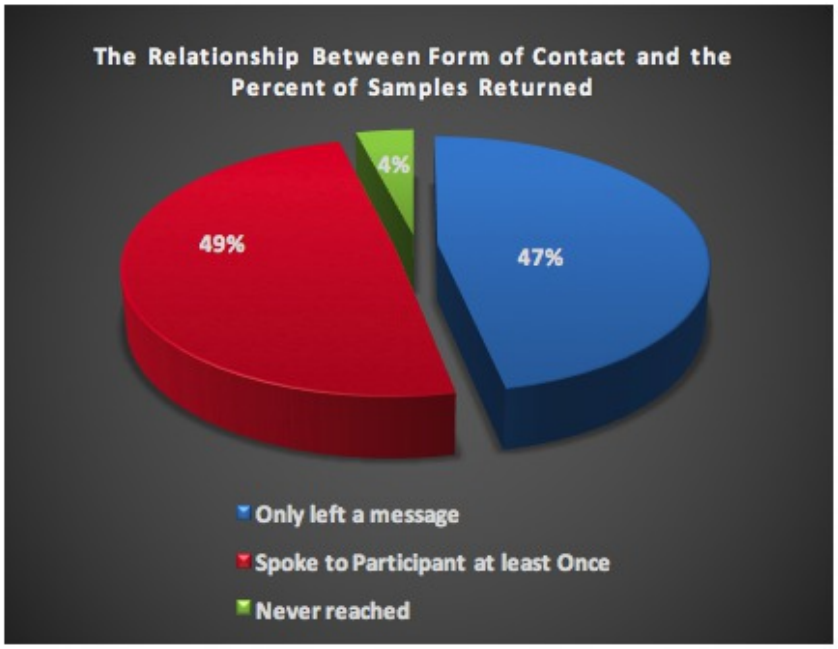

The Relationship Between Form of Contact and the Percent of Samples Returned
4%
49%
47%
Only left a message
Spoke to Participant at least Once
Never reached

Table 1: Factors for Participation in a Longitudinal Cohort Study for Microbiome Research (Total Returned samples)

Factors		N=288	Percentage (%)
Gender	*Male*	156	55%
	Female	132	46%
Age of Participant	*≤36 months*	205	71%
	>36 months	83	29%
Forms of Contact	*Only Left a Message*	134	47%
	Spoke to Participant at least Once	142	49%
	Never Reached	12	4%
Time of Day Contacted	*Morning*	57	29%
	Afternoon	105	54%
	Evening	33	17%

Table 2: Comparison of Participation between the Two Groups (Returned Samples)

Factors		Group 1 N=174	Percentage (%)	Group 2 N=114	Percentage (%)
Gender	Male	97	56%	59	52%
	Female	77	44%	55	48%
Age of Participant	≤36 months	131	75%	74	65%
	>36 months	43	25%	40	35%
Forms of Contact	Initial Call	48	27%	17	15%
	Initial Call + 1 Reminder	57	33%	97	85%
	Initial Call + 2 Reminders	69	40%		
Time of Day Contacted	Morning	27	23%	30	39%
	Afternoon	64	54%	41	54%
	Evening	28	23%	5	7%

Table 3: Comparison of Gender and Age between Total Mailed Kits and Total Returned Samples.

Factors		Total Mailed kits N=1000	Percentage (%)	Total Returned samples N=288	Percentage (%)
Gender	Male	523	52%	156	54%
	Female	477	48%	132	46%
Age of Participant	≤36 months	591	59%	205	71%
	>36 months	409	41%	83	29%

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Abstract: 99

Effects of Chorioamnionitis on microRNA Profile in Cord Blood Mononuclear Leukocytes

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Background Exposure to chorioamnionitis (CHORIO) has long-term consequences including abnormal neurodevelopment and increased risk for allergic disorders and asthma later in childhood. MicroRNAs (miRNAs) are small non-coding RNAs (19-25 nucleotide long) that regulate gene expression by RNA silencing. Recently, miRNAs have been found to be particularly important as key effectors of disease pathogenesis, biological markers and therapeutic targets for different disease development and evolution. CHORIO may incite changes in miRNA level, having the potential to modulate the immune system as well as increasing the risk of immune and developmental disorders later in life. However, there is limited data on the impact of CHORIO on miRNA expression and changes to immune and developmental systems in full-term human neonates.

Objective To determine the effects of histological chorioamnionitis on miRNA profile in cord blood mononuclear leukocytes.

Design/Methods Cord blood was collected in EDTA tubes from 10 term neonates (5 with histological CHORIO and 5 controls without CHORIO). Fetal membrane sections were stained with hematoxylin and eosin and reviewed by a blinded pathologist. Mononuclear leukocytes were isolated using Ficoll-paque plus density gradient. Total RNA along with miRNA was isolated using Qiagen miRNeasy mini kit. MicroRNA screening was then performed using Affymetrix GeneChip miRNA 4.0 Arrays.

Results 14 miRNAs were significantly upregulated and 2 were significantly down-regulated in mononuclear leukocytes from cord blood of CHORIO-exposed neonates compared to control group (Table 1, Fold Change ≥ 1.4, p-value ≤ 0.05). Top diseases and biological functions picked up by Ingenuity pathway analysis (IPA) are organismal injury and abnormalities, reproductive system disease, gastrointestinal disease, inflammatory disease, inflammatory response and developmental disorders. IPA Network 1 with score 28 and 11 focus molecules are shown in Figure. Top upstream regulators (with a significant overlap p-value) as predicted by IPA are SSB enzyme (Sjögren Syndrome Antigen B), transcription regulator TP53 (Tumor protein P53), MYOD1 (Myogenic Differentiation 1), TCF4 (Transcription Factor 4) and translation regulator AGO2 (Argonaute protein 2).

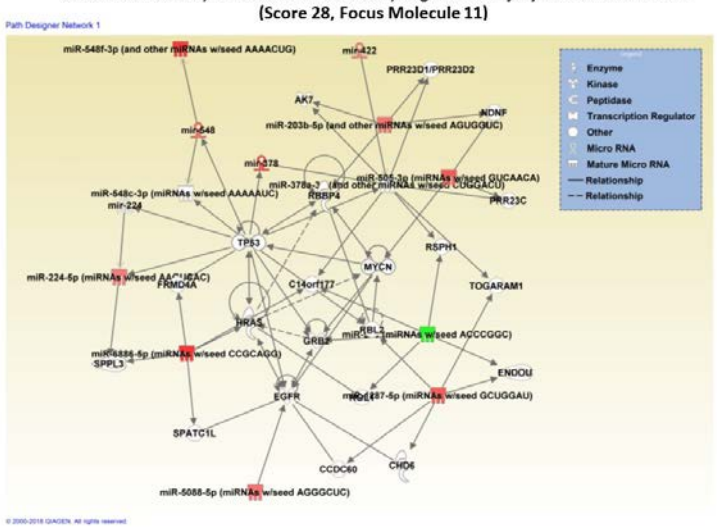
Conclusion(s) Histological CHORIO induces differential miRNA expression in cord blood mononuclear leukocytes. The differential

level of miRNA may contribute to inflammatory, immunological, allergic and developmental disorders in neonates exposed to histological CHORIO.

Table 1: Differentially Expressed miRNAs for the CHORIO group compared to the control group (Fold Change ≥ 1.4, p-value ≤ 0.05):

MicroRNA	Up/Down Regulation	Fold Change	P-value
hsa-miR-6886-5p	Up regulated miRNAs	2.28	0.0254
hsa-miR-548a-3p		2.21	0.0423
hsa-miR-378e		2.12	0.0466
hsa-miR-4330		2.08	0.0054
hsa-miR-505-3p		1.84	0.046
hsa-miR-1287-5p		1.84	0.0013
hsa-miR-548ac		1.75	0.0001
hsa-miR-3916		1.67	0.0056
hsa-miR-5088-5p		1.56	0.0067
hsa-miR-6718-5p		1.52	0.0407
hsa-miR-4461		1.5	0.0336
hsa-miR-589-3p		1.46	0.0061
hsa-miR-224-5p		1.45	0.0334
hsa-miR-422a		1.43	0.0174
hsa-miR-486-3p	Down regulated miRNAs	-1.63	0.0435
hsa-miR-941		-1.92	0.044

Network 1: Cancer, Cell Death and Survival, Organismal Injury and Abnormalities (Score 28, Focus Molecule 11)



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Abstract: 100

Association of Growth in Utero vs NICU of Very Preterm Infants (≦ 32 weeks) and Neurodevelopment at 3 Years of Age

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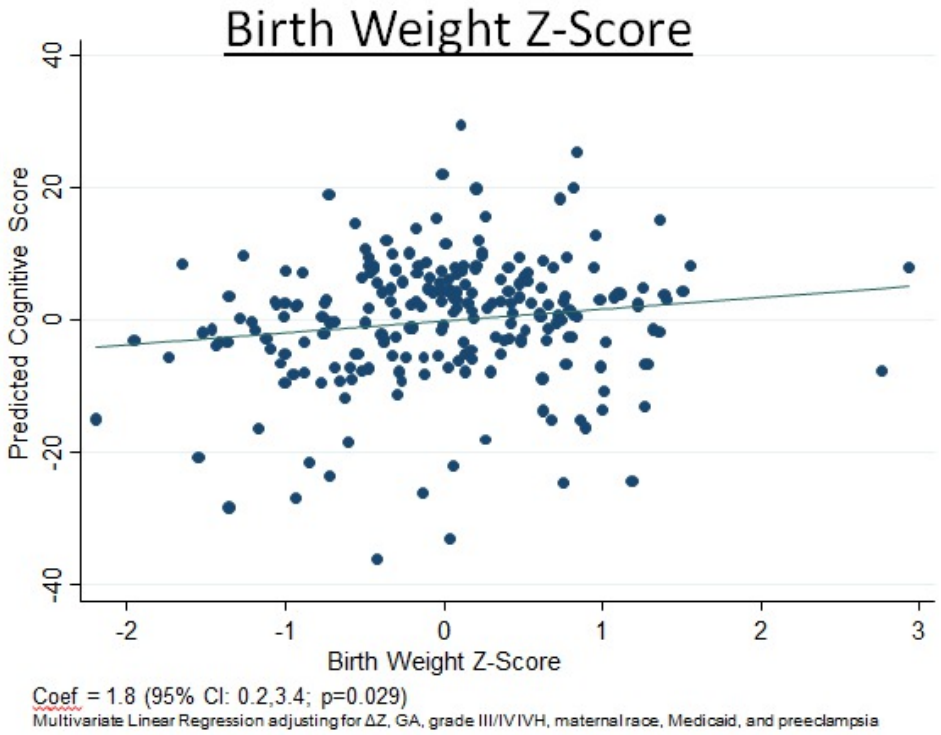
Background In utero growth restriction (IUGR) and ex utero growth restriction (EUGR) have been shown to negatively impact the neurodevelopment (ND) of very preterm infants (VPT: ≦ 32 weeks gestational age (GA)). Both IUGR and EUGR utilize an absolute cut off of 10th percentile to define them.

Objective To determine the association of in utero vs. ex utero growth from birth to NICU discharge (D/C) expressed as a Z-score upon 3 year ND cognitive outcomes among VPT infants as measured by the Bayley Scales of Infant Development 3rd edition (BSID-3).

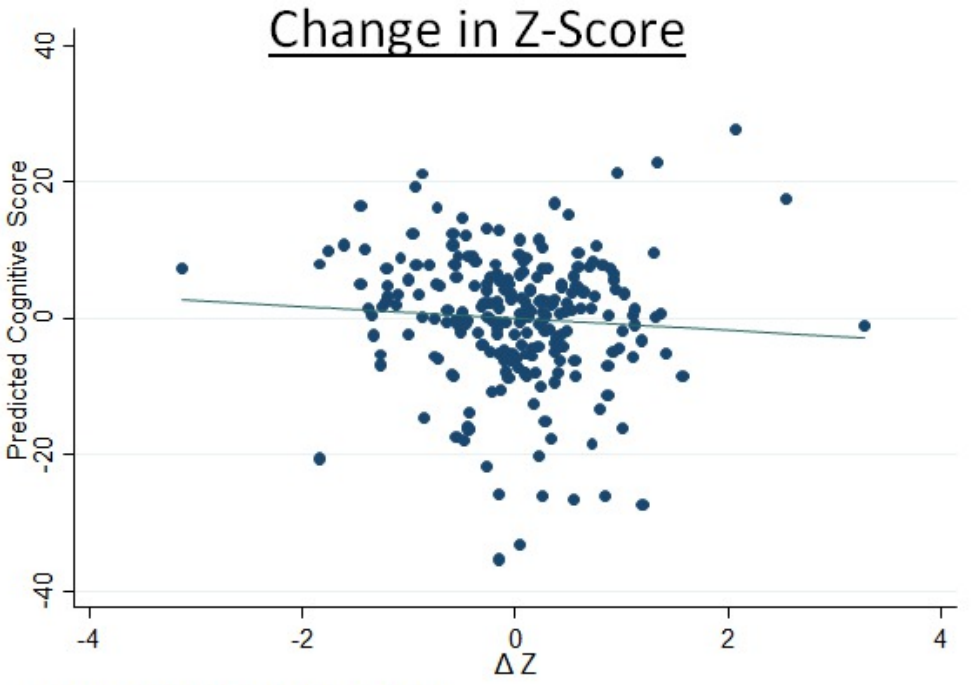
Design/Methods This is a retrospective cohort study of former VPT infants who were followed at the Regional Neonatal Follow-up Program of Westchester Medical Center (Valhalla, New York, USA). Infants with congenital malformations or genetic anomalies were excluded. Our primary outcome was cognitive score as measured by the BSID-3. Birth (BW) and D/C weight for GA and infant gender were transformed into Z-scores based on Fenton 2013 growth charts. Linear regression adjusting only for GA was utilized to analyze the association between BSID-3 cognitive score and both BW Z-score, and Z-score change from birth to NICU D/C (ZΔ). Multivariate linear regression was used to determine the association between BW Z-score and ZΔ with BSID-3 cognitive score, adjusting for GA, grade III/IV intraventricular hemorrhage (IVH), maternal race, Medicaid insurance, and preeclampsia. Data analysis was performed using Stata 14. P-value <0.05 was considered statistically significant.

Results A total of 239 infants were analyzed. In linear regression adjusting only for GA, BW Z-score was positively associated with cognitive scores (p=0.011), while ΔZ had no association (p=0.120). Multivariate linear regression analysis including BW Z-score, ΔZ, GA, grade III/IV IVH, maternal race, use of Medicaid, and preeclampsia showed that adjusting for all other covariates, a difference of 1 in BW Z-score was associated with a 1.8 point change in cognitive scores (95% CI 0.2, 3.4; p=0.029) in a positive correlation (graph 1). While a ΔZ of 1 was associated with a 0.9 change in cognitive scores (95% CI -2.5, 0.8; p=0.310) in a negative correlation (graph 2).

Conclusion(s) Although both IUGR and EUGR have been shown to be negatively associated with ND outcomes, we found that when adjusting for antenatal, demographic, NICU morbidities, and regardless of ΔZ, the BW Z-score is paramount in determining the effects of future cognitive development up to 42 months of age.



Coef = 1.8 (95% CI: 0.2,3.4; p=0.029)
Multivariate Linear Regression adjusting for ΔZ, GA, grade III/IV IVH, maternal race, Medicaid, and preeclampsia



Coef = -0.9 (95% CI: -2.5,0.8; p=0.310)
Multivariate Linear Regression adjusting for BW Z-score, GA, grade III/IV IVH, maternal race, Medicaid, and preeclampsia

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Abstract: 101

Caffeine increases GABA/Cr ratio in frontal cortex of preterm infants on spectroscopy

Aditi Gupta[1], Sudeepta K. Basu[1], mariam said[1], Subechhya Pradhan[3], Linda White[2], Kushal Kapse[2], Jonathan Murnick[3], taeun chang[4], Catherine Limperopoulos[2]

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Background Caffeine is neuroprotective in premature infants, accounting for decreased incidences of cerebral palsy and cognitive delay. With proton magnetic resonance spectroscopy (^{1}H-MRS) we are able to detect biochemical disturbances in the preterm brain which may correlate with developmental outcomes. However, the effects of caffeine therapy on preterm brain biochemistry, especially gamma-aminobutyric acid (GABA) and glutamate (Glx) has not been previously reported.

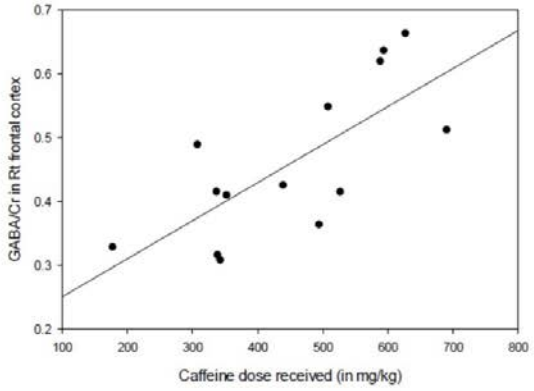
Objective To determine whether cumulative dose of caffeine is associated with ^{1}H-MRS metabolite concentrations in the frontal cortex of premature infants at term equivalent age.

Design/Methods We performed ^{1}H-MRS in a cohort of prospectively enrolled infants born at ≤32 weeks gestational age and ≤1500 g birth weight. Non-sedated ^{1}H-MRS was performed on a 3 Tesla MRI scanner with a 3cm^3 voxel in the right frontal cortex using a Meschlar-Garwood point resolved spectroscopy technique to quantify metabolite concentrations including GABA and Glx. Cumulative weight-based doses of caffeine was acquired from time of NICU admission to time of ^{1}H-MRS study. Pearson correlation and multiple linear regression were performed.

Results ^{1}H-MRS spectra from 14 premature infants with mean GA of 28 ± 1.8 weeks obtained at a mean PMA of 39.4 ± 2.6 weeks were studied. Infants received a mean cumulative dose of caffeine of 451 ± 147 mg/kg. The ^{1}H-MRS metabolite concentrations, metabolic ratios, and their association with caffeine dose are presented in Table 1. N-acetylaspartate (NAA; Pearson R -0.6, p=0.03), creatine (Cr; R- 0.6, p=0.02), NAA/Cr(R -0.6, p=0.03), Cr/CHO (R -0.8, p<0.001), and Cho/Cr(R=-0.8, p<0.001) demonstrated significant negative correlations; whereas GABA/Cr (R 0.7, p=0.003) demonstrated a significant positive correlation with cumulative caffeine dose (Table1, Figure1). On multivariate linear regression adjusting for postmenstrual age at MRS and birth weight, GABA/Cr remained significantly associated with cumulative caffeine dose (Table1, Figure2).

Conclusion(s) With increasing GABA levels being associated with developing brain connectivity, the positive association with cumulative weight-based dosing of caffeine in the frontal cortex of premature infants may have important clinical implications. Whether this association has mechanistic basis or prognostic implications, it needs to be further investigation in relation to other clinical covariates. Improved understanding of these metabolites may guide neuroprotective therapies to optimize outcomes in premature infants.

Figure 1. Cumulative caffeine dose has univariate positive correlation with GABA/Cr and negative correlation with NAA/Cr



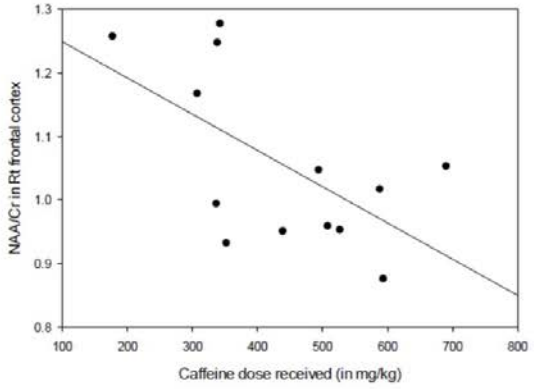


Figure 2. Relationship of GABA/Cr and NAA/Cr with cumulative caffeine dose and postmenstrual age at ¹H-MRS

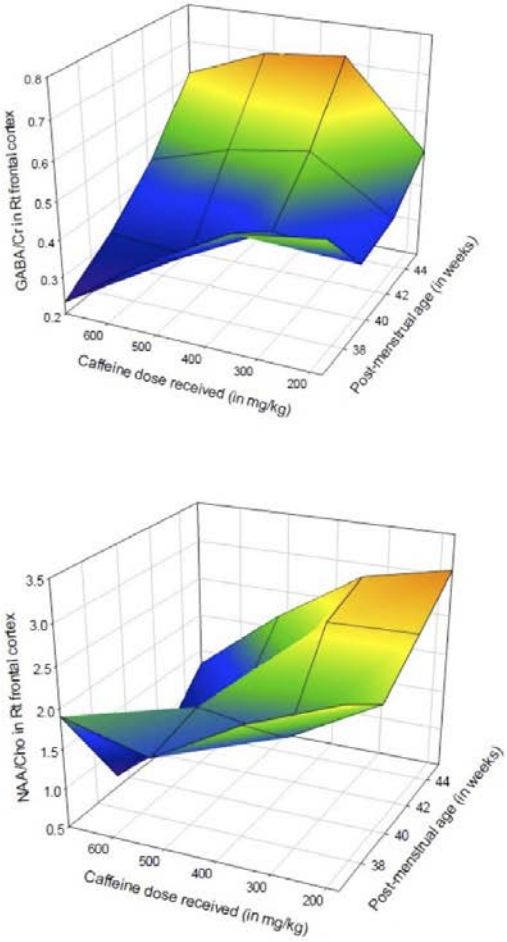


Table 1: 1H-MRS metabolic profiles in the right frontal cortex compared to total caffeine exposure.

1H-MRS Metabolites (n)	Mean	Correlation Coefficient with cumulative caffeine dose	Univariate P-value	Multiple Linear Regression p-value*
GABA (14)	1.60 +/- 0.28	0.4	0.17	
NAA (13)	3.94 +/- 1.32	-0.59	0.033	0.9
Cho (14)	1.99 +/- 0.21	-0.09	0.8	
Cr (14)	3.6 +/- 0.76	-0.61	0.02	0.09
Glx (14)	4.17 +/- 1.96	-0.01	0.7	
GSH (12)	1.65 +/-	0.55	0.07	

	0.93			
GABA/Cr (14)	0.46 +/- 0.12	0.73	0.003	0.037
GABA/Cho (13)	0.2 +/- 0.1	-0.24	0.4	
NAA/Cho (13)	1.95 +/- 0.51	-0.72	0.006	0.011
NAA/Cr (13)	1.06 +/- 0.14	-0.6	0.03	0.76
Cr/Cho (14)	1.795 +/- 0.26	-0.81	<0.001	0.06
Cho/Cr (14)	0.567 +/- 0.08	-0.81	<0.001	0.036
Glx/Cr (14)	1.190 +/- 0.66	0.14	0.6	
Glx/Cho (14)	1.994 +/- 0.21	-0.09	0.8	

*adjusted for Post Menstrual Age at MRS and birth weight

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Abstract: 102

Early Versus Late Brain MRI in Neonates with Hypoxic Ischemic Encephalopathy (HIE) Treated with Therapeutic Hypothermia (TH)

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Background MRI scans have been established as a standard of care to assess brain injury in neonates with HIE following TH . Recent recommendations from the American College of Obstetrics and Gynecology have suggested utility to performing an early MRI at 1-4 days of life to indicate timing of injury, with a later MRI at 7-21 days to define the full nature of injuries (Obstet Gynecol 2014). There is ongoing debate surrounding the ideal timing of brain MRIs in babies with HIE and whether there is added utility to performing repeat exams in the neonatal period.

Objective To evaluate the agreement in brain injury findings between early and late MRI in neonates with HIE treated with TH and (secondarily) to compare the ability of early versus late MRI to predict early neurodevelopmental outcomes.

Design/Methods This is a prospective longitudinal study of patients with HIE who underwent TH and had MRI performed at both ≤6 and ≥7 days of life according to institutional protocol since 2012. MRIs were reviewed by an experienced neuroradiologist and assigned a basal ganglia (BG), watershed (WS) and BG/WS score according to Barkovich (AJNR 1998). Scores for early and late MRIs were assessed for agreement using the Kappa statistic. Surviving infants underwent clinically routine neurodevelopmental follow-up that included assessment with the Bayley Scales of Infant Development -3rd Edition (BSID-III) at 15-30 months of age. Significant neurodevelopmental delay was defined as a BSID-III cognitive composite score ≤85 or motor composite score ≤80 (Yu et al, Res Dev Disabil 2013).

Results A total of 48 patients with moderate to severe HIE had early and late MRI studies performed at a median of 5 (range 2-6) and 10 (range 7-25) days of life respectively. Agreement between the two studies was lowest for the BG (k=0.692), while improved for the WS (k=0.796) and BG/WS scores (k=0.765) In cases of discrepant BG scoring, early MRI was more likely to identify more severe injury when compared to late MRI. Developmental outcomes were available for 26 of 47 surviving infants (55%). The distribution of BG and BG/WS scores differed significantly by outcome group for the early scan but not for the late scan (Figure 1).

Conclusion(s) There is substantial but not perfect agreement between early (≤6 days) and late (≥7 days) MRI performed after TH in neonates with HIE. In particular, the BG score may be underestimated on late MRI. In a limited cohort with follow-up data, early MRI related to outcomes more reliably than late MRI.

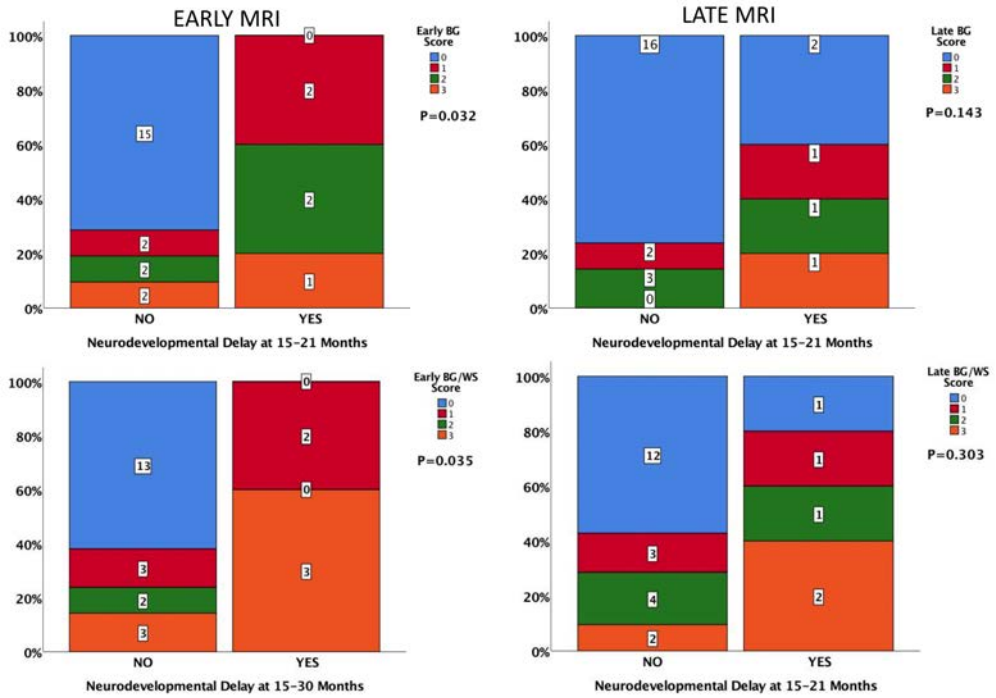

Figure 1. Distribution of BG and BG/WS Scores by Outcome Category

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Abstract: 103

HUMAN CORD BLOOD DERIVED UNRESTRICTED SOMATIC STEM CELL (USSC) INFUSION REDUCED HYDROCEPHALOUS IN A RABBIT MODEL OF GERMINAL MATRIX-INTRAVENTRICULAR HEMORRHAGE

Govindaiah Vinukonda[1], Yanling Liao[2], Shetal Shah[1], Furong Hu[1], Larisa Ivanova[2], Mitchell S. Cairo[2], Edmund F. LaGamma[1]

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Background Germinal matrix hemorrhage progressing to intraventricular hemorrhage (IVH) & hydrocephalus is a common problem of prematurity. Therapeutic strategies to minimize post-hemorrhagic hydrocephalus are currently unsuccessful. Mesenchymal stem cells offer promise in ameliorating the adverse impact of injected ventricular blood, hypoxic, brain injury & stroke. USSCs derived from human cord blood, have multi-lineage differentiation & regenerative properties that may be more advantageous.

Objective To evaluate route, time & dose of USSC administration on the progression of post-hemorrhagic hydrocephalous & behavioral outcomes after IVH.

Design/Methods We used our rabbit model of glycerol-induced spontaneous GMH-IVH (n ≥ 5 in each group; Chua, 2009, Vinukonda, 2010, PAS abs # 2700961, 2017). After IVH was confirmed at 24h postnatal age, we injected $2X10^6$ USSCs labelled with a luciferase reporter gene intracerebro-ventricularly (ICV) or $1X10^6$ intravenously (IV). USSC survival, migration & anatomical localization was assessed by live animal bioluminescence (BLI) imaging & immunostaining. The cross sectional areas of ventricle and whole brain were measured at the level of the mid-septal nuclei stained with H&E using Image-J software & presented as mean ± sem. The mRNA & protein levels of TGF-β was assessed from a coronal slice. Behavioral assessment was performed using our published scoring system.

Results USSC cells from a single injection (ICV or IV) were identified until d7 by non-invasive live BLI without significant loss. Immunostaining experiments showed the migration & anatomical localization of USSCs persisting at 3,7&14d in sub- & periventricular brain regions independent of the route of injection. Cross-sectional area of ventricles was larger in IVH-saline injected pups (34.3± 6.23 mm^2) compared to no-IVH controls (5.9 ± 0.34 mm^2) at d14 ($p<0.001$). In USSC treated pups, the ventricular area was over 50% smaller in IVH pups in either the ICV (14.9± 4.51 mm^2) or IV (10.9± 5.26 mm^2) routes at d14 ($p<0.05$). Increased level of TGF-β expression was observed in IVH pups with ventricle enlargement v. control ($P<0.05$); USSC treated results are in progress. USSC treated-IVH pups demonstrated improved walking distance and total locomotor performance compared to IVH-hydrocephalus saline controls ($P<0.05$).

Conclusion(s) A single dose of USSCs either via ICV or IV route significantly reduced ventriculomegaly & improved behavioral function.

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Abstract: 104

Lack of Progression to Severe Intraventricular Hemorrhage After Initial Reassuring Head Ultrasound in Preterm Infants: Implications for Head Ultrasound Screening

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Background Premature infants are known to be at increased risk for intraventricular hemorrhage (IVH) in the first week of life. IVH may be mild (grade I or II) or severe (grade III or IV). Mild IVH is less frequently associated with later morbidity. The presence of severe IVH may lead to death or severe neurodevelopmental disability.

Objective To determine the prevalence of worsening IVH after initial screening HUS identifies no IVH or low grade (I & II) IVH diagnosis in preterm neonates.

Design/Methods This is a retrospective, single-center study. We identified all preterm infants with birth gestational age </= 32 0/7 weeks admitted to the University of Massachusetts Memorial Medical Center Neonatal Intensive Care Unit (NICU) between January 1, 2011 and December 31, 2016 who received a HUS during hospitalization. Each HUS was classified according to the attending radiologist's documentation. Grades of IVH were defined per the Papile classification. Initial HUS was defined as HUS performed on day of life 3-10. Every subsequent HUS throughout hospitalization was read and recorded.

Results We identified 681 eligible preterm infants. Of these, 81 were excluded for lack of HUS data, 234 had initial HUS out of inclusion timing (DOL 3-10), 4 were excluded for other conditions associated with brain bleeding, and 9 died before DOL 3, leaving 353 infants for analysis (Table 1). Initial findings of severe IVH were relatively rare in this cohort (Figure 1). Of the 343 (97%) infants who had grade II IVH or less, only 4 (1.2%) babies progressed to a more severe grade (III or IV) (Table 2). All of these infants required mechanical ventilation for at least 40 days.

Conclusion(s) Based on the results of this analysis, infants who have normal (no IVH) HUS or mild IVH (grade I or II) without other risk factors may not require follow-up head ultrasounds. Infants with prolonged mechanical ventilation may require further screening despite reassuring initial HUS findings.

Figure 1. Distribution of IVH Severity by Gestational Age

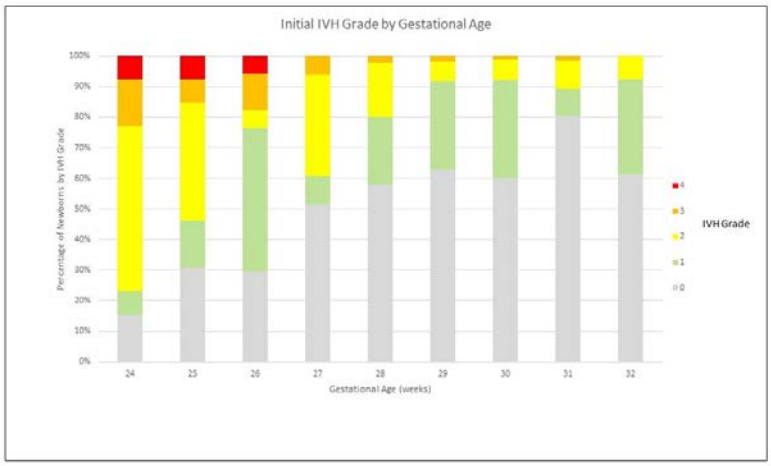

Table 2. Matrix of IVH Progression - Comparing Initial & Subsequent IVH Grade

Initial IVH Grade vs Final IVH Grade						
		Final IVH Grade				
		0	**1**	**2**	**3**	**4**
Initial IVH Grade	**0**	207	45	11	2	0
	1		36	4	1	0
	2			36	1	0
	3				7	1
	4					2

Table 1. Characteristics of Study Cohort

	Mean (SD)	n (%)
Mean Gestational Age, weeks	29 (2.02)	
Birth Weight, grams	1215 (323.82)	
Male/Total		194/353 (55)
Race		
Black		47 (13)
White		284 (80)
Asian		14 (4)
Other		8 (2)

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Abstract: 105

Impact of Early Nutrition on Microstructural Brain Development in VLBW Infants

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Background Infants born at very low birthweight (VLBW ≤ 1500g) are at significant risk for postnatal growth failure with an associated high incidence of neurocognitive impairment. Nutrition is an important modifiable factor for brain growth and development in preterm infants, however current NICU nutritional practices remain unable to mimic in utero accretion rates. Few studies have investigated the impact of early macronutrient and caloric intake on microstructural brain development in VLBW infants using advanced, quantitative MRI (qMRI) techniques such as
volumetric segmentation and diffusion tensor imaging (DTI).

Objective The aim of this study is to evaluate the impact of early macronutrient and caloric intake on brain volumes and white matter microstructural development in VLBW infants at term-equivalent age (TEA).

Design/Methods We prospectively enrolled infants born ≤1500 grams and ≤32 weeks gestational age (GA) admitted to our NICU within the first week of life and performed MRI at TEA. Infants with parenchymal brain injury were excluded. Cumulative macronutrient (g/kg of carbohydrate, protein, lipid) and caloric (kcal/kg) intake were collected for all infants until MRI. MRI data were acquired on a 3T scanner, which were used to calculate regional brain volumes (Table 1). For DTI analyses, parametric maps were generated for fractional anisotropy (FA) in regions of the cerebrum and cerebellum (Table 2). Controlling for gestational age, hierarchical multi-linear regression was performed to evaluate the impact of macronutrient and caloric intake.

Results Nutritional and DTI data were acquired for 69 infants admitted within the first week of life (57 admitted ≤ 48 hours; Mean BW 970 ±73g, Birth GA 27.6 ±0.59 weeks, GA at MRI 40 ±0.43 weeks, LOS 75 ±6.1 days). GA contributed significantly to both volumetric and DTI outcomes. Linear regression analyses demonstrated a significant negative association between FA and cumulative

macronutrient/caloric intake in the PLIC and CC (Table 1). Cumulative macronutrient/caloric intake was also significantly negatively associated with brain volumes in the cortical and deep gray matter, cerebellum, and brainstem (Table 2).
Conclusion(s) Cumulative macronutrient intake significantly contributed to cerebral volumes and white matter microstructural development in VLBW infants at TEA. The significant negative association may reflect a longer dependence on ex-utero nutritional support in the NICU and highlights the need for further research to determine optimal nutritional support for VLBW infants.

Table 1. Relationship between cumulative nutritional intake and regional brain volumes at TEA.

VOLUME	CUMULATIVE INTAKE (g/kg)			
	Carbohydrate B *(p-value)*	Lipid B *(p-value)*	Protein B *(p-value)*	kCal B *(p-value)*
Cortical Gray Matter	-0.209 *(0.052)*	-0.133 *(0.183)*	-0.236 *(0.034)**	-0.221 *(0.054)*
Deep Gray Matter	-0.312 *(0.028)**	-0.230 *(0.081)*	-0.392 *(0.008)**	-0.354 *(0.020)**
White Matter	-0.205 *(0.218)*	-0.209 *(0.171)*	-0.232 *(0.179)*	-0.261 *(0.140)*
Cerebellum	-0.408 *(0.001)**	-0.106 *(0.376)*	-0.298 *(0.025)**	-0.332 *(0.015)**
Brainstem	-0.508 *(<0.001)**	-0.315 *(0.020)**	-0.439 *(0.004)**	-0.541 *(<0.001)**

§ B = Beta Coefficient
*p <0.05

Table 2. Relationship between cumulative nutritional intake and regional DTI (FA) values at TEA.

ROI	CUMULATIVE INTAKE (g/kg)			
	Carbohydrate B *(p-value)*	Lipid B *(p-value)*	Protein B *(p-value)*	kCal B *(p-value)*
Cerebellum				
SCP	-0.138 *(0.271)*	-0.260 *(0.035)**	-0.179 *(0.152)*	-0.219 *(0.077)*
MCP	-0.142 *(0.253)*	-0.120 *(0.336)*	-0.095 *(0.449)*	-0.150 *(0.228)*
Vermis	0.226 *(0.060)*	-0.011 *(0.930)*	0.198 *(0.101)*	0.112 *(0.356)*
Pons	0.106 *(0.355)*	0.028 *(0.805)*	0.163 *(0.155)*	0.086 *(0.455)*
PLIC	-0.012 *(0.922)*	-0.139 *(0.273)*	-0.064 *(0.618)*	-0.084 *(0.509)*
Corpus Callosum				
Genu	-0.467*(<0.001)**	-0.345 *(0.003)**	-0.459 *(<0.001)**	-0.462 *(<0.001)**
Splenium	-0.440 *(<0.001)**	-0.381 *(0.002)**	-0.462 *(<0.001)**	-0.461 *(<0.001)**

§ ROI = Region of Interest, B = Beta Coefficient, PLIC = Posterior Limb of Internal Capsule
*p <0.05

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Abstract: 106

A Comparison Study of Pulmonary Function in American and Kuwaiti Children with Sickle Cell Disease.

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Background American and Kuwaiti children with Sickle Cell Disease (SCD) vary in disease severity due to different haplotypes. It is unknown what impact the different haplotypes have on lung function. African American (AA) mainly have the Benin haplotype with low fetal hemoglobin (HbF) level compared to Kuwaiti (K) who have the Arab-Indian haplotype with a high HbF. The higher HbF contributes to a milder clinical course. Pulmonary complications are considered a major complication of SCD. In the United States and in Kuwait, studies show an obstructive pattern for children with SCD.
Objective To compare pulmonary functions between AA and K Children with SCD and to assess if a high Hb F level contributes to better function.
Design/Methods A cross sectional study was done on children with SCD (Hb SS disease) followed in comprehensive sickle cell programs. AA patients were followed at Brookdale Hospital, NY and K patients were followed in Mubarak hospital, Kuwait. Children between the ages of 6 and 22 years who had Pulmonary function tests (PFT) done as a routine screening were enrolled. PFT was done using spirometer and plethysmography. Interpretation of PFT was done as per Figure 1. Patients with congenital or anatomical lung abnormality, heart disease, pulmonary disease such as Acute chest syndrome, Acute asthma or Pneumonia within 4 weeks were excluded.
Results There were 74 children (37 in each group) with SCD, See table 1. Restrictive pattern on PFT was seen in 18/37 (49%) of AA vs. 10/37 (27%) of K ($p>0.05$). Obstructive pattern was seen in 6/37 (16%) of AA vs. 13/37 (35%) of the K group ($p>0.05$).
In both groups, 13 children (35%) had normal PFT. Three/13 (15%) in the AA group had a HbF>20% as compared to 11/13 (85%) in the K group ($p<0.01$).
Abnormal PFT was noted in 24/37 children (65%) in each group. HbF was >20% in 3/24 (13%) in the AA group vs. 15/24 (63%) in the K group ($p<0.01$). In patients with abnormal PFT, mean HbF was 10.4±8.4 in AA group, compared to 22.4±8 in K group ($p<0.01$).
Conclusion(s) Abnormal PFT is highly prevalent among children with SCD in both groups. AA children are more likely to have restrictive disease and K to have an obstructive pattern. Level of HbF did not seem to protect K patients from abnormalities on PFT. This finding should emphasize the importance of performing PFT as part of the initial evaluation of all children with SCD.

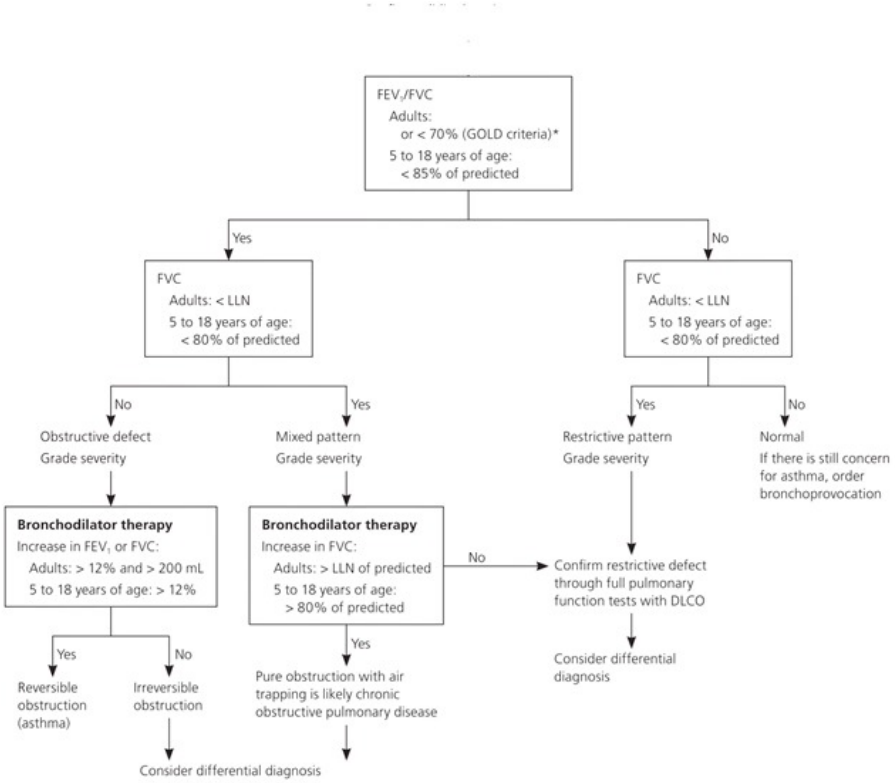
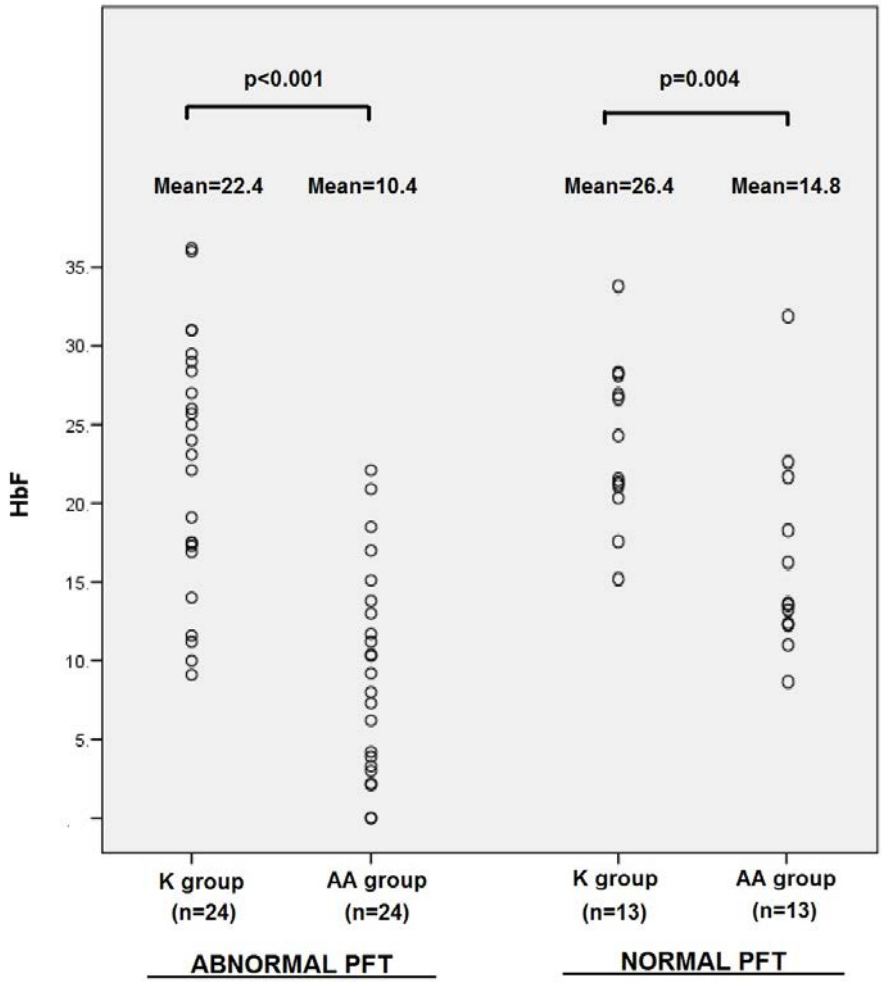


Figure 1:

Interpretation of pulmonary function test, based on National Health and Nutrition Examination Survey (NHANES III) in adults, and less than 85% in patients five to 18 years of age National Asthma Education and Prevention Program (Expert Panel Report 3).

National Health and Nutrition Examination Survey (NHANES III) in adults, and less than 85% in patients five to 18 years of age National Asthma Education and Prevention Program. Expert Panel Report 3 (EPR-3)



Distribution of Hb F level between paitent with normal and abnormal pulmonary function test in children with Hb SS disease in USA and Kuwait

Table 1: Demographic and baseline characteristics patients with sickle cell disease in African American (AA) and Kuwaiti (K) groups (n=74)

	AA group N=37	k group N=37	P value
Male gender, n (%)	23 (62%)	19 (52%)	0.348
Age in years, Mean (±SD)	14.2 (±4)	11.3 (±3.9)	0.002
History of asthma, n (%)	11 (30%)	5 (14%)	0.090
Acute Chest Syndrome, n (%)	14 (38%)	7 (19%)	0.071
vaso-occlusive crisis, n (%)	24 (65%)	11 (30%)	0.002
On Hydroxyurea therapy, n (%)	29 (78%)	22 (60%)	0.079
Splenectomized, n (%)	8 (22%)	3 (8%)	0.102
Baseline HbF, Mean (±SD) Range	85.8 (±8.3)	72.9 (±9.5)	<0.001

Baseline HbS, Mean (±SD)	7.2 (±3.2)	4.6 (±2.5)	<0.001
Number of patients with HbF >20, n (%)	6 (16%)	26 (70%)	<0.001

n=number, SD=standard deviation, IQR=interquartile ratio, MCV=mean corpuscular volume, LDH=lactate dehydrogenase, HbF=Hemoglobin F, NS=non-significant

Table 2: Comparison in findings of pulmonary function (PF) between patients with sickle cell disease in African American (AA) and Kuwaiti (K) groups (n=74).

	AA group (n=37)	K group (n=37)	P value
Patietns with restrictive PF, n (%)	18 (49%)	10 (27%)	0.055
Patients with obstructive PF, n (%)	6 (16%)	13 (35%)	0.062
Patients with PF suggestive of asthma, n (%)	0 (0%)	2 (5%)	0.493
Abnormal PF, n (%)	24 (65%)	24 (65%)	1.000
HbF >20% in patients with abnormal PF, n (%)	3 out of 24 (13%)	15 out of 24 (63%)	0.002
HbF level in patients with abnormal PF, Mean (±SD)	10.4±8.4	22.4±8	<0.001
FVC % of reference, Mean (±SD)	78.6±17.7	86.9±12.5	0.023
FEV % of reference, Mean (±SD)	77.7±16.6	83.1±14.1	0.138
FEV1/FVC, Mean (±SD)	88.4±6.1	85.5±7.4	0.075
DLCO % of reference, Mean (±SD)	62.3±13.0	78.8±22.4	0.000
TLC % of reference, Mean (±SD)	83.4±18.0	99.2±9.6	0.000
RV % of reference, Mean (±SD)	119.7±66.9	107.4±47.6	0.364

PF=pulmonary function, n=number, HbF=Hemoglobin F, SD=standard deviation, FVC=Forced vital capacity, FEV1=forced expiratory volume in 1 second, DLCO=Diffusing capacity of the lungs for carbon monoxide, TLC=total lung capacity, RV=residual volume, NS=non-significant

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Abstract: 107

Prematurity as an independent risk factor for the development of pulmonary disease

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Background Children with bronchopulmonary dysplasia (BPD) have airway functional impairment and are at increased risk for the development of asthma and other respiratory system morbidities. It is less clear how premature birth without BPD influences diagnosis or health care use for respiratory diseases compared to those infants with BPD.

Objective To determine if children born prematurely who do not have a diagnosis of BPD or chronic lung disease of prematurity (CLD) are at risk for being diagnosed with pulmonary disease.

Design/Methods We retrospectively abstracted information on diagnoses, medications, encounters with a subspecialist, and hospitalizations and emergency room visits from an electronic medical record from 1/1/2006 to 12/31/2015 of primary care patients in the 34 site CHOP network born at less than 30 weeks gestational age. Eligible subjects included infants that presented to care in the first 4 months of life, had at least one well visit after one year of life, and remained within the CHOP network for a minimum of 3 years since birth. Our cohort included 317 patients with CLD or BPD (ICD9 code 518.89 or 770.7) which were validated through chart review and 495 patients without these diagnoses. Outcomes of interest included a diagnosis of asthma or any respiratory disease, respiratory medications, and use of subspecialty, ED, or hospitalizations for respiratory disease. Multivariate poisson, Cox proportional hazard, and logistic regression models determined the impact of BPD on each outcome of interest while controlling for race, insurance type, gestational age, and gender.

Results Infants with BPD were significantly more likely to be diagnosed with asthma (OR 1.6, 95% CI 1.15–2.23), but not all respiratory diseases (OR 1.57, 95% CI 0.7–3.45) compared to those without BPD. Infants with BPD were more likely to be referred to a pulmonologist (RR 13.21, 95 % CI 11.69 – 14.93, p = 0.000) and be seen at a younger age (mean 550 +/- 597 d) compared to those without BPD (mean 1272 d +/- 740 d), which remained significant in multivariable analysis (hazard ratio 2.58, 95% CI 1.86-3.57). Infants with BPD were more likely to be hospitalized (RR 2.18, 95% CI 1.97-2.42) or have an emergency room visit for a respiratory disease (RR 1.15, 95% CI 1.01-1.31).
Conclusion(s) BPD remains an added risk for asthma and acute visits for respiratory disease. However, preterm infants without BPD have a similar risk of pulmonary disease and were more likely to have delayed referral to a pulmonologist.

Outcome	No BPD	BPD	p-value
Gender			
Male	253 (51%)	162 (51%)	0.99
Female	242 (49%)	155 (49%)	
Race			
White	162 (33%)	87 (27%)	0.45
Black	263 (53%)	190 (60%)	
Hispanic	24 (4.8%)	14 (4.4%)	
Other	19 (3.8%)	11 (3.5%)	
Unknown	27 (5.5%)	15 (4.7%)	
Gestational age (weeks)			
22	1 (0.2%)	1 (0.3%)	0.00
23	4 (0.8%)	19 (6%)	
24	18 (4%)	61 (19%)	
25	32 (7%)	49 (15%)	
26	48 (10%)	42 (13%)	
27	83 (17%)	62 (20%)	
28	142 (29%)	49 (15%)	
29	167 (34%)	33 (10%)	
Unknown	0	1 (0.3%)	
Insurance Type			
Private	221 (45%)	122 (38%)	0.21
Medicaid	244 (49%)	179 (56%)	
Self pay/Private	8 (1.6%)	6 (1.9%)	
Medicaid/Private	22 (4.4%)	10 (3.2%)	
Diagnosis of asthma	285 (58%)	218 (69%)	0.0007
Any respiratory diagnosis	468 (95%)	306 (97%)	0.2
Number of patients seen by a pulmonologist	64 (13%)	153 (48%)	0.00
Number of hospitalizations	Mean: 3.15 (95% CI 2.6 - 3.7)	Mean 6.0 (95% CI 4.81 - 7.24)	0.00
Number of ED visits	Mean: 2.45 (95% CI 2.1 - 2.81)	Mean 2.84 (95% CI 2.39 - 3.3)	0.17

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Abstract: 108

Electronitc Cigarette Menthol Flavoring Induces Bronchodialtion in Neonatal but not Adult Airway

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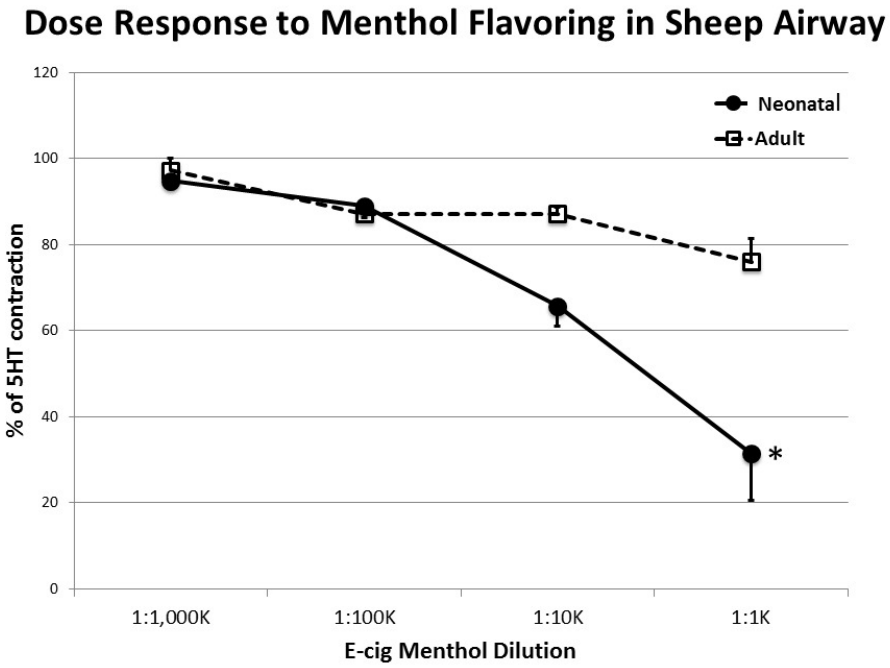
Background Rapid growth in the use of electronic cigarettes implies increased exposure of newborn and infants to the aerosolized chemicals via secondhand vapors. Menthol flavored E-liquids are one of the most popular flavor catagories used with vaping. Menthol potentially regulates intracellular calcium (Ca++) in vascular smooth muscle through voltage-gated Ca++ channels (VGCC), Na/Ca Transient Receptor Potential Melastatin-subtype 8 (TRPM8) receptor, or release from sarcoplasmic reticulum Ca++ stores. Response to menthol in neonatal airway smooth muscle and its mechanism are not known.

Objective To study the effect of E-cigarette menthol flavoring on intrapulmonary airway rings from newborn lambs and adult sheep.

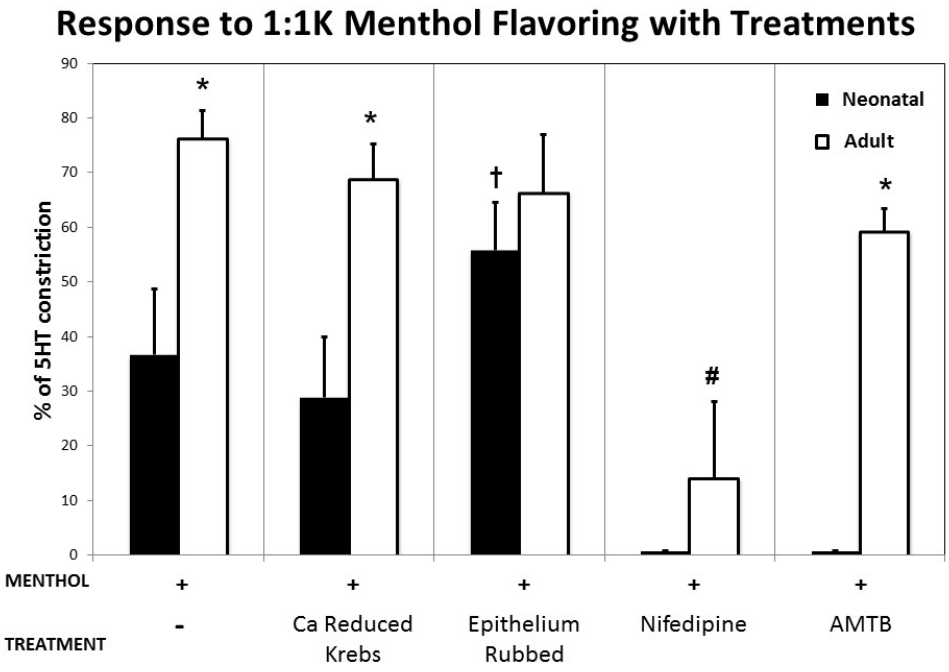
Design/Methods Intrapulmonary airway rings were collected from adult and 2-4h old lambs and placed in tissue baths with Krebs solution (Ca++-1.6mmol/L) and constricted with 5-HT. Airway rings were treated with Nifedipine 10-5 (VGCC blocker) or AMTB 10-5 (TPRM8 receptor blocker). Epithelium was removed in some airway rings. Finally, airway rings were bathed in Ca free Krebs (Ca++-0.2mmol/L). Menthol flavor was added to the constricted rings and relaxation was expressed as % 5-HT constriction.

Results Neonatal lamb airway rings exhibited significantly greater relaxation to a dose dependent exposure to menthol flavoring (figure 1) in comparison to adult airway (repeated measures anova p=0.004). Reduced extracellular Ca++ did not influence relaxation to menthol. Epithelial removal did not alter response in adults but appears to attenuate response in newborns (p=0.08). Antagonists AMTB and Nifedipine did not block the menthol relaxation (figure 2).

Conclusion(s) Menthol E-cigarette flavoring is a powerful bronchodialator in newborn but not adult sheep by an unknown mechanism dependent on epithelium but not related to extracellular Ca++. Bronchodialation induced by menthol flavoring may increase the risk of aerosolized chemical delivery, including nicotine, with passive exposure via vaping.



* p=0.004; repeated measures ANOVA



* p<0.05 vs lamb
# p<0.05 vs control
† p=0.08 vs control

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Abstract: 109

Use of Home Recorded Oximetry to Safely Discontinue Oxygen in Premature Infants with Bronchopulmonary Dysplasia

Lawrence Rhein[2], Heather White[2], Henry Feldman[1], RHO Study Group On Behalf of the[3]

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Background Current estimates indicate that over 50,000 premature infants are currently discharged home on supplementary oxygen (O_2) each year. Consensus guidelines for safe management of home O_2 therapy (HOT) do not currently exist. Current strategies to manage outpatient HOT include arbitrary timing of decreasing O_2 delivery to lower flow rates prior to discontinuation, leading to potentially unnecessarily longer duration of HOT. Recorded home oximetry (RHO) is a potential efficient, relatively inexpensive alternative tool to potentially save cost and improve the process of HOT management. RHO can provide extended O_2 saturation data between outpatient weaning visits in clinic, and also can provide data comparable to the more expensive polysomnograms that have been more recently encouraged

Objective To describe patterns of utilization of RHO to determine optimal timing of safe discontinuation of supplemental O_2 therapy in premature infants with BPD.

Design/Methods We conducted a prospective, multi-center trial designed to compare two different methods of managing HOT in premature infants. Randomized subjects were given a pulse oximeter with an attached data recorder to obtain O_2 saturations at home between visits versus a standard clinic-based approach. Subjects were followed from initial outpatient pulmonary visit to the time they were 6 months successfully discontinued from O_2. Patients were instructed to record and send in data every 4-7 days with a minimum of 1500 minutes of artifact-free data for analysis.

Results 197 infants from 9 sites were randomized to either monthly visits with in-clinic weaning protocol, or to monthly visits with in-clinic weaning protocol in addition the use of RHO. Of the 98 infants randomized to RHO, 74 patients have completed the study by December 2017 (Table 1). Baseline O_2 support varried from nocturnal oxygen (125 cc/min) to 750 cc/min at all times, with 45% of the cohort starting at 100-125 cc/min at time of randomization (Figure 1a). 34 participants have completed the study that were randomized to use RHO. The number of between-visit oximetry reports received varied between 0 and 13 (median 4, IQR 3-8) (Figure 1b).

Conclusion(s) RHO is a safe and efficient method to obtain reliable information to make data-driven decisions when determining optimal timing to safely discontinue supplemental O_2. Utilization of this tool varied substantially. This study will determine wether use of RHO can shorten duration of O_2 supplementation without compromising safety.

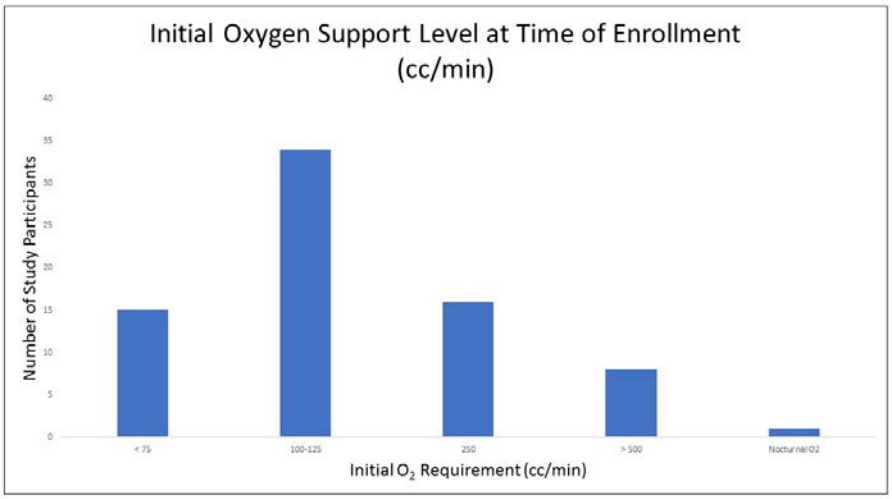

Figure 1a: All patients starting oxygen requirement

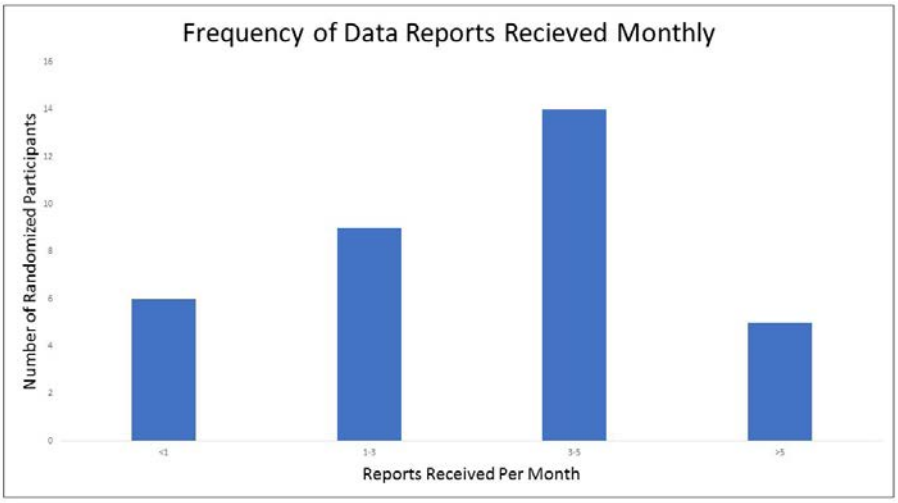

Figure 1b: The frequency that completed randomized subjects sent in RHO per month

Table 1: Characteristics of Study Cohort

	N (%)
Male	45 (61)
White	41 (55)
Black	10 (14)
Asian	3 (4)
Hispanic	7 (9)
Non-Hispanic	20 (27)
Respiratory Support at 36 Weeks	
Ventilator	1 (1)
CPAP/High Flow Nasal Cannula	34 (46)
Low Flow Nasal Cannula	25 (34)
Room Air	3 (4)
Unknown	9 (12)

Diuretics	33 (45)
	Mean ± SD
Birth Weight (g)	954 ± 555
Gestational Age (weeks)	26.8 ± 2.8
Length of NICU Stay (days)	104 ± 34

Characteristics of all study participants that have completed the study as of December 2017

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Abstract: 110

Utilizing Gene Therapy to Prevent Influenza Induced ARDS

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Background Infants and children are an especially vulnerable population for Influenza A virus (IAV), which is a major cause of infirmity and death worldwide. IAV induced morbidity and mortality is largely secondary to acute respiratory distress syndrome (ARDS). IAV infects alveolar pneumocytes, induces inflammation, and downregulates tight junctions and the Na^+,K^+-ATPase, all of which lead to a damaged epithelial-endothelial barrier, decreased alveolar fluid clearance, and impaired gas exchange. Gene therapy may present an innovative way to treat this. We have shown that gene transfer of the Na^+,K^+-ATPase β1 subunit to the lungs can improve alveolar fluid clearance, upregulate tight junction activity, and restore alveolar-capillary barrier function to mice and pigs with LPS- or sepsis-induced ARDS.

Objective To test whether gene delivery of the Na^+,K^+-ATPase β1 subunit to the lungs of mice can protect from IAV-induced ARDS.

Design/Methods Plasmid DNA (100 ug), expressing either no gene product (empty plasmid) or the β1 subunit, was delivered to the lungs of mice by instillation followed by transthoracic electroporation. One day later, mice were given saline or IAV (500 PFUs of strain PR8, H1N1) intranasally to generate 4 groups of conditions. Alveolar barrier function and lung injury were assessed on days 3 and 5 after infection.

Results We observed a significant loss of gross body weight in influenza-infected compared with uninfected mice. However, mice receiving the β1 subunit plasmid showed much less weight loss compared to those receiving empty plasmid ($p<0.01$, by ANOVA). Mice receiving the β1 subunit plasmid also showed less pulmonary edema following IAV infection at 3 and 5 days post-infection, as measured by lung wet-to-dry measurements ($p<0.001$). There was no difference between the mice receiving the β1 subunit with or without IAV infection, suggesting that β1 gene transfer completely alleviated edema caused by IAV infection. Western blots also showed differences in levels of key tight junction proteins between groups.

Conclusion(s) Gene transfer of the Na^+,K^+-ATPase β1 subunit alleviated the pulmonary edema and lung injury in mice caused by IAV infection. This suggests that our gene therapy approach may protect against IAV-mediated respiratory complications, which would be particularly helpful in vulnerable populations exhibiting ARDS. Our next goal is to test whether gene transfer of the β1 subunit can treat mice that have already been infected with IAV.

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Abstract: 111

Phenotypes of Severe Bronchopulmonary Dysplasia

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Background Preterm infants needing over 30% supplemental oxygen or positive pressure respiratory support at 36 weeks postmenstrual age (PMA) have severe bronchopulmonary dysplasia (sBPD) by NIH definitions. However, the clinical presentation and predominant pathophysiology in sBPD differs between patients.

Objective To characterize the frequency of severe parenchymal, pulmonary vascular, and large airway disease in a cohort of infants with sBPD cared for at the Children's Hospital of Philadelphia (CHOP) from 2011-2015.

Design/Methods Study infants were: (1) born < 32 weeks gestation and had sBPD (2) had a chest CTA (Computed Tomography with Angiography) performed between 40-50 weeks PMA and (3) had an echocardiogram at CHOP. CTAs were scored using the Ochiai criteria by 2 blinded pediatric radiologists. Severe parenchymal lung disease was defined as an Ochiai score of 8 or greater. The echo performed closest in time to the Chest CTA was re-analyzed by a blinded cardiologist for the presence of pulmonary hypertension

(PH). An infant was classified as having pulmonary vascular disease if any of the following were present: bidirectional or right-to-left PDA shunt, systolic pulmonary artery pressure ≥ 40 mmHg by tricuspid regurgitant jet velocity, or a flattened/bowed interventricular septum at the end of systole. An infant was classified as having large airway disease if tracheomalacia or bronchomalacia was noted on bronchoscopy/tracheoscopy reports.

Results A total of 76 infants were evaluated. In this cohort, median gestational age was 25 5/7 weeks with 2.5 weeks interquartile range (IQR), median birth weight was 635g with 195g IQR, 42% were female, and 5% were inborn. 57 infants (75%) had evidence of severe parenchymal disease, 48 (63%) had pulmonary vascular disease (PH), and 41 (54%) had large airway disease. Overlapping disease was common. The presence of all 3 disease components was the most common phenotype, seen in 28% of study infants. However, some infants only had severe parenchymal disease (14%), while others with milder parenchymal disease had PH (8%) or large airway disease (8%) as the main phenotype (Figure). Important clinical outcomes including tracheostomy placement, need for PH medications at discharge, and death within 1 year of discharge varied depending on the main phenotype or combination of phenotypes (Table).

Conclusion(s) Infants with sBPD demonstrate variability in predominant pathophysiology. Since infants with sBPD have phenotypes with differing elements of parenchymal, vascular, and airway disease - therapy should be specifically targeted.

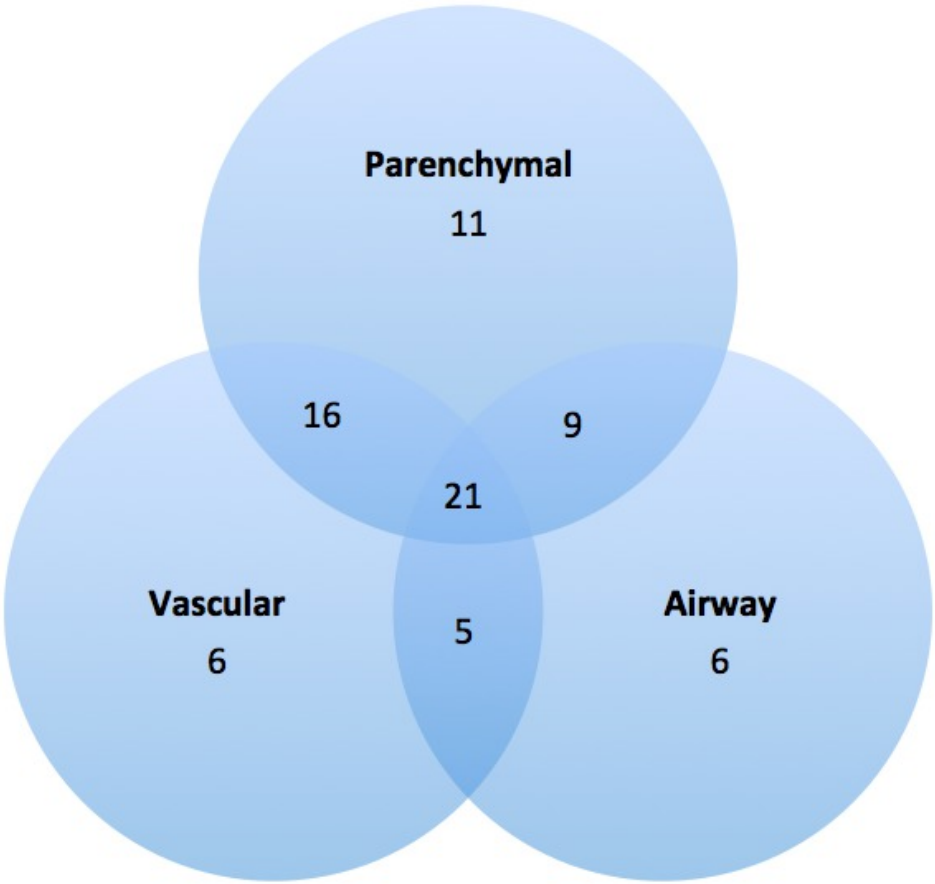

Figure. Venn diagram showing characterization of infants

Table. Percentage of outcomes in each group of infants

	Percentage of infants with tracheostomy	Percentage of infants discharged with pulmonary hypertension medications	Percentage of infants who died within 1 year of NICU discharge
Parenchymal	9%	18%	0%
Vascular	0%	50%	17%
Airway	83%	17%	0%
Parenchymal and vascular	44%	44%	38%

Parenchymal and airway	78%	0%	0%
Vascular and airway	100%	60%	0%
Parenchymal, vascular, and airway	86%	57%	14%

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Abstract: 112

Effect of targeted anti-GD2/-CD16 Bispecific NK cell Engager (BiKE) with ALT803 against Neuroblastoma (NB) and Ewing Sarcoma (ES)

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Background GD2 is a surface disialoganglioside that is a well-characterized immunotherapeutic target in NB and ES. The efficacies of anti- GD2 Ab depend on engaging functional NK cells to kill GD2-positive targets through ADCC. However, NK cell number and function are decreased in most cancer patients at diagnosis and further reduced by radiation chemotherapy. Further, immunosuppressive tumor microenvironment (TME) leads to treatment failure. Hence, to overcome TME resistance and improve NK cell mediated ADCC against tumor cells is to use novel approach; BiKE. ALT-803 is a superagonist of an IL-15 variant bound to an IL-15RaSu-Fc fusion with enhanced IL-15 biological activity.

Objective To investigate the in-vitro activity of hu-anti-GD2/-CD16 with/without ALT803 against GD2 expressing NB/ES.

Design/Methods Anti-GD2/-CD16 BiKE was constructed in mammalian expression vector, transfected into HEK293-EBNA cells and selected by Zeocin. Purification of anti-GD2/-CD16 plasmid was performed by ProBond™ Ni column and validated by Western blot. Cytotoxicity was examined against NB/ES cells with/without ALT803 (generously supplied by Altor Biosciences) with K562-mbIL21-41BBL expanded NK cells by DELFIA cytotoxicity assay at 10:1 E:T ratio and hu-IFN-g release was quantified by ELISA assay.

Results GD2 expressing NB (54.4± 10.61%) and ES (71.93±8.33%) cells were used for functional assays. BiKE+NK compared to Medium+NK significantly increased NK mediated cytotoxicity against NB: SKNF1 (64.5±5.9% vs.20.1±1.3%, p=0.002), SKNBE2 (67.4±4.02% vs.15.1±0.9%, p=0.004), SHS5Y5 (68.9±0.9% vs.30.2±0.85%, p=0.005) and ES: EWS502 (68.05±3.06% vs.28.1±4.05%, p=0.004), A673 (66.02±4.05% vs.20.3±0.8%, p=0.005) respectively. Further, BiKE+NK+ALT803 compared to BiKE+NK+rhuIL15 improved NK mediated cytotoxicity against NB: SKNF1 (73.9±9.3% vs.56.5±8.5%, p=0.007) and SKNBE2 (63.9±0.6% vs. 40.5±0.49%, p=0.002) against NB cell lines. In addition, BiKE+NK+ALT803 compared to BiKE+NK+rhuIL15 increased NK IFN-g levels against NB: SHS5Y5 (1305±7.5 vs.906±0%, p=6.53E-05) and ES: EWS (1677±8.8% vs.1316±0%, p=0.18).

Conclusion(s) Our preliminary results demonstrated that BiKE+ALT803 significantly enhanced NK cytotoxicity and IFN-g secretion against NB/ES. More in vitro experiments will be done to further verify the efficacy of this BiKE+ ALT803; in addition, testing it against GD2 expressing solid tumor in humanized NSG xenografted mouse model.

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Abstract: 113

Immediate Outcomes of Neonates with Prenatally Diagnosed Congenital Renal and Urinary Tract Anomalies and Associated Pulmonary Hypoplasia

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Background Congenital renal and urological anomalies associated with oligohydramnios or anhydramnios can result in severe pulmonary hypoplasia with significant morbidity and mortality. Understanding characteristics associated with the development of severe pulmonary hypoplasia and the initial neonatal course is critical for guiding appropriate fetal counseling and neonatal intensive care for this high-risk cohort of patients.

Objective To review the obstetrical characteristics and short term outcomes in neonates with pulmonary hypoplasia associated with prenatal diagnosis of renal and urological anomalies.

Design/Methods Retrospective cohort study of neonates born in the Special Delivery Unit at The Children's Hospital of Philadelphia from 2010-2016 with prenatal diagnosis of renal or urologic anomalies associated with pulmonary hypoplasia(Table 1). Fetal characteristics, delivery room events, and Neonatal Intensive Care Unit(NICU) admission data and outcomes were reviewed(Table 2).

Results 50 neonates were identified over the study period. Average diagnosis of oligohydramnios was 29 weeks gestational age(wksGA) and anhydramnios 31 wksGA. Of the 50 patients, 14(28%) died; 9 male, 5 female. In the patients that died, the average diagnosis of oligohydramnios was 24 wksGA and anhydramnios 26 wksGA; 10 of the 14(71%) had anhydramnios. Of the deaths, 2 were palliative deliveries, 11 required intubation in the delivery room(DR), with average first gas pH 6.97 and $C0_2$ 84. Of those

intubated, 3 required conventional mechanical ventilation(CMV), 7 high frequency oscillator(HFOV), 10 developed pneumothoraces(PTX), 8 had persistent pulmonary hypertension(PPHN), and 4 required vasopressors. Of the 36 survivors, 11 had anhydramnios(30%), 14 required intubation in the DR with average first gas pH 7.2 and $C0_2$ 63. Of those intubated, 12 required CMV, 2 HFOV, 9 developed PTX, 2 PPHN, and 4 required vasopressors.
Conclusion(s) Development of oligohydramnios or anhydramnios at earlier gestational ages is associated with increased morbidity and mortality. Infants who died had lower APGAR scores, were more likely to require intubation and HFOV, were more hypercarbic on first blood gas, and were more likely to develop PTX, PPHN, and require vasopressors. Better knowledge of the natural history of decreased amniotic fluid volume and the effect on fetal pulmonary development and neonatal phenotype is beneficial in prenatal counseling guiding resuscitation and acute/subacute management in the NICU.

Renal or Urologic Diagnosis

Anomaly	Total Patients	Deaths
ADPKD	1	0
ARPKD	11	7
LUTO	26	4
MCDK	6	2
Dysplastic Kidney	5	0
Renal Agenesis	1	1

Autosomal dominant polycystic kidney disease (ADPKD), autosomal recessive polycystic kidney disease (ARPKD), Lower urinary outlet obstruction (LUTO), multicystic dysplastic kidney (MCDK)

Fetal Characteristics

	Survivor (n=36)	Death (n=14)
Diagnosis of oligohydramnios (wksGA)	29	24
Diagnosis of anhydramnios (wksGA)	31	26
Diagnosed with anhydramnios	11 (30%)	10 (71%)
1 minute APGAR	6	4
5 minute APGAR	8	5
Intubated in DR	14 (39%)	11 (79%)
First gas pH	7.2	6.97
First gas CO_2	63	84
CMV	12 (33%)	3 (21%)
HFOV	9 (25%)	7 (50%)
PPHN	2 (19%)	8 (57%)
Vasopressors	4 (11%)	4 (29%)
PTX	9 (25%)	10 (71%)
Avg NICU LOS (days)	24	3.4

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Abstract: 114
Biallelic variants in EARS2 cause T cell lymphopenia, macrocytic anemia, hyperlactatemia with short telomere length.
Kimihiko Oishi[1], Amy Williamson[1], Tatyana Tarasenko[2], William B. Mitchell[3], Pankaj Prasun[1], Na Lin[1], Chunli Yu[1], Peter J. McGuire[2], Mary Armanios[4], Charlotte Cunningham-Rundles[5]

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Background T cell receptor excision circle (TREC) test has been used for newborn screening (NBS) for severe combined immunodeficiency. This NBS also detects infants with other causes of T cell lymphopenia (TCL). Recently, biallelic EARS2 variants were found to cause an autosomal recessive mitochondrial disorder with variable clinical symptoms including hypotonia, failure to thrive, lactic acidosis, and leukoencephalopathy during infancy. EARS2 encodes mitochondrial glutamyl-tRNA synthetase that is important for translation of mtDNA encoded proteins. We identified two female siblings (currently 2 and 5 years old), who were picked up by NBS with low TREC values. They had persistent TCL (range 906 to 1683 /mm^3) and lactate elevation with episodes of macrocytic anemia, failure to thrive and mild developmental delay.
Objective To identify the cause of idiopathic TCL with macrocytic anemia and hyperlactatemia.
Design/Methods Next generation sequencing analysis of the mitochondrial genome and nuclear genes associated with mitochondrial disorders was done. Tests for mitogen response, mitochondrial respiration, apoptosis and telomere length using peripheral blood mononuclear cells (PBMC) were performed.
Results Both patients developed severe macrocytic anemia (Hb: 5-6 g/dl and MCV: 94-106 FL) around the age of one and their bone marrows were histologically normal with decreased erythropoiesis. Biallelic novel likely pathogenic variants, c.485+4090_511del5090 and c.667G>A, p.D223N in EARS2 were detected for both patients. In the older patient, oxygen consumption rate of PBMC and lymphocyte responses to ConA and PHA were significantly reduced, while those of the younger one were in normal range before she developed macrocytic anemia. Apoptosis profiles of their PBMC were normal. They both had abnormally short telomeres in the lymphocyte lineage.
Conclusion(s) Biallelic variants in EARS2 can cause a new constellation of clinical symptoms with T cell lymphopenia, macrocytic anemia and hyperlactatemia with lymphocyte lineage specific short telomere length. The syndrome may be caused by variable proliferation abnormalities of hematopoietic cells secondary to mitochondrial functional defects. It is important to consider EARS2 related condition as a cause of neonatal T cell lymphopenia with elevated lactate.

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Abstract: 115

Utilization of Public Health Service Increased Risk Kidneys in Pediatric Renal Transplant Recipients By Era

Melissa R. Meyers[1], Justine Shults[1], Benjamin Laskin[1], Paige Porrett[2], Matthew Levine[2], Peter Abt[2], Sandra Amaral[1], David S. Goldberg[2]

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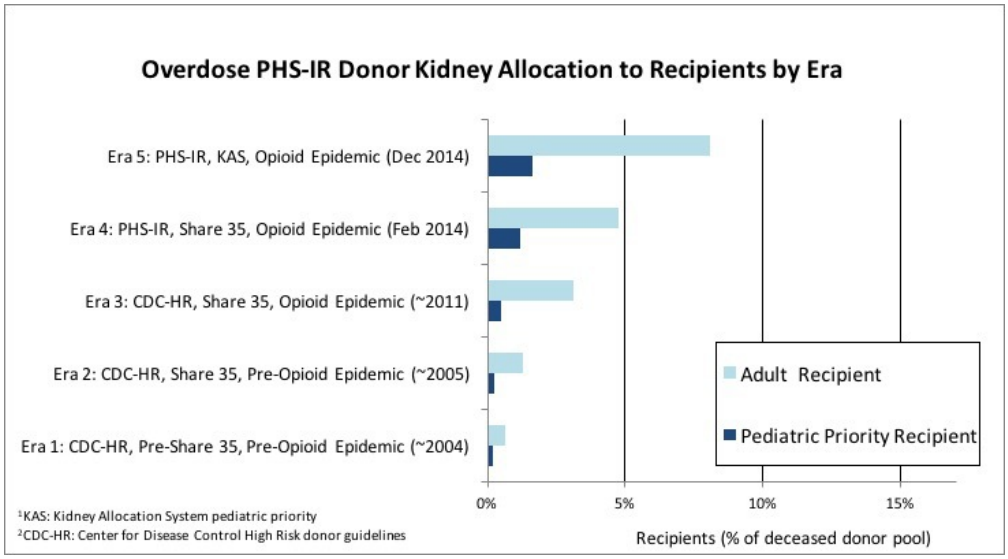
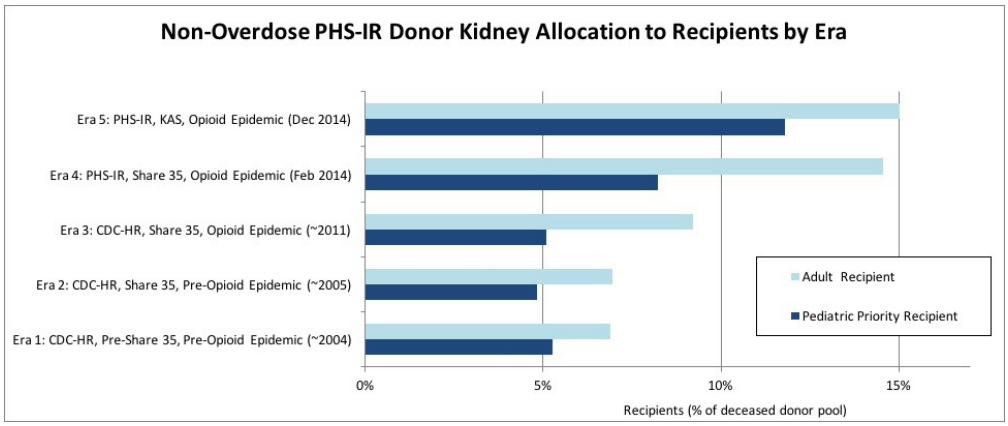
Background Donors labeled Public Health Service Increased Risk (PHS-IR) continue to rise due to opioid abuse and expanding criteria defining 'increased-risk.' Many PHS-IR donors are young adults with low Kidney Donor Profile Index scores yet it is unknown if utilization patterns differ between pediatric and adult patients.
Objective To compare use of kidneys from Public Health Service Increased Risk donors in pediatric versus adult transplant recipients across eras.
Design/Methods Retrospective study of all deceased donor (DD) isolated kidney transplant (KT) recipients in the US since outset of 'increased risk' monitoring (6/30/04-12/31/16). Recipients with pediatric priority (cases) were compared to those without (adult controls). Eras were defined by changes in pediatric priority, donor risk guidelines, and the opioid epidemic.
Results Of 7019 pediatric priority DDKT recipients during the study period, 498 (7.1%) received a kidney from a PHS-IR donor. This compared to 16,825 (12.9% of all adult DDKT recipients; $p<0.001$). Since initiation of Share 35 pediatric priority, the percentage of pediatric recipients receiving a DDKT from a PHS-IR donor was significantly lower than adult recipients ($p<0.001$). When stratified by mechanism of death (drug overdose/non-overdose), kidneys from PHS-IR donors were utilized less frequently in pediatric recipients in all eras, with larger differences seen in donors who died from drug overdose.
Conclusion(s) There are differences in utilization of PHS-IR kidneys in children compared to adults. Children infrequently received PHS-IR kidneys, especially from donors who died from overdose, which may represent balancing donor transmission risk with the benefits of transplant. Further studies should examine the decision to use PHS-IR kidneys in children and the associated long-term outcomes.





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Abstract: 116

Mean Platelet Volume (MPV) and other Hematologic Markers and Extent of Airway Inflammation in Allergic Airway Disease in Children.

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Background Allergic rhinitis (AR) is seen in 10–40% of children worldwide. AR very often coexists with asthma. Airway involvement can be localized as in AR or asthma or be more extensive with both AR and asthma. Platelets and eosinophils are involved in the pathophysiology of allergic diseases. There are few studies evaluating the relationship of MPV as an indirect inflammatory marker in allergic airway diseases. Furthermore, the relationship of MPV, blood platelet count and eosinophil count in extensive airway disease compared to localized disease has not been studied, to the best of our knowledge, in children.

Objective To determine whether MPV, platelet and/or eosinophil counts are related to the presence of AR and asthma in the pediatric population and whether it varies depending on the extent of inflammation (local inflammation as in AR or Asthma vs. extensive inflammation as both AR with asthma).

Design/Methods This is a retrospective chart review of children 2 to 18 years of age attending pediatric ambulatory clinics with AR and/ or with asthma, from January 2014 to September 2017. Subjects were divided into 3 groups based on the extension of respiratory tract inflammation. G1: AR without asthma (localized), G2: asthma without AR (localized), and G3: asthma & AR (extensive). MPV, platelet and eosinophil counts were compared with age and gender matched controls and among groups.

Results Our study included 1073 cases (G1: 18%, G2: 59%, G3: 21%) and 1072 controls. Demographic characteristics are shown in table 1. BMI was significantly higher in G1 compared to controls ($p < 0.0001$).

Mean MPV, platelets and eosinophil counts are shown in table 2. MPV and platelet count did not differ among all 3 groups and controls. However, there were significant group differences; MPV was higher in G1 compared to G2 ($p=0.046$) and platelet counts were higher in G2 compared to G1 ($p<0.0001$).

G1, G2 and G3 had higher eosinophil counts than controls. In addition, eosinophil counts was significantly higher in G3 compared to G1 and G2 ($p < 0.0001$).

Conclusion(s) MPV and platelet counts were not associated with the extent of the inflammation. In contrast, there was an association between eosinophil count and the extent of airway inflammation in children with AR and/or Asthma.

Table 1

	AR (n=198) Group 1	Asthma (n=643) Group 2	Asthma + AR (n=232) Group 3	Controls (n=1072)
Sex, Male, n (%)	110 (55.6%)	352 (54.7%)	133 (57.3%)	594 (55.4%)
Race, African American, n (%)	155 (78.3%)	532 (82.7%)	194 (83.6%)	904 (84.3%)
Age in years, Mean (±SD)	12.1 (±3.4)	8.6 (±4.8)	8.9 (±4.3)	9.3 (±4.7)
BMI, Mean (±SD)	22.3 (±5.3)	20.6 (±6.2)	19.7 (±5.2)	18.8 (±4.1)

Table 2

	Group	N	Mean (±SD)	F	p value
Eosinophil Count	AR G1	198	0.29 (±0.23791)	44.094	<0.0001*
	Asthma G2	643	0.29 (±0.24987)		
	Asthma + AR ; G3	232	0.42 (±0.73207)		
	Control	1073	0.18 (±0.17415)		
MPV	AR G1	198	9.19 (±0.93297)	2.672	0.046**
	Asthma G2	643	8.98 (±0.98908)		
	Asthma + AR; G3	232	9.06 (±0.94487)		
	Control	1073	9.06 (±1.00999)		
Platelet Count	AR G1	197	263.40 (±66.995)	11.254	<0.0001***
	Asthma G2	639	291.82 (±74.892)		
	Asthma + AR; G3	231	278.38 (±69.634)		
	Control	1072	274.44 (±71.743)		

*Children with Asthma + AR have higher eosinophil count than those with Asthma or AR and control.**Children with AR have higher MPV than children with Asthma.***Children with Asthma have higher platelet counts than children with AR and the control.

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Abstract: 117

High Prevalence of Ambulatory Blood Pressure Monitoring Abnormalities Detected in Survivors of Wilms Tumor

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Background Given the increasing number of survivors with Wilms tumor (WT), the most common renal malignancy in childhood, the cumulative burden of long-term treatment-related morbidity can be expected to increase. Masked hypertension is an established biomarker of early chronic kidney disease and adverse cardiovascular outcomes

Objective To assess for abnormalities in blood pressure loads and nocturnal dipping on ambulatory blood pressure monitoring (ABPM) among survivors of WT

Design/Methods Survivors of WT followed at The Children's Hospital of Philadelphia who were ≥5 years of age and ≥1 year beyond completion of therapy for WT were eligible. 24-hour ABPM was performed using Spacelabs 90217 monitors. The 90th percentile for age, sex and height for ABPM parameters was used to define normal limit values (Wuhl et al. 2002). Blood pressure loads were defined as: normal <25%, borderline 25-50%, and elevated >50%. Nocturnal dipping of <10% was considered diminished

Results We evaluated 27 (13 male/14 female) participants (pts) at a median age of 13.2 years (range 7.4-21.3). Median time from completion of WT therapy was 8.7 years (range 1.0-18.0). Most recent estimated glomerular filtration rate ranged from 77.5-134.6 mL/min/1.73m2 (median 99.0). WT staging at diagnosis was Stage 1: 2 pts; Stage 2: 5 pts; Stage 3: 9 pts; Stage 4: 9 pts; and Stage 5: 2 pts. None were diagnosed with genetic syndromes associated with WT. All pts received chemotherapy. 25 pts underwent unilateral

radical nephrectomy (1 of whom also had contralateral partial nephrectomy), Two underwent bilateral partial nephrectomy. Eighteen (67%) pts received radiation therapy to the kidney or whole abdomen as initial therapy or for recurrence.

Nine (33%) and 3 (11%) pts had borderline or elevated systolic and diastolic loads, respectively, while awake. Ten (37%) and 9 (33%) pts had borderline or elevated systolic and diastolic loads, respectively, while sleeping. Fourteen (52%) pts demonstrated a diminished systolic sleep decline, while 7 (26%) had a diminished diastolic sleep decline.

Only 6 (22%) pts had ABPM results that were normal in all domains (systolic and diastolic loads both awake and asleep, nocturnal dipping). Six (22%) pts had at least one blood pressure load >50%
Conclusion(s) A significant proportion of WT survivors screened for hypertension by ABPM had abnormal blood pressure loads, especially during sleep. Diminished nocturnal dipping was the most frequent abnormality. Long-term ABPM monitoring for this high risk population is suggested

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Abstract: 118

High Flow Nasal Cannula versus Continuous Positive Airway Pressure in Bronchiolitis

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Background Management of bronchiolitis varies widely in United States. From 2000 to 2009, only 2% of hospitalized patients required mechanical ventilation, but these children accounted for 18% of the total annual costs. Recently, there has been proposed use of high flow nasal cannula (HFNC) over continuous positive airway pressure (CPAP) to decrease rate of endotracheal intubation and invasive mechanical ventilation.
Objective To determine superiority of HFNC or CPAP in children aged 1 to 24 months with acute bronchiolitis.
Design/Methods Retrospective cohort study of 1771 children aged 1 to 24 months with acute bronchiolitis admitted to the single academic pediatric intensive care unit (PICU) between 2011-2013 (prior to use of HFNC), and 2016 (post-HFNC) for acute bronchiolitis. Primary endpoints included the need for escalation to intubation, length of stay in the ICU, and length of stay in the hospital. Data presented as mean ± SD or median [IQR]. Groups were compared using paired t test for parametric variables and Chi-square for non-parametric variables.
Results 1015 children were assessed in the pre-HFNC group, and 755 in the post-HFNC group (Table 1). The mean age for the pre-HFNC group was 8.2 months and post-HFNC group was 8.83 months (p = 0.480) with the median ages of 7 and 8 months respectively. With the increased use of HFNC (7% in the pre-HFNC group and 29% in the post-HFNC group), statistically significant decreases (although small) were observed in the rates of intubation (1.58% vs. 1.19%; p = 0.014), the use of CPAP (3.35% vs. 0.4%; p = 0.000), along with decreased hospital length of stay (4.2 days vs. 3.08 days; p = 0.000). PICU length of stay remained equivocal (0.75 days vs. 0.75 days; p = 0.798) between the two groups. There were also decreases observed in the rates of steroid, antibiotic and albuterol use which may be due to evidence in recent years regarding the suboptimal efficacy of those treatments in bronchiolitis.
Conclusion(s) Use of HFNC instead of CPAP in bronchiolitis may decrease the length of hospital stay, need for mechanical ventilation as well as health care costs.

	2011-2013			2016			P-Value
n	1015			755			
HFNC	71	7.00%		221	29.27%		0.000
CPAP	34	3.35%		3	0.40%		0.000
Intubation	16	1.58%		9	1.19%		0.014
	Mean	CI Low-High		Mean	CI Low-High		
Hospital LOS	4.2	3.82 4.58		3.08	2.83 3.33		0.000
PICU LOS	0.75	0.52 0.98		0.75	0.57 0.85		0.798

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Abstract: 119

Clinical Outcomes of Neonatal and Pediatric Extracorporeal Life Support: A Seventeen-Year, Single Institution Experience

Payal Trivedi[1], Kristen Glass[1], Joseph B. Clark[2], John L. Myers[2], Robert E. Cilley[3], Gary Ceneviva[1], Shigang Wang[1], Allen Kunselman[4], Akif Undar[5]

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United States, [4]Public Health Sciences, Penn State College of Medicine, Hershey, Pennsylvania, United States, [5]Pediatrics, Surgery, Bioengineering, Penn State College of Medicine, Hershey, Pennsylvania, United States

Background Extracorporeal life support (ECLS) has become the standard treatment for neonatal and pediatric patients with severe cardiac or pulmonary failure refractory to medical therapies. At our center, a multidisciplinary team utilizes translational research to investigate and implement new circuitry technology.
Objective The objective of this study was to describe our experience with neonatal and pediatric ECLS and compare clinical outcomes with those of the Extracorporeal Life Support Organization (ELSO) Registry.
Design/Methods A retrospective review of the medical record was performed for patients <18 years of age supported with ECLS at our institution from 2000 to 2016. Outcomes were compared to the January 2017 ELSO Registry report using Fisher's exact test.
Results The study included 118 patients. Survival was 70.3% to discontinuation of ECLS and 65.2% to discharge or transfer (Table 1). A transition in ECLS equipment occurred with the adoption of polymethylpentene (PMP) oxygenators and centrifugal pumps in the pediatric intensive care unit in 2009. PMP oxygenators were also adopted in the neonatal intensive care unit in 2011. Following those changes, the survival to discharge or transfer improved for both neonatal (≤28 days) and pediatric (29 days to <18 years) patients (Figure 1). The most common complications associated with ECLS were disseminated intravascular coagulopathy, seizures, intracranial hemorrhage, and arrhythmias. ECLS for pulmonary support appeared to be associated with a higher risk of circuit thrombus and cannula dysfunction.
Conclusion(s) Outcomes for neonatal and pediatric patients treated with ECLS at our institution compare favorably with the ELSO Registry. The adoption of PMP oxygenators was associated with an improvement in overall survival to discharge or transfer. Patients requiring pulmonary support appeared to experience more mechanical complications during ECLS, suggesting the need for ongoing technological improvement.

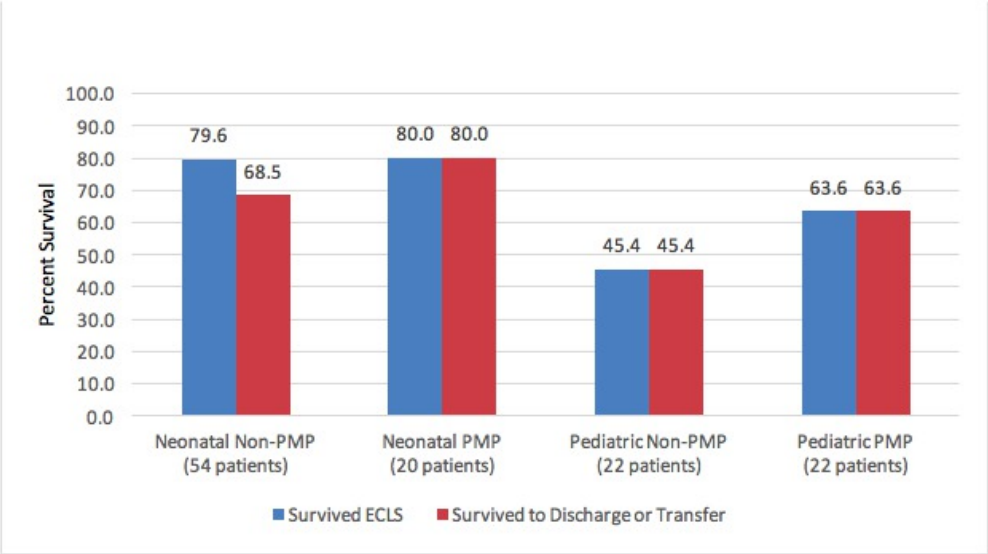

Figure 1. Effect of Oxygenator Type on Neonatal and Pediatric Survival
*p-values were not statistically significant between groups

Table 1. Overall Survival Outcomes of Penn State Hershey Medical Center Compared to ELSO Registry Report (January 2017)

	Total Runs	Survived ECLS	ELSO Data	p-value	Survived to Discharge or Transfer	ELSO Data	p-value
Neonatal							
Pulmonary	61	48 (78.7%)	84%	0.22	43 (70.5%)	73%	0.66
Cardiac	7	6 (85.7%)	64%	0.43	6 (85.7%)	40%	0.02*
ECPR	6	5 (83.3%)	67%	0.67	4 (66.7%)	40%	0.24
Pediatric							
Pulmonary	21	9 (42.9%)	67%	0.03*	9 (42.9%)	57%	0.19
Cardiac	15	12 (80%)	68%	0.42	12 (80%)	50%	0.03*
ECPR	8	3 (37.5%)	57%	0.30	3 (37.5%)	41%	1.00

Total	118	83 (70.3%)			77 (65.2%)		

*p-value<0.05

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Abstract: 120

Effect of Inhalational Anesthesia with Nitrous Oxide on Neuronal Membrane Function in the Piglet Brain.

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Background Nitrous oxide (N_2O) is a widely used anesthetic agent for children undergoing medical/surgical procedures. Anesthesia is known to affect various channels and receptors on neuronal membranes causing hyperpolarization and reduced excitability/firing of action potentials. Na-K ATPase restores the resting potential of neuronal membrane and maintains cell volume by powering efflux of Na^+ and influx of K^+ across the membrane. Although NMDA-antagonistic, GABA-memetic and K_{2p}-channel effects of N_2O have been described, the molecular targets underlying the mechanisms by which N_2O affects neuronal membranes are not well understood.
Objective To test the hypothesis that Na-K ATPase activity in the piglet brain is reduced after N_2O anesthesia.
Design/Methods Piglets (3-5 days) were ventilated with 75%:25% N_2O:O_2 x4hrs (n=5), then the brains were harvested. Na-K ATPase activity in membrane fraction of the cerebral cortex (CC) was measured as Oubain sensitive ATPase activity using a modified Fisk-Subarow reaction. ATP levels in CC (µmol/g tissue) were measured biochemically to determine tissue energy status. Cerebral water contents (gH_2O/g wet tissue) were measured in frontal CC before and after incubation at 90°C to determine cerebral edema. Normal, non-instrumented, non-anesthetized
piglets (Nx; n=6) and ventilated piglets anesthetized with ketamine (ket; 30 mg/kg IM; n=1) served as controls (M±SD).
Results Na-K ATPase activities (µmol/mg protein/hr) were 69.3±6.4 in Nx, 49.0±3.1 in N2O ($p<0.001$ vs Nx) and 64.3 in ket piglets. Cerebral water contents were 5.41±0.14 in Nx, 5.61±0.17 in N2O and 5.62 in ket groups (p=NS). Cerebral ATP levels were reduced by 40% from Nx with both N_2O ($p<0.01$ vs Nx) and ket anesthesia. Systolic BPs (mmHg) were 80-116 in normal, 77-99 in N_2O and 71-96 in ket piglets; blood gases remained within normal range.
Conclusion(s) We conclude that anesthesia with nitrous oxide, but not ketamine, reduces Na-K ATPase activity in the piglet brain. We suggest that Na-K ATPase inhibition may be a novel mechanism of anesthesia by which N_2O delays restoration of resting potential and prolongs the hyperpolarization phase during which neurons are nonresponsive to further stimuli. Nitrous oxide has been shown to induce neurodegeneration and apoptosis in the developing brain through nNOS and p53 mediated pathways. Due to the role of Na-K ATPase in neuronal membrane integrity and homeostasis, these findings continue to raise concerns regarding the safety of nitrous oxide as an anesthetic agent in
children.

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Abstract: 121

NICU NETWORK NEUROBEHAVIORAL SCALE (NNNS) AND PREDICTION OF DEVELOPMENTAL OUTCOMES IN NEWBORNS WITH HYPOXIC-ISCHEMIC ENCEPHALOPATHY (HIE) TREATED WITH THERAPEUTIC HYPOTHERMIA (TH)

Nicole Bendush[1], Penny Glass[1], Judy Brown[1], Joanna Burton[2], Gwendolyn Gerner[2], Michelande Ridore[3], Taeun Chang[4], An Massaro[3]

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Background The NNNS is a standardized assessment of neurobehavioral integrity in the newborn. We previously reported a relationship between NNNS performance and brain injury by MRI in newborns with HIE (Coleman et al, Early Hum Dev 2013). Whether NNNS predicts later neurodevelopmental outcomes after HIE is unknown.
Objective To determine whether NNNS performed prior to NICU discharge predicts later neurodevelopmental outcomes in newborns with HIE.
Design/Methods Term newborns with HIE were enrolled in a prospective observational study. Neurobehavioral performance was evaluated using the NNNS at 2 weeks of life (or NICU discharge if earlier). Infants were followed in the developmental clinic as standard of care and evaluated with either the Bayley Scale of Infant Development 2nd edition (BSID-II, 2008-2011) or 3rd edition (BSID-III, 2012-2017). Significant neurodevelopmental delay (NDD) was defined as BSID-II Mental or Psychomotor Developmental Index < 70 OR BSID-III Cognitive composite Score <85 or Motor Composite Score <80, accounting for the overestimation of developmental performance reported for BSID-III (Yu et al, Res Dev Disabil 2013). Infants were categorized according to their assessment results at 15-30 months of age. The relationships between NNNS summary scores and developmental outcomes were assessed by logistic regression analyses adjusting for gender, gestational age, Apgar score at 5 minutes, and the encephalopathy grade

at presentation.
Results Of the 108 surviving babies who underwent NNNS, 70 (65%) babies completed developmental follow up between 15-30 months. Mean birthweight was 3.35 ± 0.08 Kg, gestational age 38.8 ± 1.7 wks, and 42% were female. Median Apgar score was 1 and 3 at 1 and 5 minutes respectively, and 16% had severe encephalopathy. Higher Stress, higher Excitability and lower Regulation scores were predictive of NDD after adjusting for covariates (Figure 1). Other NNNS summary scores (Habituation, Attention, Arousal, Handling, Quality of Movement, Asymmetry, Nonoptimal Reflexes, Hypertonia, Hypotonia, Lethargy) were not significantly related to outcomes ($p>0.05$).
Conclusion(s) For newborns with HIE treated with TH, neurobehavioral performance in the neonatal period is predictive of later neurodevelopmental outcomes. The NNNS may be a valuable pre-discharge assessment that can aid in directing surveillance and therapeutic services to optimize outcomes in this high risk population.

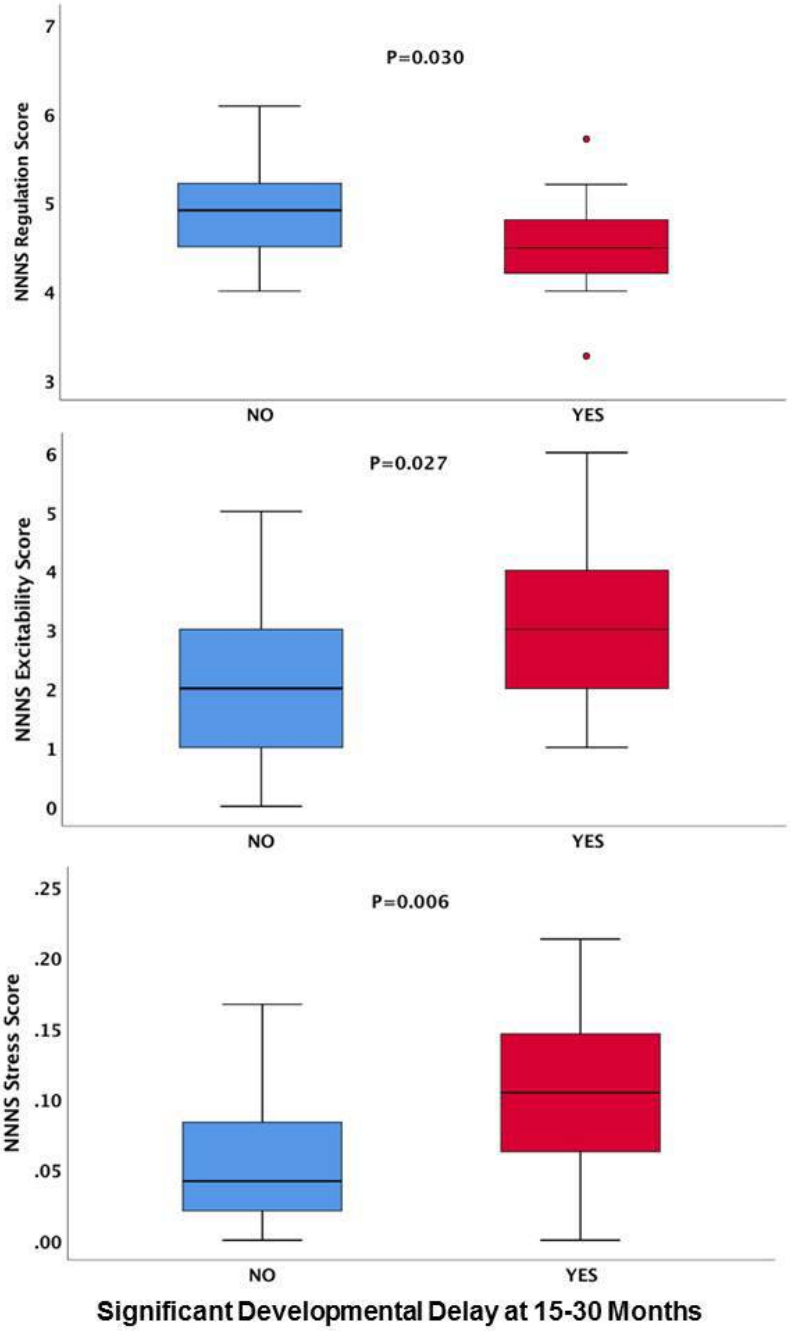

Figure 1. NNNS summary scores for Regulation, Excitability and Stress by outcome group.

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Abstract: 122
A qualitative investigation of communication between pediatric critical care providers and patient's parents or guardians.
Tyler Greenway[2], Tanya D. Murtha[1], Sarah Kandil[1], Marjorie S. Rosenthal[1], Kevin G. Couloures[1]

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Background Effective communication of clear and appropriate medical information between parents and guardians and provider teams is crucial for families to understand a child's disease, prognosis, and goals of care. Unclear communication can lead to misunderstanding and compromise care. However, little is known about what families perceive as obstacles to effective communication in the PICU, and the barriers perceived by families might be different from those perceived by providers.

Objective To characterize the perspective of parents and guardians of critically ill children regarding communication with healthcare providers.

Design/Methods We conducted semi-structured interviews of 41 parents and guardians whose children were admitted to a tertiary pediatric intensive care unit in 2017. Interviews were audio-recorded and professionally transcribed verbatim. An interprofessional team of a Pediatric Critical Care fellow, nurse manager, and medical student coded the transcripts. Interviewing continued until thematic saturation was reached. Codes were organized into common themes using the constant comparative method.

Results The families interviewed represented 16 acutely ill children with minimal past medical history, and 25 children with chronic health conditions. Patient ages ranged from 11 days to 18 years old. Twenty families self-identified as Caucasian, 8 as Latino, 6 as African American, 6 as Asian/Pacific Islander, and 1 as Middle Eastern. Length of PICU stay ranged from 24 hours to 4 months, and number of past PICU admissions ranged from 0 to 10+. Perceived communication deficiencies between health care providers and families included: 1) feeling that their child was discharged from the PICU before the child was ready, 2) not receiving care updates if they were not present for rounds, 3) a lack of communication/coordination between specialty services, 4) suboptimal communication was more common at night, and 5) among parents of children with long-term chronic health conditions, their opinions were not valued.

Conclusion(s) Communication between families and health care providers is a key component of the family's experience during their child's critical illness. Families perceived communication barriers negatively impact the PICU experience and the child's health. Eliminating these perceived barriers would improve the overall patient experience and ultimately health outcomes.

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Abstract: 123

The Use of Bronchoalveolar Lavage Cytokines and Chemokines for Prediction of Persistent Pediatric Acute Respiratory Distress Syndrome (PARDS)

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Background Viral respiratory infections are a common cause of admission to the pediatric intensive care unit (PICU) and leads to significant morbidity and mortality. Unpredictably, some patients' lung function continues to worsen following intubation/mechanical ventilation and develop pediatric acute respiratory distress syndrome (PARDS), possibly due to secondary bacterial infection. We hypothesized that analysis of lung mucosal fluid could provide an early biomarker profile to predict progression to PARDS.
Objective To evaluate the ability of several bronchoalveolar lavage (BAL) fluid chemokines to correlate with clinical outcomes.

Design/Methods A prospective, single-center study was performed and blind BAL fluid samples were obtained from 23 patients. The study group was defined as being intubated for respiratory failure in the setting of vial infection confirmed by polymerase chain reaction (PCR). A control group was comprised of pediatric patients intubated in the OR setting for airway control only. Biological markers were quantified using a variety of methods including quantitative, multiplexed immunoassays.

Results While eleven patients met the criteria for PARDS by elevated oxygen saturation index (OSI) on the day of intubation (day 0), only five patients to meet criteria for PARDS after day 1 post-intubation (persistent PARDS). At early time points several chemokines including CCL7, CXCL9, -10 and -12 were significantly elevated in persistent PARDS patients ($p<0.05$). Principal component analysis (PCA) of OSI and the BAL cytokines and chemokines revealed a possible positive relationship between OSI and IL-10, CXCL9 and CXCL10, whereas a negative relationship between OSI and CCL15. Using this knowledge we have created a formula utilizing sampling technique independent variables, i.e., the ratios of the chemokines CXCL9, -10 and CCL15, -22. Using a cut-off of 60.1, our index formula has a sensitivity of 100% and a specificity of 91.7% (ROC AUC 0.958, $p=0.0056$) for prediction of persistent PARDS based on early BAL sampling.

Conclusion(s) Early analysis of BAL fluid chemokines during viral infections can identify patients at risk of PARDS. Further studies will enroll additional patients to validate the current results.

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Abstract: 124

Resident burnout, depression and wellbeing: a multi-specialty survey

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Background Physician burnout and depression contribute to decreased productivity, medical errors and poor patient outcomes.
Objective To assess and compare rates of burnout, depression and satisfaction among residents of various levels and specialties; to evaluate residents' perception of available mental health support within their programs.
Design/Methods Cross-sectional anonymous survey of a convenience sample representing residents from all 12 programs at an urban academic medical center. The 19-question survey included questions on demographics, satisfaction, perceived happiness, stress, depression, burnout and program support. Questions on depression and burnout were adapted from validated surveys (PHQ2 and abbreviated Maslach inventory).
Results N=176. All gender, training levels and specialties represented (Table 1). Mean level of satisfaction with life as whole was 7.6/10, with life as a resident was 6.9/10. PGY2 residents had lowest mean level of satisfaction with life as a whole, p=0.078. FMGs had higher satisfaction as residents, p=0.001. Emergency medicine residents were least satisfied (p=0.002); internal medicine and pediatric residents were more satisfied (p=0.021, p=0.024). 44% screened positive for depression; 42% reported feeling burned out at work and 43% feeling callous toward people. USMGs were more likely to report feeling burned out compared to FMGs. PGY1 residents were less likely to report feeling burned out (p<0.05); PGY4 and PGY5 more likely (p=0.018, p=0.04). 77% state their program provides mental health/wellbeing programming. 18% have used programming, of which 89% state it helped. When describing available resources, 44% rely on interpersonal support from peers or faculty.
Conclusion(s) Depression and burnout were prevalent among residents. Satisfaction with life as a resident was lower than satisfaction with life overall. PGY2 residents were the least satisfied and had lower mean happiness scores. The majority perceived availability of support programming and those who used it found it helpful; however, utilization remained low. Interpersonal support was utilized more commonly than structured programming. More attention needs to be drawn to resident mental health, promoting utilization of available support, and incorporating wellbeing curricula into residency training, preferably before the beginning of PGY2.

Demographics		
Age	29.4 years, SD 2.5	
Gender • Male • Female	 95/176 (54%) 81/176 (46%)	
Type of medical graduate • US (USMG) • Foreign (FMG)	 104/176 (59%) 72/176 (41%)	
Level of training • PGY1 • PGY2 • PGY3 • PGY4 • PGY5	 55/176 (31%) 53/176 (30%) 39/176 (22% 23/176 (13%) 6/176 (4%)	
Specialty	**% of total responses**	**% of total residents in that specialty**
Emergency Medicine	17.6	31/60 (52%)
Internal Medicine	20.5	36/82 (44%)
Preliminary	1.1	2/10 (20%
Neurology	4.5	8/9 (89%)
Obstetrics/Gynecology	6.3	11/20 (55%)
Orthopedic surgery	5.1	9/10 (90%)
Pediatrics	9.7	17/33 (52%)
Podiatry	1.1	2/3 (67%)
Psychiatry	10.8	19/30 (63%)
Radiology	7.4	13/20 (65%)
Surgery	8.5	15/26 (57%)
Urology	7.4	13/17 (76%)

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Parental Electronic Cigarette Use and Lifestyle Behaviors
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Background Electronic cigarette (ecig) use is well described amongst adolescents. However, little is known regarding parental ecig use & associated behaviors.
Objective To assess lifestyle behaviors associated with parental ecig & tobacco use.
Design/Methods This is an interim analysis of a cross-sectional survey of consenting English speaking parents (≥18 yrs) of live singletons. Questions were adapted from pre-validated surveys (Pregnancy Risk Associated Monitoring System; Population

Assessment of Tobacco & Health). Subjects were categorized into 4 groups: ecig use only (ECO), tobacco products only (TPO; cigarettes, smokeless tobacco, hookah), dual use (DU; ecig & tobacco), & non-users (NU; neither ecig nor tobacco). Behaviors compared included exercise (≥3 days/week), alcohol consumption, & drug use (marijuana, cocaine, amphetamines). Also assessed was parental social stress in the periconceptional period such as partner incarceration, job loss, & homelessness. Further, among users (ECO, TPO, DU), rates of self-identification as non-smokers were evaluated. X^2, Fisher's Exact test, ANOVA & logistic regression were used. Logistic regression controlled for race/ethnicity, age, gender, education, social stress, & food insecurity.
Results Of 559 respondents: 2% were ECO, 9% DU, 15% TPO & 74% NU. The four groups did not differ by age or race, but ECO & NU had more females & lower social stress (p's<0.01). Further, ECO were more food insecure & less educated (p's<0.01). Rates of exercise trended higher in ECO vs TPO & DU (70% vs 37%, p=0.085; 70% vs 39%, p=0.089, respectively), but did not differ from NU. ECO were more likely to self-identify as non-smokers compared to TPO & DU (70% vs 25%, p=0.007; 70% vs 10%, p<0.001, respectively). There was no association with other behaviors. In regression models, ECO were more likely to exercise than TPO (OR 5.0, 95%CI: 1.1-22.1) & DU (OR 5.3, 95%CI: 1.1-24.6), but did not differ from NU. ECO were more likely to identify as non-smokers when compared to TPO (OR 12.5 95%CI: 2.4-65.9) & DU (OR 50.3, 95%CI: 7.4-340.5).
Conclusion(s) Exclusive ecig use was linked with higher rates of exercise. The majority of ecig users did not self-identify as smokers, potentially leading to a gap in counseling. We speculate that ecig users may consider ecigs as a healthier alternative to tobacco use. Physicians should consider screening parents for ecig use, as assessing for only smoking may underrepresent nicotine exposure.
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The effect of multi-disciplinary in situ high-fidelity simulation in the Emergency Department on adherence to Neonatal Resuscitation Program guidelines
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Background While extramural and Emergency Department (ED) deliveries are uncommon, resuscitation of a critically ill neonate is a vital skill for ED providers. There is limited training among ED practitioners in the Neonatal Resuscitation Program (NRP), an evidence based pathway for management of a newborn. Simulation is frequently used to educate ED providers in rarely used competencies and procedures. There are no prior ED-based studies utilizing simulation in NRP.
Objective To determine the effect of multi-disciplinary training using a high-fidelity simulation system on adherence to NRP guidelines by ED providers.
Design/Methods This was a prospective randomized controlled intervention based in the pediatric ED of an urban, academic hospital without obstetric services. All subjects received NRP training and participated in a baseline multi-disciplinary, in-situ simulation of a neonatal resuscitation using a high-fidelity system. A validated tool was used to measure execution of critical actions; participants also completed baseline self-efficacy and knowledge assessments. These measures were repeated at 3- and 6-month intervals. Between these intervals the intervention group received additional NRP training via high-fidelity simulation. Time to perform critical actions during a simulated neonatal resuscitation were analyzed as the primary objective; scores from self-efficacy and knowledge assessments were analyzed as secondary objectives.
Results 11 physicians and 11 nurses were enrolled. Results are listed in Table 1. At baseline, mean self-efficacy and knowledge scores were 67% and 86%, respectively. Subjects executed 88% of the critical actions; mean times were 10s, 50s, 170s, 380s and 455s to stimulate, positive-pressure ventilation (PPV), chest compressions, epinephrine delivery, and intubation, respectively. At 3 months, the intervention group had 14% (p=0.005) and 17% (p=0.037) higher self-efficacy and knowledge scores, respectively versus the control group. The intervention group also executed PPV 30s (p=0.039) and epinephrine delivery 163s (p=0.025) earlier than the control group.
Conclusion(s) Participants in the intervention group had improved knowledge retention, increased adherence to NRP guidelines and higher ratings for self-efficacy compared to the control group. This ongoing study is the first-known ED-based intervention to utilize multi-disciplinary in-situ simulation training to assess retention of knowledge and procedural skills related to NRP.

Table 1: Self efficacy, knowledge and critical actions scores and times at baseline and 3-month intervals

	Baseline	3-month interval		
		Control Group	Intervention Group	p-value
Self-efficacy score (%)	67	66	88	0.005
Knowledge score (%)	87	75	92	0.037
Completed critical actions (%)	88	77	93	0.0003
Critical action time (seconds):				
Warm/Dry/Stimulate	10	27	7	0.091
Positive Pressure Ventilation	50	72	42	0.039

Chest compressions	170	116	108	0.732
Epinephrine Delivery	380	371	208	0.025
Intubation	455	364	215	0.168

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Effect of Simulation Based Training on Pediatric Residents Response to Unprofessional Behavior

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Background As front line members of the medical team, residents may sometimes witness unprofessional behavior in their colleagues and may feel uncomfortable about addressing it directly with their peer. Studies have emphasized the importance of professionalism training in residents, but can residents train each other?

Objective To assess the impact of simulation-based approach to teach pediatric residents how to respond to unprofessional behavior in a colleague.

Design/Methods A pilot, randomized, blinded, case control study was conducted in pediatric residency in a community hospital.The residents were randomized to intervention(IG) and control groups(CG) .IG received didactics on strategies to address unprofessional behavior in a colleague and CG on electronic professionalism .Residents then participated in two professionalism case scenarios(CSs): communication(CS1) and racial bias(CS2) in the simulation lab.These ten-minute interactions were videotaped and evaluated independently by two blinded reviewers with each aspect of the interaction scored on a five-point Likert scale.Inferential statistics were used to compare the two groups.

Results A total of 28 pediatric residents (11 PL1,11 PL2 and 6 PL3) participated in the study.Twenty(71%) were female.The IG had 13 residents and the CG had 15. Both groups were identical in year of training, gender, prior clinical training and country of training.Median intercoder reliability between two reviewers was 0.714 for CS1 and 0.755 for CS2.

An initial analysis between the two CSs showed significant differences in residents' addressing unprofessional behavior with the different scenarios.Residents reacted more appropriately in addressing a communication issue than a racial bias one,specifically in areas of "remaining neutral in face of anger" and "acknowledging resident stress" (Table 1).

Although IG scored higher in both CSs,mean score differences were not statistical significant [CS1: IG = 3.3 vs. CG = 3 (p=0.32)] and [CS2: IG = 2.9 vs. CG = 2.7 (p=0.32)].However, subgroup analysis on the individual components of the scale showed statistically higher score for IG in "allowing colleague to express self" in CS1 (IG = 3.9 vs. CG = 3.2 ($p<0.05$)(Table 2).

Conclusion(s) Simulation based CSs with specific professional training seem to improve residents' response to unprofessional behavior in a colleague, especially in the area of allowing colleagues to express self.Addressing unprofessional behavior regarding racial bias should be a targeted area of simulation training.

Table 1: Mean Scores on Individual components of scale in two case scenarios

Individual components of scale	Communication Case	Racial Bias Case
Elicit self assessment†	2.57 (SD=1.25)	2.12 (SD=1.01)
Acknowledges resident stress¶	3.50 (SD=0.90)	2.00 (SD=0.73)
Remain neutral in face of anger§	3.62 (SD=0.90)	3.28 (SD=0.64)

† p=0.06, ¶ p<0.001, § p<0.05

Table 2: Mean Scores on Individual components of scale in Intervention Groups versus Control Groups in two case scenarios

Communication Case Scenario		
Individual components of scale	Intervention	Control
Allows colleague to express self*	3.9	3.2

Communicates in non-judgmental fashion	3.9	3.3
Uses language appropriate to situation	3	2.9
Uses non-verbal behavior that is facilitative & culturally appropriate	3.6	3.3
Proceeds in organized fashion	3.3	2.8
Clearly state your concerns	3.3	3.1
Be specific about the behavior – not the person	3.1	3.2
Explain your rationale	2.8	2.4
Elicit self-assessment	2.5	2.6
Acknowledges resident stress	3.7	3.3
Remain neutral in face of anger	3.8	3.5
Peer acknowledges inappropriate behavior as a result	2.4	2.4
Racial Bias Case Scenario		
Individual components of scale	Intervention	Control
Allows colleague to express self	3.8	3.3
Communicates in non-judgmental fashion	3.5	3.3
Uses language appropriate to situation	2.8	2.6
Uses non-verbal behavior that is facilitative & culturally appropriate	3.5	3.4
Proceeds in organized fashion	3.1	2.6
Clearly state your concerns	2.9	2.8
Be specific about the behavior – not the person	2.8	2.7
Explain your rationale	2.6	2.3
Elicit self-assessment	2.3	2
Acknowledge resident stress	2.1	1.9
Remain neutral in face of anger	3.3	3.3
Peer acknowledges inappropriate behavior as a result	2.5	2.4

* Statistically significant $p<0.05$

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Effect of educational handouts based on local vs national data on child influenza vaccine receipt, a randomized controlled trial.

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Background Educational information aimed at debunking vaccine myths or providing corrective information has had paradoxical effects on intention to vaccinate. Analysis of the relationship between type of educational information and influenza vaccine receipt in the pediatric population is limited.

Objective To assess whether providing parents with an educational handout about influenza disease and vaccine information based on local versus national data influences child vaccine receipt, relative to usual care.

Design/Methods A convenience sample of parents of children ≥6 months old who had a visit during Fall-Winter 2016 to an urban academic pediatrics clinic were randomized (1:1:1) to receive local vs. national-based educational information vs. usual care. Intervention arm parents received a paper educational handout to read in the waiting room, which highlighted the risk of influenza, that the flu shot does not cause the flu, and vaccine coverage data. The "local" handout included vaccine coverage data and information from a local study in the community while the "national" handout used data and information from the CDC. The primary outcomes were child influenza vaccine receipt on day of survey or during season, as abstracted from the medical record. Chi square analysis and multivariable logistic regression were used to assess the association between intervention type and our outcomes, adjusting for any differences among arms.
Results Of 501 eligible parents approached, 400 (80%) were enrolled. Median child and parent age was 4.3 (IQR 1.5-9.4) and 33.0 (IQR 28.0-41.0) years. Most children were Latino (88%), publicly-insured (96%), and 51% of parents had ≤high school education. Intervention arms differed significantly by caregiver education and child ill that day. Any intervention (vs. usual care) parents had greater odds of having their child receive the influenza vaccine by the end of the season (aOR 1.78, 95% CI: 1.11, 2.86). Both intervention types resulted in increased odds of influenza receipt by the end of season vs. usual care: handout with national data (aOR 1.76, 95% CI 1.003-3.10) and handout with local data (aOR 1.87, 95% CI 1.07-3.27). Only children whose parents received the national educational handout had greater odds of receiving the influenza vaccine on day of survey vs. usual care (aOR 1.79, 95% CI 1.02, 3.14).
Conclusion(s) An educational intervention given in the waiting room prior to pediatrician visit may help increase child influenza vaccine receipt.

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Enhanced Meaning In Work Through Efficient and Effective Discharge Summaries

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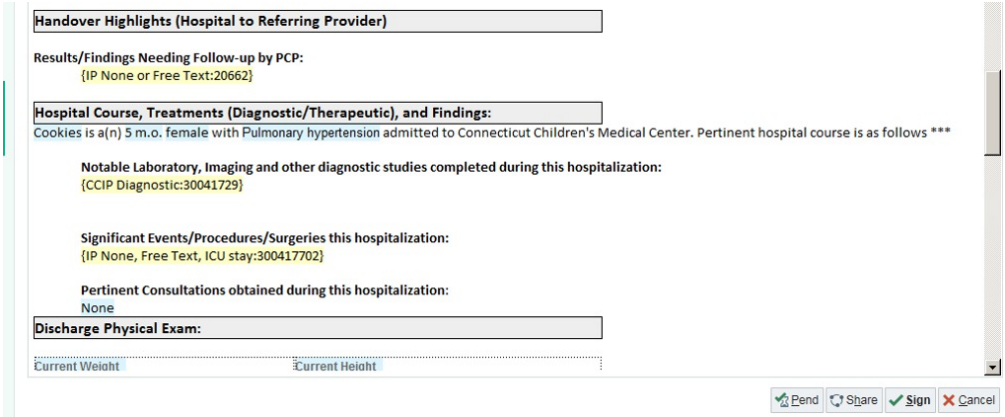
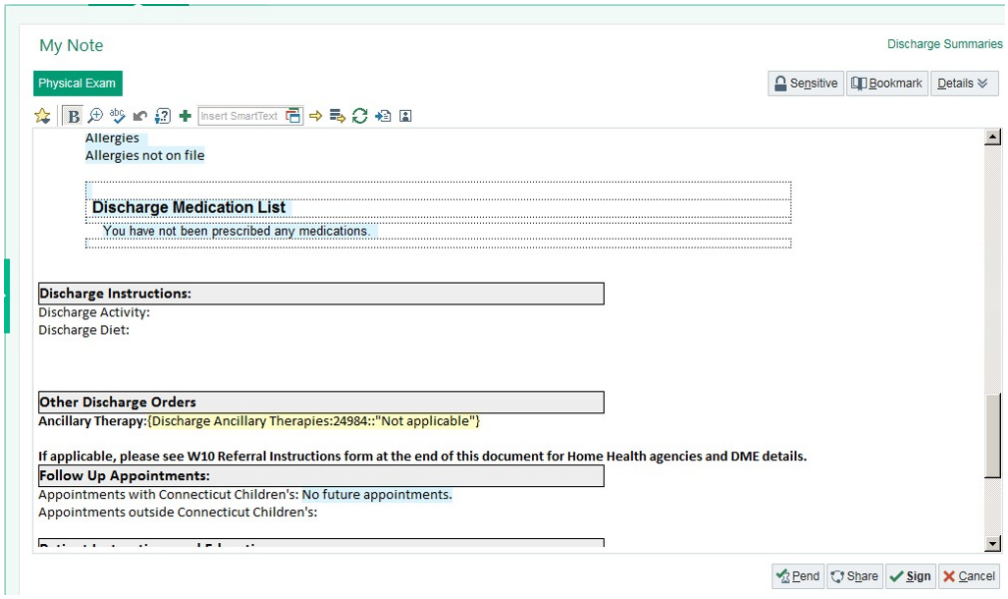
Background Residents and faculty devote excessive time to documentation. Discharge summaries lacked timely completion. Faculty were frequently cited as delinquent due to resident delays in dictating summaries. PCPs and families cited frustration due to delays in discharge summaries at follow up.
Objective Our objective was to develop and implement a revised and real-time discharge summary to be completed efficiently on the day of discharge. This effort was University of CT Pediatric Chief Resident led and involved interdisciplinary collaboration at CT Children's Medical Center.
Design/Methods The working group consisted of residents, faculty, community PCPs, and representatives from families, IT, legal, billing and coding, risk management and regulatory compliance. They met every other week for 6 months. It was an iterative process including rebuilding the discharge summary in EPIC EMR, followed by pilot trial, then full implementation. The required content was established with billing, risk management, regulatory compliance and legal considerations. The desired information and format was identified with PCP input. The electronic format in EPIC maximized information extracted automatically. There was training on the discharge summary and Dragon Voice Activated Software. Time for summary creation was tracked in EPIC. Time of completion from discharge, overall compliance and deliquencies were tracked by HIM. Resident and faculty feedback was collected from focus groups.
Results The discharge summary counted as the progress note on the day of discharge and was suitable for billing. Most of the note was auto-populated. The only documentation required was a short hospital course and final physical exam with check boxes. The time for creating the discharge summary and final progress note combined was reduced from 20 minutes to 5 minutes on average. The number of delinquent summaries was reduced from 772 to 3 in the year before and after implementation. Residents, faculty and PCPs reported universal satisfaction starting immediately with full implementation, faculty noted additional professional and personal time, and there were no family complaints.
Conclusion(s) We were able to design an efficient and effective discharge summary that improved timely handover to PCPs, reduced delinquencies and increased provider time for meaning in work.





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The Use of Telemedicine for Child Psychiatric Consultations in an Inner-city Hospital

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Background Similar to other urban hospitals in the United States, the volume and complexities of pediatric psychiatric patients seen in our emergency department have increased tremendously in the last few years. Due to the shortage of mental health care providers in lower socioeconomic areas, patients often have to wait a long time to see a provider. Moreover, most cases of unnecessary hospital admissions occur in settings with limited access to a child Psychiatrist. Telemedicine bridges this gap. A recent study in San Francisco showed that telemedicine reduced the ED wait time for psychiatric consultation.

Objective To evaluate the impact of telepsychiatry consultation on the length of Pediatric Emergency Department (PED) stay and inpatient admission rates for children with psychiatric conditions.

Design/Methods A retrospective chart review of patients aged 5-21 years who visited the Bronx Lebanon Hospital Center (BLHC) PED from January to December 2016 with conditions necessitating psychiatry consultation. Patients were classified into two groups: those who received telepsychiatry consults (TPC) which happened between 8 am to 4 pm daily and those who received routine consults (RC) from 4 pm to 8 am daily.

Results There was no difference between the TPC and RC groups in terms of gender, race and disease diagnosis (P=0.248) respectively. Compared to RC, TPC was associated with reduction in admission or transfer to a temporary psychiatric observation unit (OR = 0.44, 95% CI= 0.30, 0.59; p<0.001). After adjusting for differences in age and disease diagnosis, TPC was still associated with reduction in admission rates (OR = 0.41, 95% CI: 0.28, 0.58; p<0.001). A subset analysis of 311 (52%) patients transferred to the temporary psychiatry observation unit from the PED showed that patients who had TPC were less likely to be discharged compared to those who had RC (Adjusted OR=0.49, 95%CI= 0.29,0.84, p=0.010). However, TPC was associated with a longer PED stay compared to RC (183 mins vs. 125 mins; P<0.0001).

Conclusion(s) Telemedicine has been proven to improve health care quality in various settings. In our study telemedicine reduced admission rates from the ED and also prevented unnecessary transfers to temporary psychiatry observation units. However, there was increased ED length of stay. Our results are similar to recent findings published by Center for Medicaid & Medicare Services showing that telemedicine use in nursing facilities reduced unnecessary hospital admissions.

	Consult type		
	Routine (n=257)	Telemedicine (n=340)	
Gender Male: Female:	 30.1% 20.2%	 25.2% 24.7%	P Value 0.143
Age > 10 Years: < 10 Years:	 43% 10%	 35% 12%	P Value 0.019
Ethnicity Hispanic: Others:	 35% 25%	 22% 18%	P Value 0.361

Table 1: Demographic distribution of study patients.

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The Utility of Peripheral White Blood Cell Count for Non-Diagnostic Ultrasound and Non-Contrast Magnetic Resonance Imaging Studies in Suspected Pediatric Appendicitis

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Background Ultrasound (US) and magnetic resonance imaging (MRI) studies in pediatric patients with suspected appendicitis often partially visualize or do not visualize the appendix. These results create a clinical dilemma prompting consideration of additional diagnostic imaging or admission for observation.

Objective To determine if the use of specified peripheral white blood cell (WBC) cutoffs improve the negative predictive values (NPVs) of US and MRI studies with partial or non-visualization of the appendix without secondary signs of appendicitis.

Design/Methods We conducted a retrospective cohort study of patients 3-18 years old with suspected appendicitis who had MRI performed with or without a preceding US in a pediatric tertiary care hospital emergency department from 2013-2017. Clinical data and specified outcomes were recorded. Imaging studies were categorized into diagnostic or non-diagnostic results with the latter subcategorized into equivocal, partial visualization, or non-visualization with or without secondary signs. NPVs were calculated for

these results with and without using WBC cutoffs of <10.0 and <7.5 x 10^9/L.
Results Of the 612 patients included for analysis, 129 (20.1%) were diagnosed with appendicitis. Of the 402 US studies performed, 18 (4.5%) were categorized as partial visualization without secondary signs and 323 (80.3%) were categorized as non-visualization without secondary signs. The NPV of these subcategories combined is 85.3% (95% CI 81.1-88.9%). The NPV improves to 94.8% (95% CI 90.3-97.6%) and 96.5% (95% CI 90.1-99.3%) using WBC cutoffs of <10.0 and <7.5, respectively. Of the 612 MRI studies performed, 47 (7.7%) were categorized as partial visualization without secondary signs and 142 (23.2%) were categorized as non-visualization without secondary signs. The NPV of these subcategories combined is 97.9% (95% CI 94.7-99.4%). The NPV changes to 98.1% (95% CI 93.3-99.8%) and 98.2% (95% CI 90.5-99.95%) using WBC cutoffs of <10.0 and <7.5, respectively.
Conclusion(s) In pediatric patients with suspected appendicitis, using WBC cutoffs in combination with US results showing partial or non-visualization of the appendix without secondary signs identifies a low-risk group that may safely avoid further imaging or admission for observation. In contrast, the already high NPV of MRI studies with partial or non-visualization of the appendix without secondary signs does not significantly improve with the use of these WBC cutoffs.

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It's All Fun and Games Until Someone Loses an Eye: Prevalence of Potential Unintentional Injuries Observed in Public Baby Videos

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Background YouTube (YT) is a video-sharing platform used by parents to share clips of their children. However, options to share and "like" videos can influence parents to overlook child safety in favor of creating viewer-attracting content in some of the 76 million "funny baby videos" (FV). With unintentional injuries (UI) as the leading cause of death and disability in children >1 year, it is imperative to evaluate how prevalent potential UI are in FV and how viewers perceive them.
Objective To measure the presence of potential UI in children in "FV" on YT, and to observe filmer and viewer reactions.
Design/Methods A researcher watched public videos posted on YT as "FV" sorted as "most relevant" by YT and analyzed them for basic demographics (child gender, listed or estimated age of child based on developmental milestones), view count, and number of likes/dislikes. Thematic content analysis was performed for the presence of common infant UI causes according to the Center for Disease Control (CDC) (MV Traffic, Fall, Drowning, Suffocation, Natural/Environment, Unspecified, Poisoning, Struck by/Against), whether the UI was potential or immediate, and whether an adult intervened in potential UI.
Results YT FV(n=86) were analyzed (total of 1,809,911,810 views). Infant subjects were 86% White, 3% Asian, 2% Black, 3% Hispanic, 5% Other; 59.3% male; mean age of 15-18 months, approximated through development milestones. 58.1% of videos had no potential UI, 23.3% had potential UI without immediate injury, and 18.6% had potential UI resulting in direct UI. Dangers sorted by CDC UI causes are shown in Fig. 1 (Potential) and Fig. 2 (Immediate). Of all videos displaying potential/direct UI, only 1 resulted in filming cessation to prevent or assist UI. Non-UI FV averaging 31,160 "likes", Potential-UI averaging 93,000, and UI averaging 14,250, demonstrates an increased popularity among viewers of potential UI scenarios.
Conclusion(s) Although the majority of videos examined did not display immediate UI, an alarming number displayed the potential for serious UI. Also concerning was parental encouragement and continued filming of risky behaviors. While Potential-UI were most "liked", the lack of immediate UI is not synonymous with caution. Without understanding the danger of filming without intervening, parents may prioritize content creation over child safety. Considering the seriousness of UI, it is imperative for clinicians to discuss responsible filming to reduce easily preventable accidents.

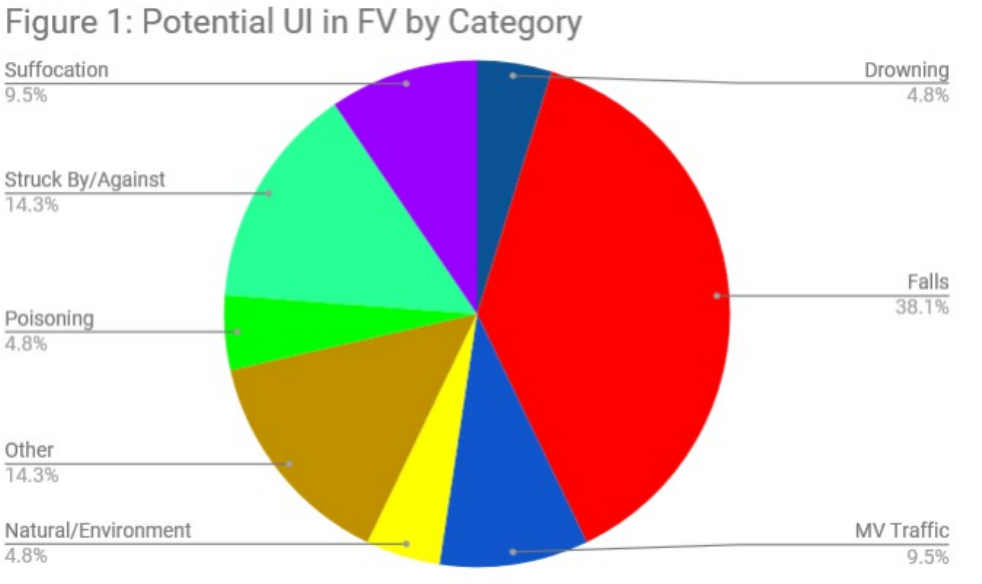

Figure 1: Potential UI in FV by Category

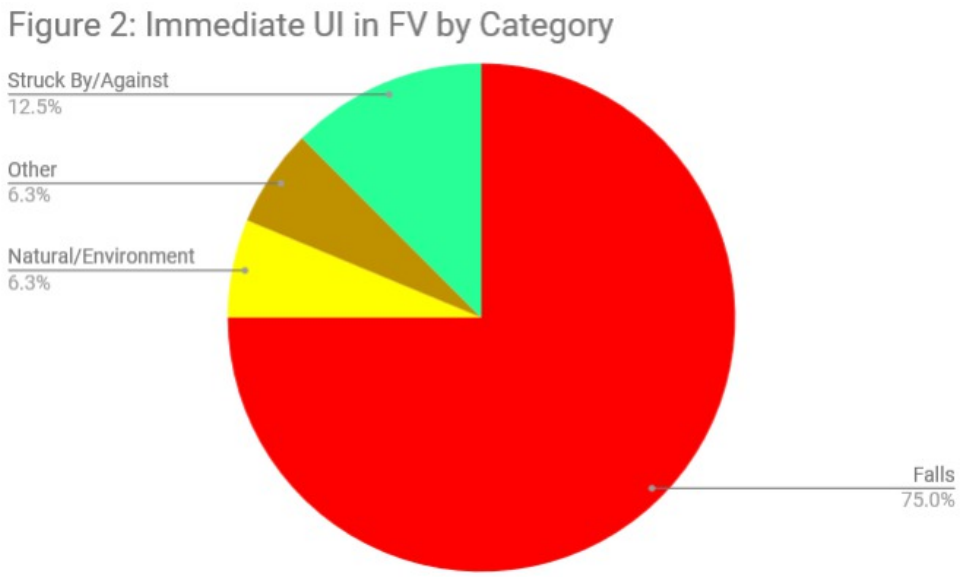

Figure 2: Immediate UI in FV by Category

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Maternal Confidence Level and Emergency Department Utilization in Pediatric Patients

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Background The Maternal Confidence Questionnaire (MCQ) is a validated scale that assesses a mother's confidence in taking care of her infant. The relationship between maternal confidence and Emergency Department (ED) visits has not been investigated. The aim of this study was to determine if maternal confidence affects pediatric ED utilization in the first year of life.

Objective

Design/Methods This retrospective cohort study looked at MCQ responses from the Inova Translational Medicine Institute (ITMI) Longitudinal Childhood Genome Study (N=2429, response rate=85%) and ED visits for these patients across all Inova hospitals from January 2012 to July 2017 for full-term children ≤ twelve months of age at the time of visit. Children with prematurity and chronic medical conditions were excluded. Other data including race/ethnicity, maternal age, education, parity, and insurance type were evaluated against Emergency Severity Index (ESI) acuity levels and ED frequency. Multivariable stepwise regression was used to determine predictors for ED visits.

Results Of the 2429 participants in the ITMI study, there were 1413 who visited the ED, of which 1029 patients were excluded leaving 384 patients. Medicaid status was found to be the best predictor for any ED visit (OR=7.647, CI=5.680 to 10.296). Low maternal confidence did not correlate with frequent ED visits (r = -0.14) or lower acuity visits (r = -0.03). Higher maternal confidence scores were seen in Hispanic/Latino mothers (OR=1.867, CI=1.174 to 2.970) and mothers with parity > 1 (OR=1.298, CI=1.000 to 1.684). Among mothers who brought their child to the ED, Hispanic/Latino mothers were more likely to have Medicaid (OR=45.276, CI=24.616 to 83.278) and more likely to seek the ED (OR=2.582, CI=1.669 to 3.996) but there was no difference in ESI acuity level compared to non-Hispanic mothers. Mothers with any college education had lower maternal confidence scores (OR=0.484, CI=0.260 to 0.902), were less likely to visit the ED (OR=0.402, CI=0.251 to 0.645) but did have higher acuity level visits (OR=2.146, CI=1.346 to 3.423).

Conclusion(s) Low maternal confidence did not correlate with frequent ED visits or lower acuity visits. Medicaid status was the main predictor for any ED visit. Hispanic/Latino mothers had higher maternal confidence scores, were more likely to have Medicaid and more likely to bring their child to the ED.

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The "GUT Check": A novel approach using point of care ultrasound to confirm pediatric gastrostomy tube reinsertion.

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Background Children with a gastrostomy tube (g-tube) often require replacement in the emergency department. Following g-tube reinsertion, there are variable methods of confirming proper position. Data show that contrast studies prolong length of stay and may expose children to unnecessary ionizing radiation. Furthermore, confirmation by gastric content aspiration only reflects the position of the distal tip, and does not confirm proper placement of the inflated balloon within the stomach.
Objective We aim to use point of care ultrasound (POCUS) to confirm placement following g-tube reinsertion.
Design/Methods This was a prospective, descriptive study at a tertiary pediatric hospital using a proposed protocol, "GUT Check", for g-tube evaluation following reinsertion. Patients were recruited from the pediatric emergency department (PED) and pediatric surgical clinic. Our "GUT Check" protocol has three elements: G) identification of the gastric line, U) identification of the g-tube balloon under the gastric line, indicating its position within the stomach, and T) evaluation of fluid infusion through the g-tube into the stomach cavity using color Doppler. When all three criteria are met, we considered g-tube placement confirmed. All ultrasound studies were reviewed for image quality and completion of the "GUT Check" protocol by two pediatric emergency sonologists. Further, we compared our method of confirmation with standard techniques such as gastric content aspiration or contrast study. Last, all patients were followed for one month post-replacement.
Results We enrolled 16 patients with an average age of 4.1 years and an average g-tube age of 20.8 months. Ten patients presented with g-tube dislodgement, 3 with g-tube leakage and 3 for routine postoperative g-tube care. Following replacement, 12 had gastric content aspiration and 4 had contrast studies performed which all confirmed correct position. Upon review of ultrasound images, all 3 POCUS markers were successfully obtained in 13/16 patients following g-tube replacement. One study was technically limited, and the reviewers disagreed on the interpretation of the remaining two studies. On follow up, only one patient returned to the ED for g-tube related issues.
Conclusion(s) The "GUT Check" offers a dynamic evaluation of g-tube location and function within the gastric cavity. With further investigation, this protocol offers a promising modality to confirm g-tube position by using 3 distinct point of care markers.

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Utility of Alvarado Score to Predict Outcome of Appendicitis in Pediatrics

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Background Appendectomies (AP) are the most common inpatient surgical procedure in children and adolescents aged 3 to 18 years. In the past decade, the management of acute appendicitis (AA) has changed from an emergent to urgent surgical procedure. AP are performed during daytime hours within 24 hours of presentation to emergency department (ED). Studies have shown that delays of 12 to 24 hours after initial evaluation in the ED are not associated with increased risk of perforation, increased length of stay (LOS) or intraabdominal abscess. Alvarado score (AS), a ten point clinical scoring system, has been used to identify AA. There are no studies in pediatric patients using AS to predict outcome of emergent and urgent AP in a community hospital.
Objective To determine if urgent AP is appropriate for patients <18 years and to determine if AS is predictive of outcome.
Design/Methods Retrospective chart review of children aged 3-18 years with diagnosis of AA seen in Flushing Hospital Medical Center Pediatric ED. Demographic data included age, gender, and ethnicity. AS, ED to operating room (OR) time, LOS, perforation rates, post-operative
(post-op) complications and readmission rates were determined. ED to OR time of 12 hours was arbitrarily set for this study. Data were analyzed using Graphpad and t test, $p<0.05$ was considered significant.
Results Among 230 patients with AA, 104 (45%) perforated and scheduled for interval appendectomy. Of remaining 126, 60.3% were male, 75.8% Hispanic, mean age 11.5 years. Mean LOS for ED to OR< 12 hours was 2.73 days compared to ED to OR >12 hours of 3.5 days, p=0.01. AS 0-7 and 8-10 were compared for mean LOS, perforation rate, post-op complications and readmission rates (Table 1).
Conclusion(s) ED to OR >12 hours was associated with longer LOS. Higher AS had significantly longer LOS and higher perforation rates. Higher AS did not have a statistically significant effect on post-op complications and readmission rates. AS is a useful tool in Pediatric ED to affect rates of perforated AA.

Table 1

Alvarado score	0-7 n=55(%)	8-10 n=71(%)	p-value
Mean LOS (days)	2.44	3.65	0.0017
Perforation rate	4 (7.27)	16 (22.74)	0.0262
Post-op complications	3 (5.45)	11 (15.49)	0.0915
Readmission rate	3 (5.45)	6 (8.45)	0.7303

$p<0.05$ was significant

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Lysosomal Enzyme Activities Does Not Predict Development of Necrotizing Enterocolitis

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Background Necrotizing enterocolitis (NEC) is a devastating disease affecting newborn premature infants. The pathogenesis of NEC is complex and its development insidious, ultimately leading to intestinal inflammation, ischemia and cell death. Specific diagnostic biomarkers to predict and/or confirm the development of NEC are desired. In pre-clinical (Dimmitt,R.A. 2003) and small, single center clinical studies (Chen,D.M. 2011; Benkoe,T.M. 2015; Gomez-Chaparro Moreno,J.L. 2016), lysosomal enzymes localized primarily in the gut were significantly higher in the NEC group as compared to controls, when assessed at induction or confirmation of NEC. Whether lysosomal enzymes are significantly elevated before, and with the development of NEC has not been tested in large multi-center studies.

Objective To determine if plasma lysosomal enzyme activities of β-glucosidase (ABG), α-glucosidase (GAA), galactocerebrosidase (GALC) and/or acid sphingomyelinase (ASM) are significantly higher before and after the development of NEC (Modified Bell's ≥Stage 2) when compared to matched controls.

Design/Methods In this case control study, preterm infants born between 24-0/7 to 27-6/7, weeks of gestation enrolled in the Preterm Erythropoietin Neuroprotection Trial (PENUT Trial, ClinicalTrials.gov identifier NCT01378273) who developed NEC—but no other significant morbidities—were matched by gestational age, sex, study site and allocation group in a 1:2 ratio with controls without any morbidities. Lysosomal enzyme activities were determined on blood samples scheduled on day 0, 7, 9 and 14 of life. Mean enzyme activities on the sample drawn on the day closest to, and that immediately following the development of NEC were compared between cases and controls.

Results In 17 NEC and 34 controls, the time between enzyme measurement and developing NEC ranged from 1-6d and 1-4d after the development of NEC. The plasma activities of the four lysosomal enzyme activities did not differ between cases and controls in the days preceding the development of NEC (Table). After the development of NEC, GAA was significantly higher in controls when compared to cases; all other comparisons were not significant.

Conclusion(s) In this large multi-center study, prospectively measured plasma lysosomal enzyme activities were not significantly higher in the days leading up to and following the development of NEC. These findings suggest that lysosomal enzyme activities are not predictive or diagnostic biomarkers for NEC. (Supported by NINDS U01 NS077953)

Mean (SEM) lysosomal enzyme activities (μmol/L/h) in NEC cases versus controls

	NEC (N=17)	Control (N=34)	p-value
β-glucosidase (ABG)			
Pre-NEC	4.8 (1.5)	2.9 (0.5)	0.153
Post-NEC	5.0 (1.9)	4.3 (0.8)	0.723
α-glucosidase (GAA)			
Pre-NEC	1.47 (0.37)	1.61 (0.31)	0.781
Post-NEC	0.87 (0.26)	2.29 (0.52)	0.013*
Galactocerebrosidase (GALC)			
Pre-NEC	0.56 (0.10)	0.63 (0.08)	0.573
Post-NEC	0.40 (0.08)	0.63 (0.09)	0.071
Acid sphingomyelinase (ASM)			
Pre-NEC	26.1 (3.2)	22.1 (2.6)	0.344
Post-NEC	34.6 (6.2)	28.5 (4.6)	0.432

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Multicenter Database of Transfusion Related Acute Gut Injury (TRAGI) from an Online Registry: www.tragiregistry.com: Consensus and Collaboration

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Background TRAGI is documented in multiple reports where proposed etiologic factors include: extreme prematurity, permissive anemia, feeding during transfusion, disrupted angiogenesis, blood storage lesions & dysregulated immunologic barrier defense (reviewed in Sem Perinatol 36(4):294, 2012; NeoReviews. 2015; 16(7): e420-e430). All reports are retrospective & limited by small numbers of affected neonates at one center. Users' Groups at prior PAS meetings concluded that a multicenter database was needed to better characterize TRAGI & to help foster a clinical trial targeted at prevention.

Objective To improve an online database: i) to capture data from a diverse group of institutions with different clinical practices to help identify common features of TRAGI & ii) to identify clinicians interested in a future multicenter trial.

Design/Methods We asked neonatologists to submit cases they encountered. TRAGI is defined as the development of NEC Stage IIb <48h after a PRBC transfusion.

Results TRAGI cases reported on www.tragiregistry.com

Since the registry's debut in Oct 2011, HIPAA-compliant, de-identified demographic & clinical data was collected from TRAGI patients from 13 institutions. As we & others previously reported, TRAGI cases were generally characterized by prematurity, anemia & a curious centering of disease around 31-32 weeks PCA. The role of EBM & NPO status during transfusion did not appear related to the pathogenesis of TRAGI.

Conclusion(s) This online database is allowing clinicians using different clinical strategies to compare their experiences which continue to show consistency in case presentation. We speculate that: 1) the consistent pattern of affected cases will contribute to hypotheses formation & 2) clinicians are willing to self-identify as participants in a future, prospective, multicenter trial of disease prevention.

TRAGI cases reported on www.tragiregistry.com

Mean SEM (Median, Minimum-Maximum)	TRAGI N=54
Birth weight (grams)	1014 ± 59 (899, 554-2215)
Gestational age (weeks)	27 ± 0 (27, 23-35)
Age at onset of NEC (days)	27 ± 2 (26, 3-72)
Postconceptual age at onset of NEC (weeks)	31 ± 0 (31, 25-38)
Full feeds at onset of NEC	80%
Hematocrit before NEC	29 ± 1 (28, 20-41)
Made NPO for transfusion	45%
Hrs after PRBCs to 1st signs of NEC	19 ± 3 (16, 2-48)
Majority of feeds EBM prior to onset of NEC	52%
Interested in a future trial	98%

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Evaluation of Effect of Different Flush volumes after Epinephrine dose in Neonatal model of Asphyxial Arrest.

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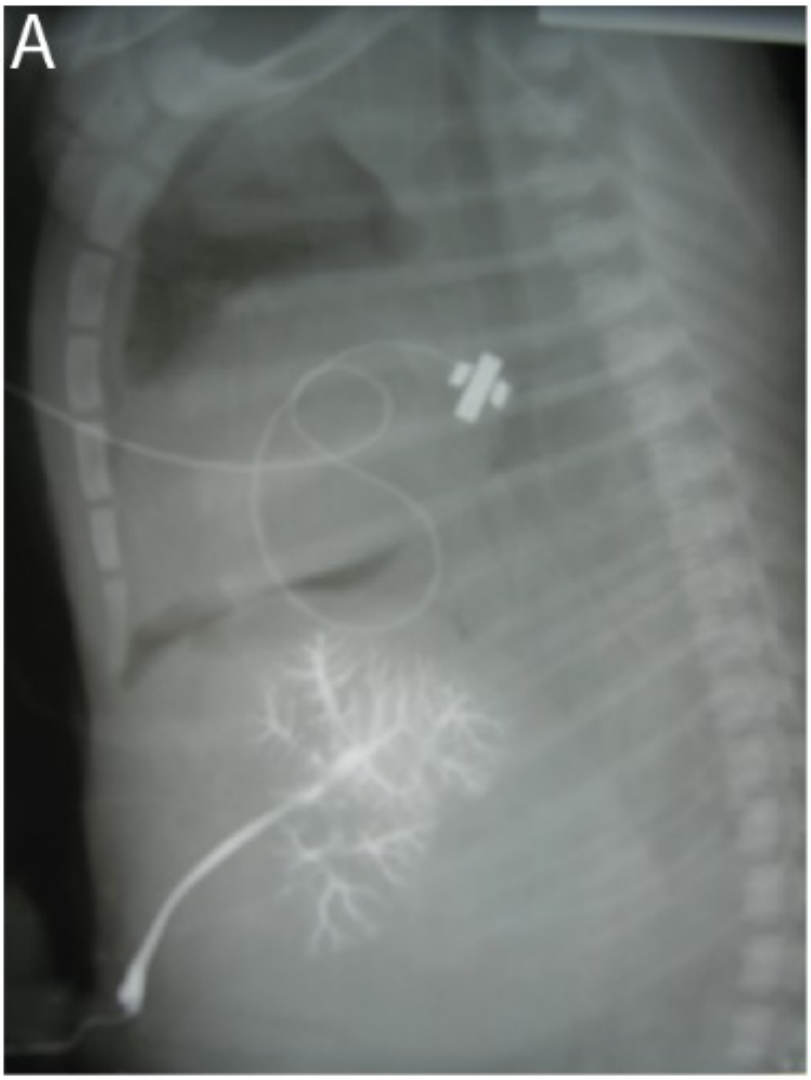
Background Current NRP guidelines recommend administration of 0.5-1ml flush following epinephrine via low umbilical venous (UV) catheter. It is not known if this flush volume is adequate to propel epinephrine from the umbilical vein to the right atrium and general circulation during chest compressions. Administration of a higher volume flush may increase UV pressure and flow, and maintain patency of the ductus venosus and propel epinephrine towards the right atrium (figure 1).

Objective We hypothesized that administration of a higher flush volume (3ml/kg) following epinephrine dose would result in higher peak plasma epinephrine levels and more frequent and rapid return of spontaneous circulation (ROSC).
Design/Methods Asystole was induced by umbilical cord occlusion in 12 lambs. Resuscitation was initiated following 5 minutes of asystole. After 5 min of resuscitation as per NRP guidelines, lambs without ROSC received 0.03 mg/kg of epinephrine through low UVC. Following epinephrine, lambs were randomized to receive standard flush (1ml saline= low flush) (figure 1A) or high-volume flush (3ml/kg) (figure 1B). Repeated doses of epinephrine followed by 1 ml flush were administered every 3 minutes if ROSC was not achieved. Hemodynamics, blood gases and plasma epinephrine levels were monitored.
Results Out of 12 lambs with asphyxial arrest, 6 lambs had ROSC prior to epinephrine administration. The remaining 6 lambs received epinephrine:2/3 lambs in the low flush group and 3/3 lambs in the high flush group achieved ROSC. 1/3 (33%) lambs had ROSC with 1st dose of epinephrine in low flush group compared to 3/3(100%) in high flush group (table 1). Higher carotid artery blood flow and mean blood pressure were achieved with high flush group compared to low flush group (figure 2) (table 2). The low flush and high flush groups achieved comparable peak plasma epinephrine concentration by 1 minute (450±189 ng/ml versus 744±323 ng/ml).
Conclusion(s) Higher flush volume following similar dose of epinephrine via low UVC resulted in higher incidence of ROSC compared to lower flush volume. With higher flush volume, more lambs were able to achieve ROSC with 1st dose of epinephrine with significantly higher carotid artery blood flow and mean blood pressures.

A. Epinephrine followed by 1 ml contrast (Omnipaque) flush + 30 sec of chest compressions



B. Epinephrine followed by 10 ml

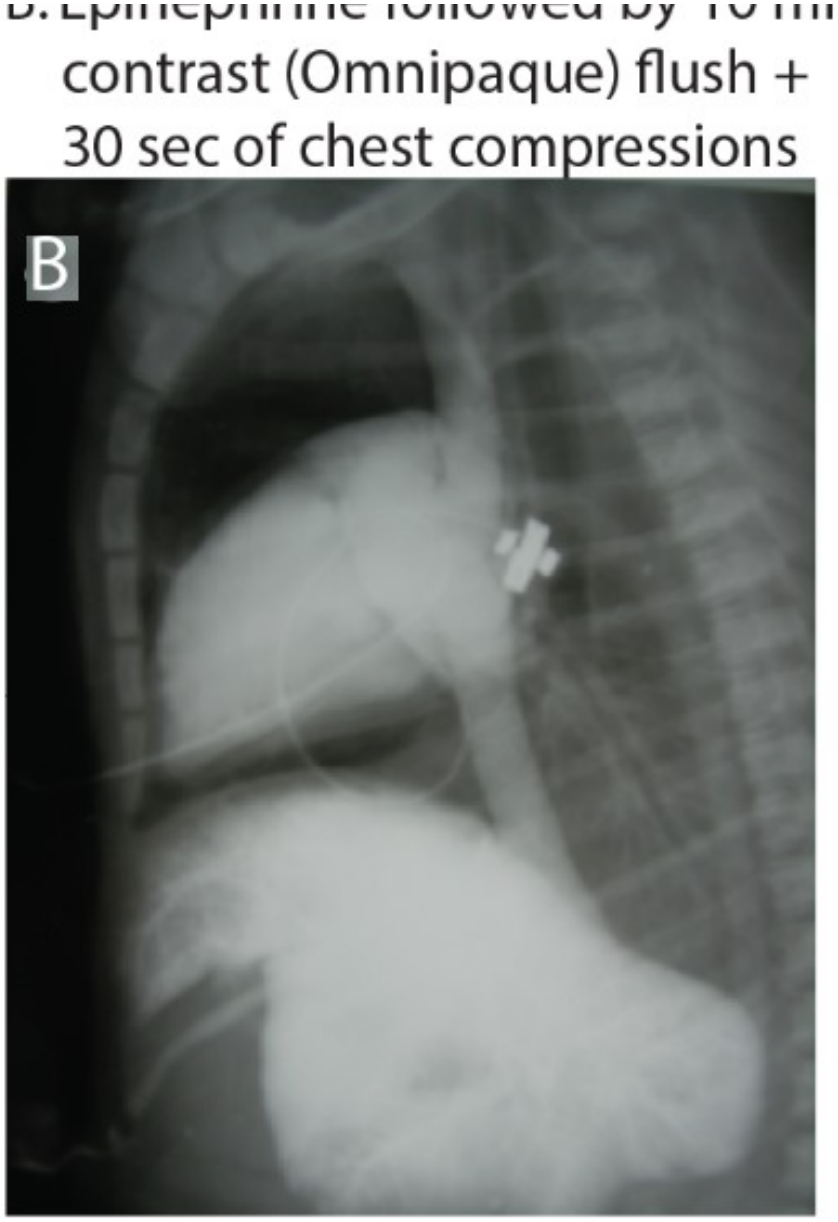


Figure 1:Flush volume and distribution of epinephrine in term lambs in cardiac arrest with chest comprtessions. Injection of epinephrine was followed by a flush of 1cc (A) or 10cc (B) of Omnipaque contrast solution through low UVC. Chest compressions provided for 30 seconds and X-ray chest and abdomen lateral view was obtained. 1cc flush remained in the portal venous system in spite of chest compressions.

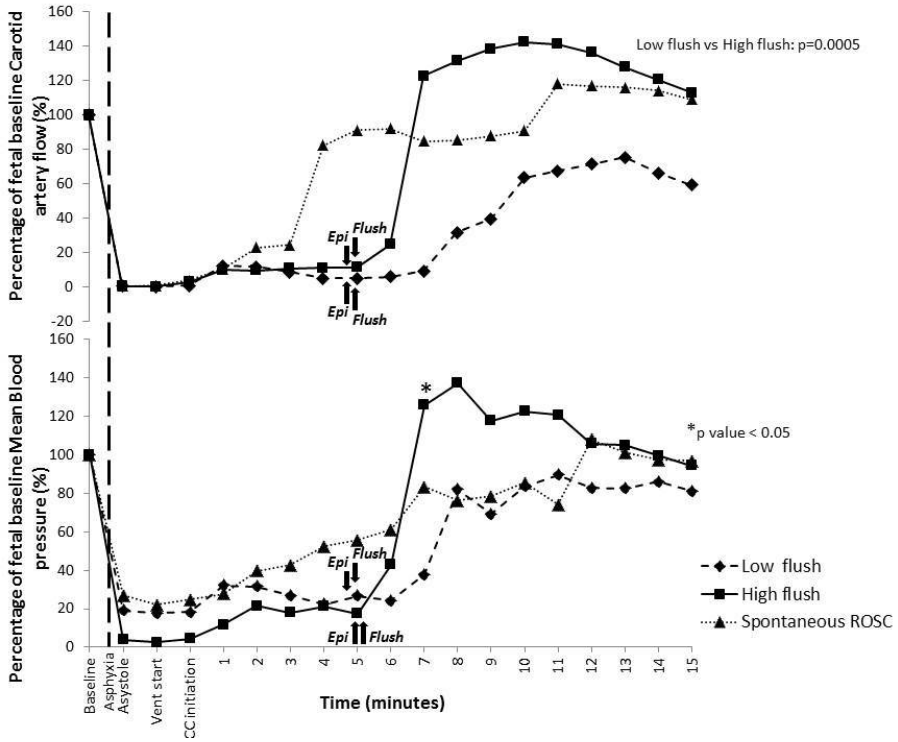


Figure 2: Percentage of fetal baseline Carotid artery blood flow and Mean blood pressure plotted against time, comparing lambs with Low flush, High flush and Spontaneous ROSC (ROSC prior to epinephrine dose).
Vent start: Time of start of ventilation= Time 0
CC initiation: Time of initiation of chest compressions
Epi: Timing of epinephrine dose
Flush: Timing of flush.

Table 1: Baseline Characteristics, Arterial Blood Gas Analysis, and Timing and Incidence of ROSC in the 2 Study Groups

Parameter	Low flush (1ml)	High flush (3ml/Kg)
Weight (Kg)	3.78 (1.6)	3.96 (0.01)
Sex	2 females,1 male	2 males,1 female
Baseline pH	6.85 (0.03)	6.84 (0.12)
Baseline pCO2 (mmHg)	139 (14)	137 (25)
Baseline pO2 (mmHg)	4 (2)	10 (4)
Baseline Lactate (mg/dl)	10 (1.4)	11 (3.6)
ROSC achieved n (%)	2 (67%)	3 (100%)
Time to ROSC from start of ventilation (minutes)	8 (2.82)	6.27 (0.63)
Number of Epi doses	1 dose (n=1) 2 doses (n=1) 4 doses (n=1, no ROSC)	1 dose (n=3)
ROSC with 1st dose of Epi (%)	1 (33%)	3 (100%)
Timing of 1st dose of Epi (minutes)	5.33 (0.57)	5.39 (0.53)
Median time (interquartile range) to ROSC from time of Epi & flush (seconds)	48 (42-54)	40 (35-50)

Data represented as Mean (Standard deviation) unless otherwise specified. ROSC: Return of spontaneous circulation and Epi: Epinephrine

Table 2: Comparison of Hemodynamic parameters during resuscitation between Low flush & High flush groups, just before and after Epinephrine dose with Flush.

Parameter	Low flush		High flush	
	Before epi & flush	After epi & flush	Before epi & flush	After epi & flush
Systolic BP (mmHg)	24.38 (8.7)	33.50 (17.9)	29.09 (10.5)	49 *(15.1)
Diastolic BP (mmHg)	9.32 (0.58)	15.28 (3.42)	5.55 (16)	18.22 *(13)
Mean BP (mmHg)	16.64 (2.6)	23.32 (10.3)	11.31 (13)	27.53 *(10.7)
Carotid artery blood flow (ml/kg/min)	1.32 (0.69)	5.91 (6.22)	3.66 †(1.18)	13.77 *(2.49)
Pulmonary artery blood flow (ml/kg/min)	0.63 (0.41)	14.65 (22.1)	1.16 (1.43)	29.45 *(1.81)
Ductus arteriosus blood flow (ml/kg/min) Right to left	3.32 (10.6)	-33.59 (39.7)	-1.66 (1.66)	-73.77 (64.5)

† $p < 0.05$ comparing low flush and high flush and * $p < 0.05$ comparing before and after epinephrine dose with flush. Data represented as Mean (Standard deviation); epi: Epinephrine; BP: Blood pressure.

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Continued Improvements in Neonatal Resuscitation in the Delivery Room Using Video Recording.

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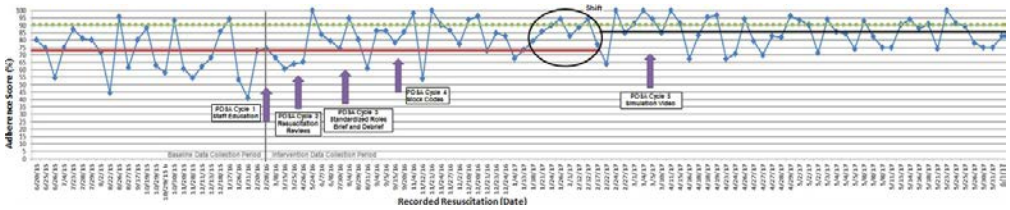
Background The Neonatal Resuscitation Protocol (NRP) guidelines are the standard of care for neonatal resuscitation. Adherence to NRP can be challenging due to limited experience of practitioners, high-stress environment when a neonate is distressed, poor communication amongst team members, and decline in skills over time. Video recording and video evaluation tools have demonstrated efficacy in improving resuscitation outcomes. Video recording and a modified version of the Neonatal Resuscitation Assessment (NRA) were used to assess NRP compliance in the delivery room (DR) at our institution, a level 3 perinatal center with around 6500 deliveries per year. We found that median baseline adherence to NRP was 73 out of 100%.

Objective Improve adherence to NRP guidelines from 73% to 90% by July 2017.

Design/Methods Actual, non-simulated DR resuscitations were recorded from 3/15-7/17. The modified NRA tool was used to determine NRP adherence. Baseline data were collected from 3/15-2/16, and results were used to develop several PDSA cycles for improvement. Five improvement phases included targeted staff education for specific NRP skills with low adherence (2/16), monthly resuscitation reviews for NICU staff to view and debrief recorded resuscitations (3/16-ongoing), introduction of formalized briefing, debriefing and standardized roles and responsibilities (7/16-ongoing), initiating in-situ unannounced mock codes (9/16-ongoing), and distributing a recorded simulation video highlighting effective communication and teamwork (3/17).

Results 36 resuscitations were assessed during the baseline period and 115 resuscitations were assessed during the intervention period. Adherence to NRP guidelines improved from 73% to 86%, with a shift of 8 data points above the baseline median noted in 2/2017. This has been sustained through 7/2017. PDSA cycles as well as data collection and analysis are ongoing.

Conclusion(s) Clinical teams that perform neonatal resuscitations are formed ad hoc and must respond to situations that cannot be recreated in a mock code or simulation lab. The use of video recording in the DR was successful in identifying areas for improvement. Development of targeted interventions to improve adherence to NRP is ongoing. Future PDSA cycles will include dedicated training for pediatric residents and OB nursing staff. The infrastructure developed for obtaining and assessing data from real-life video recorded resuscitations will facilitate a method to accurately assess the success of ongoing and future PDSA cycles.



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Abstract: 140

Norepinephrine - An Alternative Vasopressor to Dopamine for Management of Systemic Hypotension in a Preterm Model

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Background Approximately, 20-40% of extremely preterm babies are diagnosed with hypotension (Seri, 2006). Hypotension is treated with fluid bolus, vasopressors and hydrocortisone in the immediate postnatal period. Dopamine (Dop) is most commonly used in infants with hypotension and hypoxemia, amidst concerns for raising pulmonary, coronary vascular resistance, pulmonary/systemic arterial pressure (Tourneux 2008, Lakshminrusimha 2008). Previously we have shown that norepinephrine (NE) may be a more selective vasoconstrictor with less effect of pulmonary vasculature based on in vitro studies (Chandrasekharan, 2013). However, the in vivo effects of escalating doses of NE and Dop have not been studied.

Objective To evaluate the pulmonary and systemic vascular hemodynamics following administration of escalating doses of Dop and NE in a preterm lamb model with systemic hypotension.

Design/Methods Preterm lambs with systemic hypotension (mean blood pressure (MBP) < 35mm Hg, < 5th percentile) were randomized to receive Dop or NE. After a fluid bolus if the MBP remained <35 mmHg, vasopressor infusion was started. Dop was started at 5mcg/kg/min and titrated in increments of 5mcg/kg/min upto a maximum dose of 20mcg/kg/min. NE was initiated at a dose of 0.5mcg/kg/min and titrated with increments of 0.5mcg/kg/min upto a maximum dose of 2 mcg/kg/min. Changes in mean systemic blood pressure (MBP), mean pulmonary arterial (MPA) pressure, carotid artery blood flow (CAF) and pulmonary artery blood flow (PBF) were monitored.

Results The characteristics of the preterm lambs are shown in table 1 and were similar prior to vasopressor administration. Dop significantly increased the MPA at 10, 15 and 20 mcg/kg/min compared to the MBP (Figure 1A & 1B). NE increased MBP and MPA, with a gradient between them until the maximum dose (Figure 2A & 2B). Dop significantly increased the pulmonary/systemic pressure ratio (MPA/MBP) at 5 and 10 mcg/kg/min and decreased the PBF at higher concentrations (Figure 1D & 1C). NE decreased MPA/MBP ratio and increased PBF (Figure 2D & 2C).

Conclusion(s) Dopamine administration can increase pulmonary arterial pressure more than systemic pressure which may decompensate a hypotensive preterm infant. NE may cause pulmonary vasodilation along with systemic vasoconstriction and may be beneficial in preterm infants with pulmonary hypertension. Clinical trials evaluating the benefits and risks of dopamine and norepinephrine infusion at escalating doses in preterm babies with hypotension is required.

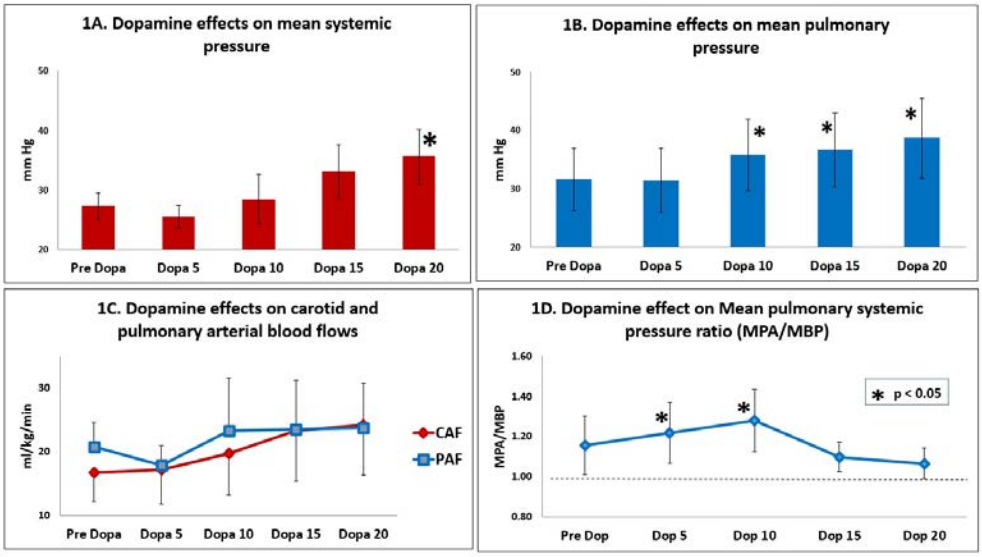

Figure 1: Dopamine effects on systemic and pulmonary vascular hemodynamics

1A: Dopamine increased the Mean Systemic Blood pressure on escalating doses and was statistically significant at 20mcg/kg/min when compared to predopamine MBP.

1B: Dopamine increased the Mean Pulmonary artery pressure significantly at 10, 15 and 20mcg/kg/min when compared to

predopamine MPA.
1C: Dopamine consistently increased the Carotid artery blood flow on escalating doses, when compared to Pulmonary artery blood flow, which plateaued at 10, 15 and 20 mcg/kg/min.
1D: Mean Pulmonary Systemic Pressure Ratio (MPA/MBP) was always higher than 1.0 on dopamine infusion and was statistically significant at 5 and 10 mcg/kg/min showing elevated pulmonary vascular resistance.

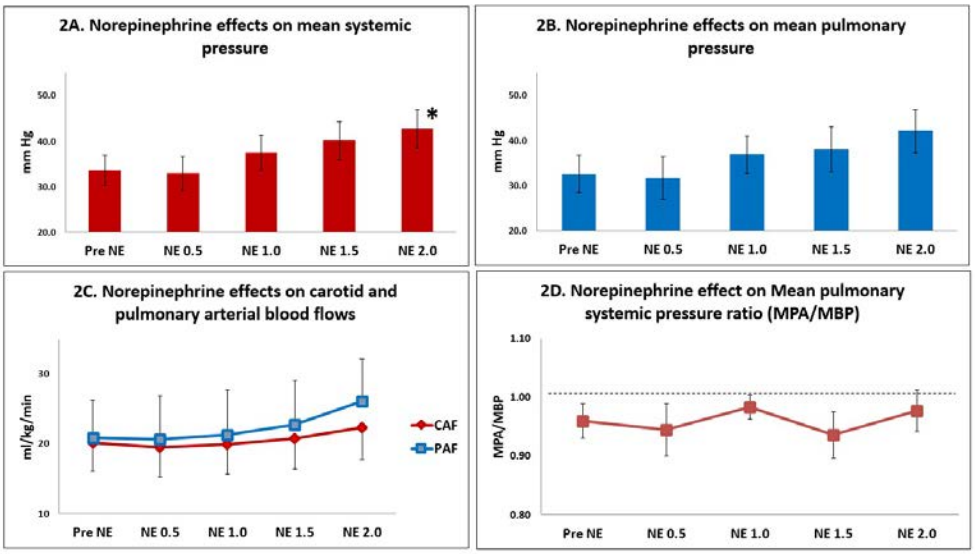

Figure 2: Norepinephrine effects on systemic and pulmonary vascular hemodynamics
2A: NE increased the Mean Systemic Blood pressure on escalating doses and was statistically significant at 20mcg/kg/min when compared to pre NE MBP.
2B: No significant increase in Mean Pulmonary artery pressure was demonstrated on escalating doses of NE
2C: NE consistently increased both the pulmonary and carotid artery blood flow on escalating doses.
2D: Mean Pulmonary Systemic Pressure Ratio (MPA/MBP) was always lower than 1.0 on escalating doses of NE infusion signifying decreased pulmonary vascular resistance.

Characteristic of Dopamine and Norepinephrine group prior to vasopressor administration

PARAMETERS	Dopamine Group (n = 6)	Norepinephrine Group (n=7)	p value
Gestation age (days)	126.8 ± 0.4	127	0.3
Birth weight (kg)	2.6 ± 0.6	2.9 ± 0.5	0.5
Gender (Female - %)	5 (83.3)	5 (71.4)	0.61
Mean Pulmonary Arterial Pressure: Pre-Vasopressor (mm Hg)	31.6 ± 11.9	32.5 ± 10.1	0.89
Mean Systemic Arterial Pressure: Pre-Vasopressor (mmHg)	29.5 ± 7.3	31.1 ± 9.6	0.74
Left Carotid Arterial Blood Flow: Pre-Vasopressor (ml/kg/min)	16.7 ± 11	20.1 ± 10.7	0.58
Left Pulmonary Arterial Blood Flow: Pre-Vasopressor (ml/kg/min)	20.7 ± 9.4	20.8 ± 14.7	0.94

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Abstract: 141
Asystolic cardiac arrest- Resuscitation with an intact cord is associated with low pulmonary blood flow
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Background Delayed cord clamping (DCC) improves hemodynamics during resuscitation of near term asphyxiated lambs without asystole. We have previously shown that in asystolic lambs, DCC improves post return of spontaneous circulation (ROSC) diastolic (DBP) and mean blood pressures (MBP) (Davidson, PAS 2017). However there is no information on hemodynamics during resuscitation with an intact cord in a model of cardiac arrest.

Objective To compare systemic and pulmonary hemodynamics during asphyxial cardiac arrest with DCC and early cord clamping (ECC)

Design/Methods 13 near term lambs at 141 d gestation were partially exteriorized and instrumented in utero with right carotid and jugular venous lines and left carotid (CA), left pulmonary (PA) and ductal flow probes. After a period of stability, cardiac arrest was induced by umbilical cord occlusion. Lambs were randomized into DCC (n=7: cord clamped after 120s) and ECC (n=6: cord clamped within 30 sec). After 5 min of asystole, resuscitation was initiated according to NRP guidelines. We evaluated the lambs in arrest from delivery over the 120 seconds of resuscitation (with intact cord in DCC group and clamped and cut cord in ECC). Hemodynamic parameters were continuously collected and analyzed between the 2 groups.

Results Baseline characteristics of the groups are shown in Table 1. There were no differences in systemic hemodynamic parameters (systolic, diastolic or mean BP and CA flow) between the groups (table 2, Fig). Mean PA flow as well as minimum ductal blood flow signifying extent of left to right flow was higher in the ECC group (Fig). There were no significant changes in end tidal CO2 or blood gas parameters of pCO2 or pO2 between the 2 groups in the 2 min period.

Conclusion(s) During resuscitation with an intact cord, the low-resistance placental circuit is part of the circulation. In spite of the presence of this low resistance circuit, systemic BP and CA flow were not lower in DCC lambs compared to ECC lambs. In sharp contrast, resuscitation with an intact cord may enhance right to left flow through the ductus arteriosus and reduce antegrade pulmonary blood flow. Further clinical trials are necessary to evaluate delayed cord clamping during resuscitation of infants with cardiac arrest.

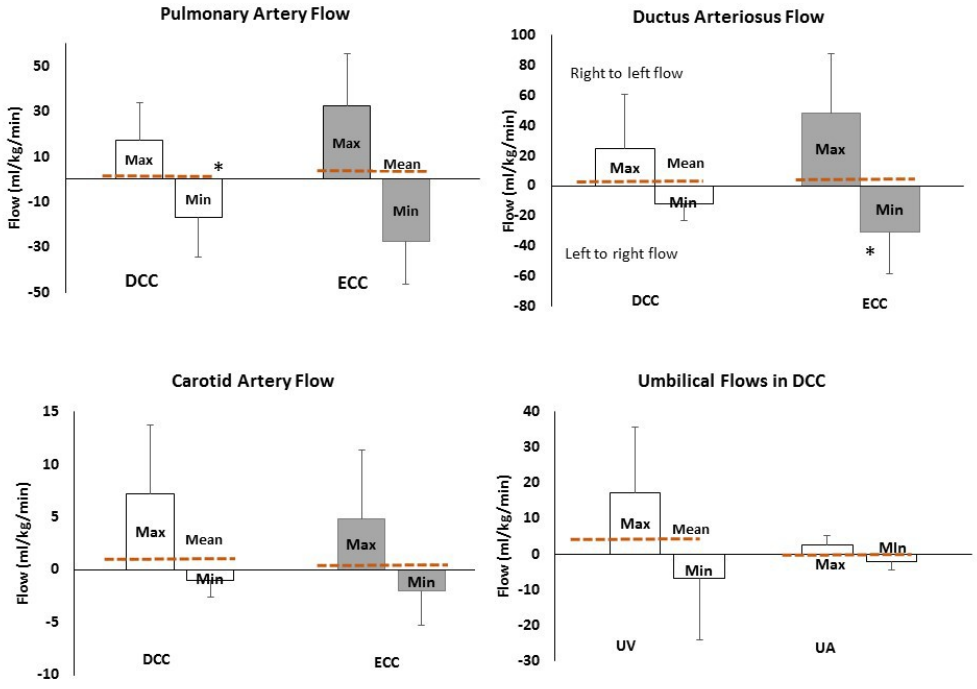

Table 1: Baseline Characteristics

	DCC (N=7)	ECC (N=6)
Weight (kg)	4.39 ± 0.5	3.34 ± 1*
Heart Rate (bpm)	229 ± 31	176 ± 31*
Systolic BP (mmHg)	53± 16	47 ± 13
Multiples (Twin/Triplet)	3/7 (43%)	5/6 (83%)
PA Mean Flow (ml/kg/min)	1.8 ± 2.3	0.47 ± 38.8
Carotid Mean Flow(ml/kg/min)	21.3 ± 12.5	22 ± 11.8
Ductal Mean Flow (ml/kg/min)	82.56 ± 120.6	109 ± 43
UV Mean Flow (ml/kg/min)	27 ± 54.2	21.3 ± 9.3

pH	7.08 ± 0.1	7.09 ± 0.2
pCO2 (mmHg)	80.1 ± 10.6	80.7 ± 30.7
Lactate mmol/L	10.7 ± 3.1	8.2 ± 4.4

Table 2: Blood pressure

	DCC (n=7)	ECC (n=6)
Systolic Blood Pressure (mm Hg)	31±10	26±6
Diastolic Blood Pressure (mm Hg)	11±7	7±11
Mean Blood Pressure (mm Hg)	21±6	16±8

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Abstract: 142

Carbon Dioxide Clearance: Enhancement using Pulsed High Flow Nasal Cannula in a Premature Infant Lung Model

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Background High frequency airway oscillations such as produced in non-invasive therapies such as nasal HFOV and bubble CPAP have been shown to improve gas exchange in sick infants. It has been postulated that superimposing oscillations on the supply flow of a humidified high flow nasal cannula (HFNC) system may further enhance the improved CO_2 washout previously demonstrated and attributed to the effective reduction in nasopharyngeal dead space to potentially lessen the level of respiratory support.
Objective To compare CO_2 clearance in a premature infant lung model using HFNC supplied with pulsed vs. a standard, non-pulsed, flow source.
Design/Methods A premature infant lung simulator consisting of a 40ml silicone bellows having a compliance of 0.5 or 1.0 ml/cmH_2O was connected to a 3D-printed replica of an upper airway from a 28wk premature infant having airway resistance of 22 cmH_2O/(L/s); total model resistance was 73 cmH_2O/(L/s) and total instrumented dead space was 3.5 ml. The model lung was placed in a rigid chamber connected to a computer controlled piston to simulate spontaneous breathing at a constant tidal volume of 6.0 ml. A Fisher&Paykel Optiflow^{TM} premature (2.8mm OD) nasal cannula was used with prongs fixed at 1/2 nares diameter. Pulsing was achieved by passing the HFNC supply flow through a 3-way solenoid valve operating at 10 Hz for a 50% on-off duty cycle. 100% CO_2 was continuously injected into the bellows at a constant rate of 9.0 ml/min. After End-Tidal CO_2 ($ETCO_2$) equilibration using non-pulsed supply flow the solenoid valve was switched to pulsing mode and $ETCO_2$ was allowed to equilibrate again. $ETCO_2$ was measured at HFNC flows of 2,3,4,5,6,7,8 L/min and repeated at a respiratory rate (RR) of 40 and 60 br/min for both model lung compliances.
Results $ETCO_2$ (in %CO_2) as a function of both non-pulsed and pulsed HFNC set flows is shown in Figure 1 for 40 br/min and in Figure 2 for 60 br/min and for the 0.5 and 1.0 ml/cmH_2O compliance lungs (left and right panels). Also shown on each set of bars are the $ETCO_2$ percent changes from non-pulsed to pulsed mode at each flow level. Pulsed HFNC CO_2 clearance progressively improved relative to non-pulsed HFNC as the set flow increased from 2 to 8 L/min (p =0.004) for all combinations of RR and compliance level.
Conclusion(s) Pulsed HFNC as compared to non-pulsed was associated with significantly improved CO_2 clearance across the respiratory rates and compliances evaluated in this in-vitro premature lung model of mild and moderately sever lung disease.

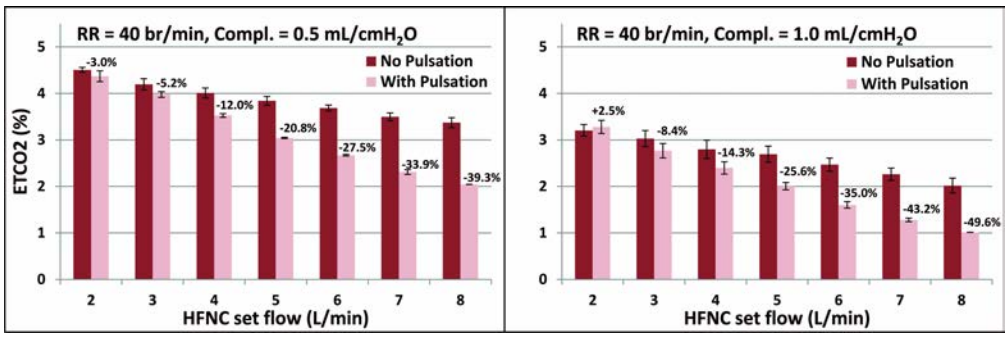

Figure 1. $ETCO_2$ for Pulsed vs. non-Pulsed HFNC at 2 to 8 L/min. Simulated breathing at 40 Breaths/min. Model Compliance = 0.5 cmH_2O (Left) and 1.0 cmH_2O (Right).

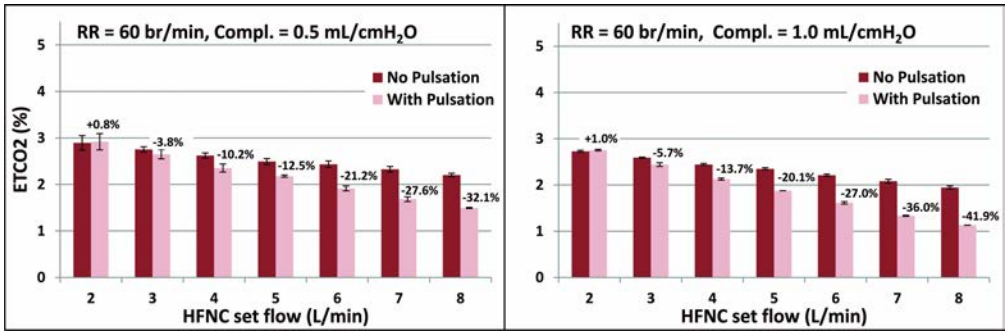

Figure 2. $ETCO_2$ for Pulsed vs. non-Pulsed HFNC at 2 to 8 L/min. Simulated breathing at 60 Breaths/min. Model Compliance = 0.5 cmH_2O (Left) and 1.0 cmH_2O (Right).

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Abstract: 143

Partial Liquid Ventilation with Perfluorooctylbromide Highlights Heterogeneous Ventilation Patterns in Severe Bronchopulmonary Dysplasia

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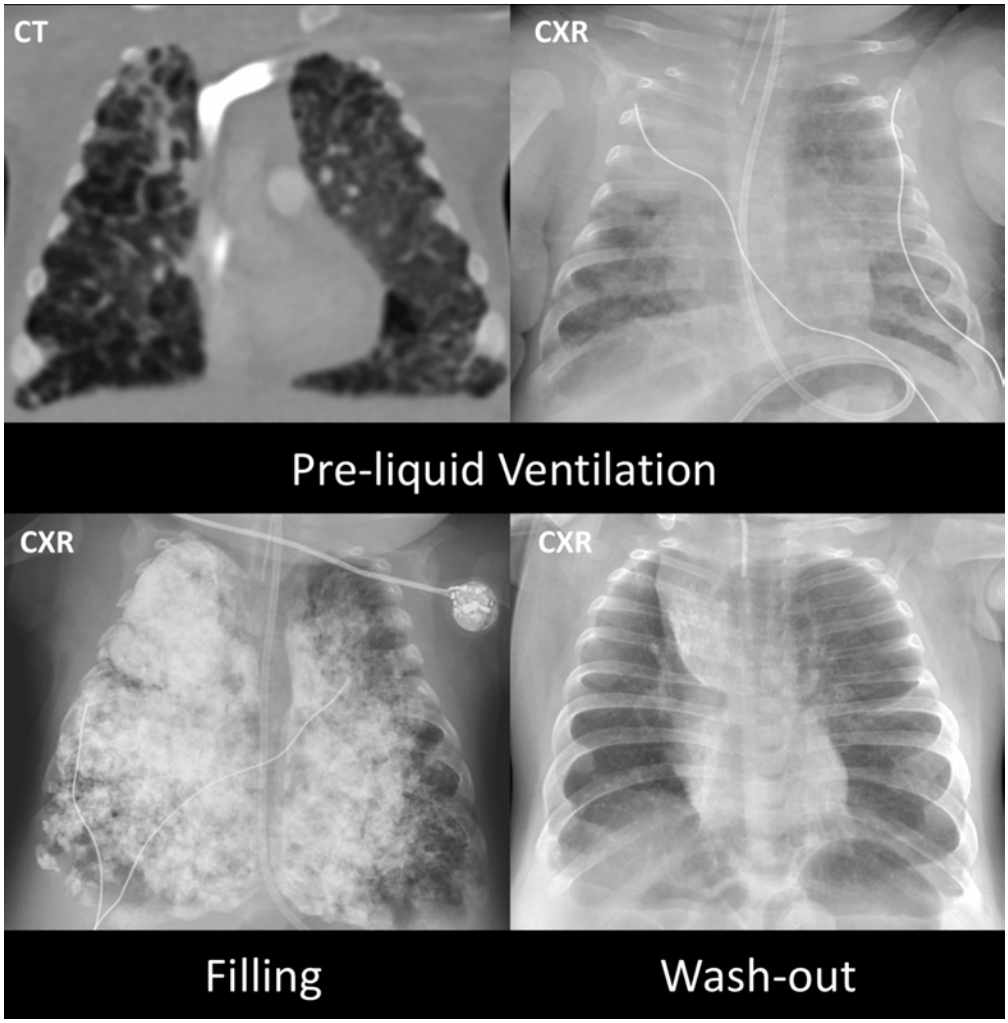
Background Despite substantial research efforts and successes with noninvasive ventilation, severe bronchopulmonary dysplasia (sBPD) remains a significant challenge for neonatologists, and the ventilation patterns in sBPD are poorly understood. Partial liquid ventilation (PLV) is being reexamined as a method to minimize surface tension, enhance alveolar recruitment and reduce inflammation. As a radiopaque agent, PLV may provide insights into ventilation in sBPD on radiographs.

Objective To ascertain differences in apparent ventilation patterns in infants with sBPD.

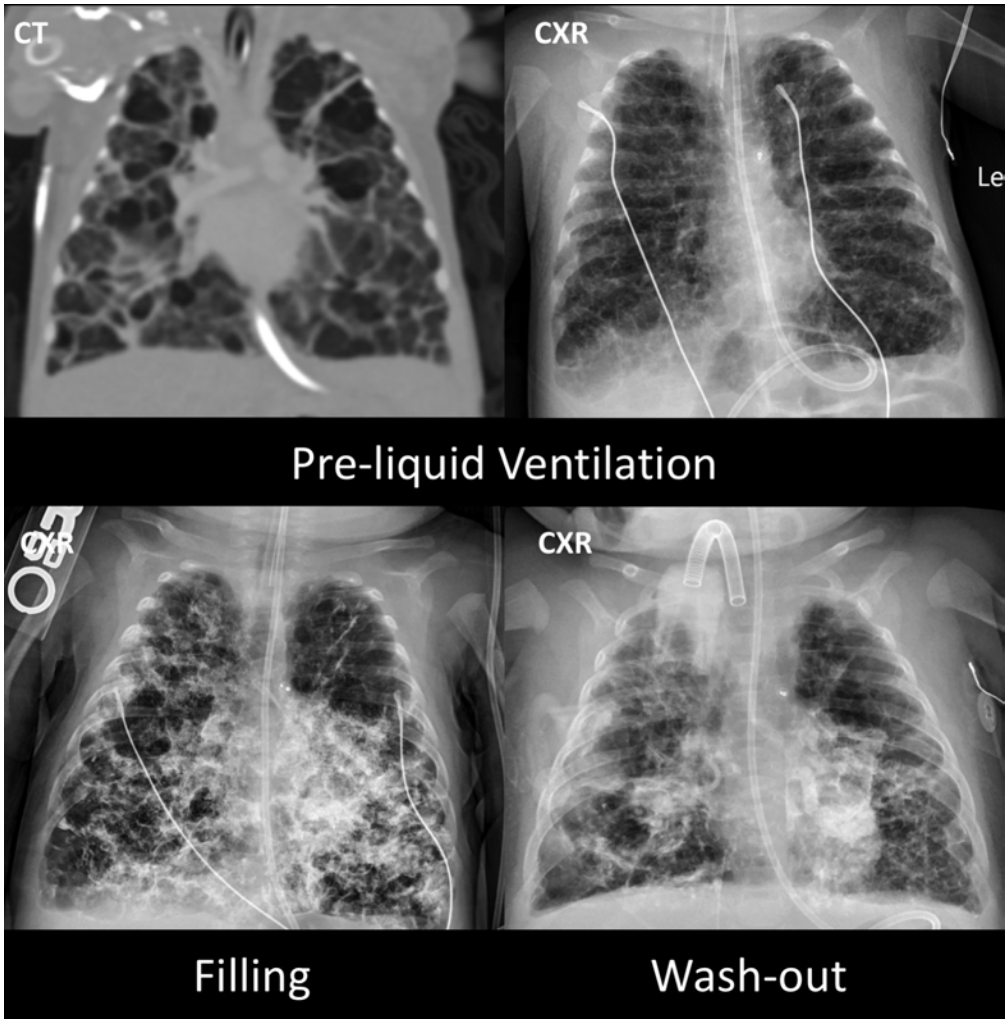
Design/Methods We examined preterm infants with sBPD enrolled in the Fluid Filled Lung Oxygenation Assistance Trial (FFLOAT) of perfluorooctylbromide (PFOB). Post PLV radiographs were compared to pre-study radiographs and CT examinations in this pilot observational study.

Results Images from 3 infants with sBPD requiring mechanical ventilation from birth until the time of PLV at 43-49 weeks postmenstrual gestational age were examined. Heterogeneous opacification on serial radiographs with PLV filling suggested irregular ventilation patterns not specifically predicted on radiographs or CT examinations prior to PLV. PFOB initially preferentially filled the central perihilar regions. At maximal filling, peripheral lung segments opacified late or not at all with poor filling of peripheral dilated airspaces. Atelectatic lung segments demonstrated delayed filling with prolonged retention of liquid ventilation material following discontinuation of PLV (Figure 1). In one patient (Figure 2), there was no filling of hyper-aerated left upper lobe and subsequent examination by flexible bronchoscopy demonstrated severe narrowing of the left upper bronchus.

Conclusion(s) This early descriptive work examining the imaging evaluation of sBPD infants prior to and following liquid ventilation offers unique insight into ventilation patterns. A general pattern of decreased filling corresponding to peripheral dilated airspaces seen on pre-liquid ventilation CT was noted, which may suggest impaired alveolization with simplified alveolar structures peripherally. However, filling patterns were heterogeneous and did not specifically match aerated segments seen on prior conventional chest radiographs and CT. Our findings highlight the severely uneven ventilation patterns in patients with sBPD and may provide new insights on ventilation strategies in these infants.



Comparison of post PLV chest radiograph (lower panel) to pre-study CT (left upper) and chest radiograph (right upper) in one patient. Irregular filling pattern was seen with peripheral lung segments opacified late or not at all at maximum filling (left lower). Atelectatic lung segments demonstrated delayed filling with prolonged retention of PFOB following discontinuation of PLV (right lower).



Comparison of post PLV chest radiograph (lower panel) to pre-study CT (left upper) and chest radiograph (right upper) in another patient demonstrating no filling of PFOB at the dilated left upper lobe at maximum filling (left lower) and retention of PFOB in certain lung fields one month post the study (right lower).

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Abstract: 144

Duration of tracheostomy and ventilation support in infants with severe Bronchopulmonary Dysplasia

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Background With the advances in NICU care, many preterm infants are now surviving but some with severe bronchopulmonary dysplasia (sBPD). These infants may require prolonged ventilator support via tracheotomy. The optimum timing of tracheostomy placement and the duration of mechanical ventilation and tracheostomy needed are largely unknown in this patient population. However, this information is important when counseling parents about tracheostomy.

Objective To provide data regarding duration of tracheostomy and ventilation support in a cohort of infants with sBPD requiring long-term ventilation.

Design/Methods Retrospective cohort study of preterm infants born at < 32 weeks gestational age or <1500g birth weight with sBPD who survived to NICU discharge and underwent tracheostomy placement between 2011-2015 to enable chronic ventilator support. Data on infant characteristics including birth weight and gestational age, age at the time of tracheostomy placement, duration of NICU stay, respiratory support at the time of NICU discharge, 1yr and 2yr corrected age, and duration of tracheostomy placement were analyzed.

Results A total of 80 infants were included in this study. Tracheostomy placement occured at a median age of 176 days and 52 weeks postmenstrual age. Infants spent a median of 266 days in the NICU before they were transferred to a transitional unit or a chronic care facility. Median time from tracheostomy to decannulation was 2.8 years (table 1). All patients tolerated tracheostomy placement without significant complications. Till the time of this report, there were no death post NICU discharge in the infants with follow up information (n=71) . The most common tracheostomy related complications were wound infections and granuloma formation. The

majority of patients (80%) were on full ventilator support at the time of NICU discharge. However, by 2 years corrected age, most patients were off intermittent mandatory ventilation with more than half off any respiratory support (table 2).
Conclusion(s) Infants with sBPD requiring tracheostomy have prolonged initial NICU stay and ventilator support. However, they are able to gradually wean toward off support over a two-year period post discharge, although they may need longer time to be decannulated. Data from this study is useful when counseling parents for tracheostomy placement in infants with sBPD. Optimum timing of tracheostomy placement need to be further studied.

Table 1. Patient demographics, time of tracheostomy, NICU discharge and decannulation

Gestational age at birth, week	26 (25,27)
Birth weight, grams	680 (580,810)
Male	46 (58)
Race, % Black White Other	. 37.5 34.7 27.8
Chronological age at tracheostomy, days	176 (142, 210)
Postmenstrual age at tracheostomy, week	52 (46, 55)
Postmenstrual age at NICU discharge, week	65 (57, 71)
Length of NICU stay, days	266 (218, 312)
Corrected age at decannulation, year	3.0 (2.4, 3.9)
Time from tracheostomy to decannulation, year	2.8 (2.1, 3.7)

Data presented as median (Q1, Q3) unless noted otherwise.

Table 2. Respiratory support at various time points

	Non-invasive support n (%)	Full vent support n (%)	Tracheostomy CPAP or CPAP/PS n (%)	Tracheostomy no support n (%)	Decannulated n (%)
At 36 week PMA n=80	31(38.7%)	49(61.3%)	-	-	-
NICU discharge n=80	-	65 (81.3%)	14(17.5%)	1 (1.2%)	0
At 1-year CA n=74*	-	40 (54.0%)	27(36.5%)	7 (9.5%)	0
At 2-year CA n=57**	-	7(12.3%)	19 (33.3%)	27 (47.4%)	4 (7.0%)

* 6 patients were lost to follow up at 1 year CA. ** 9 patients were lost to follow up at 2 year CA and 14 have not reached 2 year CA yet.

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Abstract: 145
Impact of Antenatal Steroids on Neonatal Respiratory Morbidities in Late Preterm Infants
Sheryl Purrier[1], Sean Bailey[1], Sourabh Verma[1], Ashley S. Roman[2], pradeep n. mally[1]
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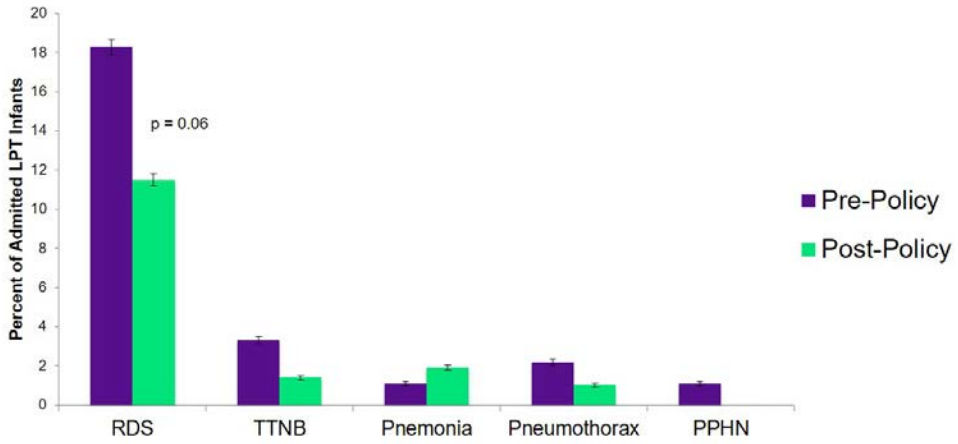
Background Current evidence indicates that late preterm (LPT) infants, those born between 34 0/7 and 36 6/7 weeks gestation, are at greater risk than term infants for neonatal respiratory related morbidity and mortality. Recently an American College of Obstetricians and Gynecologists committee recommended antenatal steroid administration for women at risk of LPT delivery. Based on this The NYU Langone Health obstetric team instituted a policy in June 2016 to administer steroids to mothers at 34 weeks GA, who have a high probability of delivering a LPT infant.

Objective To determine the impact of instituting a new policy to administer antenatal steroids to women at risk for delivering between 34 0/7 and 36 6/7 weeks on A) Neonatal intensive Care Unit admission rates, B) the incidence of respiratory morbidities, and C) the need for respiratory support in this LPT population.

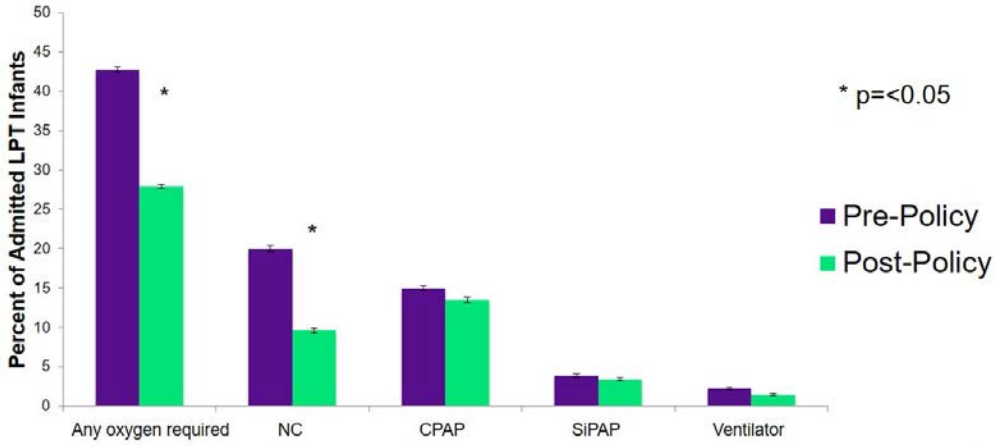
Design/Methods We conducted a retrospective chart review analyzing LPT infant outcomes during two time periods: a year period beginning June 2015 (pre-policy) and a one year period beginning in June 2016 (post- policy). We included all singleton LPT infants born at NYU Langone Health. We excluded any LPT infant who had a maternal history of receiving antenatal steroids at <34 weeks of GA, had a maternal history of incomplete steroid course, were born of a multiple gestation pregnancy, were born with a congenital anomaly, or who were diagnosed with a genetic syndrome. The Students t-test and Chi-square test were used for analysis.

Results There were 12,068 births during the study period, of which 626 were LPT births, 388 infants met inclusion criteria, 180 in the pre-policy group and 208 in the post-policy group. The difference between the baseline characteristics between groups were a higher rate of C-section births and a lower mean birth weight in the pre-policy group compared to the post-policy group subjects (See Table 1). We found a significant decrease in LPT NICU admission rates in the post-policy group (44.2% vs 54.4%, $p<0.05$). There was also a trend towards decreased respiratory morbidities, such as respiratory distress syndrome, in the post-policy group (See Figure 1). Overall, there was significantly less oxygen support required in the post-policy group (See Figure 2).

Conclusion(s) Implementing an obstetric policy to administer antennal steroids to mothers at LPT delivery appears to potentially have a positive impact on the need for LT infants to require NICU level care after birth.



Respiratory morbidities



Respiratory support requirements.

Study Population Demographics

	Pre-Policy (n=180)	Post-Policy (n=208)	p-value
MATERNAL ETHNICITY			
White	59%(106)	60% (125)	ns
Hispanic	2% (3)	0% (0)	ns
Black	4% (8)	8% (16)	ns
Asian	10% (18)	14% (29)	ns
Other/Unidentified	25% (45)	18% (38)	ns
DELIVERY MODE			
Cesarean	37% (66)	27% (56)	0.04
Induction	31% (55)	34% (70)	ns
REASON FOR CESAREAN/INDUCTION			
Previous Cesarean	13% (24)	12% (25)	ns
Preelampsia	7% (13)	5% (10)	ns
Breech	7% (12)	2% (5)	ns
PROM	8% (15)	9% (18)	ns
Hypertension	4% (7)	2% (4)	ns
GESTATIONAL AGE			
34 weeks	33% (32)	28% (26)	ns
35 weeks	21% (38)	23% (48)	ns
36 weeks	61% (110)	64% (134)	ns
Birth Weight (g)	2579 (+/- 409)	2687 (+/- 429)	0.01
5 min Apgar (median)	9	9	ns
Male	55% (99)	62% (129)	ns
Female	45% (81)	38% (79)	ns

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Abstract: 146

Association of Hedgehog Interacting Protein Gene Variants with Susceptibility of BPD and PDA in ELBW infants

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Background Genome-wide association studies in adults for lung function have identified single nucleotide polymorphisms (SNPs) in chromosome 4 with Hedgehog Interacting Protein (HHIP) gene as a key regulator of Hedgehog signaling pathway. Loss of HHIP function in animal models lead to lethality at birth due to impairment of lung branching morphogenesis and hypoplastic lungs. HHIP is known to inhibit sonic hedgehog (SHH) signaling by ligand sequestration and SHH-mediated repression of FGF10. Therefore, low HHIP levels result in reduced FGF10 levels and lung hypoplasia. Our prior study showed no significant association of FGF10 gene polymorphism with BPD. HHIP would be a candidate gene for BPD, since BPD is associated with altered growth in small airways, which worsens with stimuli including volutrauma, barotrauma, and reactive oxygen species. In addition, there may be a role in PDA susceptibility as SHH promotes smooth muscle differentiation by induction of myocardin and smooth muscle actin. Eight different HHIP SNPs were tested based on their association with COPD and asthma.

Objective To determine HHIP gene polymorphisms associated with susceptibilty to BPD and PDA in ELBW infants

Design/Methods DNA from buccal swabs of ELBW infants, with informed parental consent, was isolated and subjected to allelic discrimination by RT-PCR. PDA was diagnosed by echo between day 3-5. BPD was defined as oxygen dependence at 36 weeks PMA. Student's t test and chi-square test were used. Logistic regression analyses were performed to test the association between each SNP with BPD/PDA . Hardy–Weinberg equilibrium testing was performed. P-value of < 0.05 was statistically significant.

Results Demographic characteristics did not differ among the study groups except birth weight (835±132 vs 715±153 gm) and

gestational age (GA) (26 vs 25wk) were less in babies with BPD (Table I). Among the eight SNPs tested, rs13147758 was found to be associated with BPD and rs1512288 was associated with PDA (Table II). After logistic regression analyses, rs1512288 is associated with PDA when adjusted for GA.

Conclusion(s) HHIP snps are associated with susceptibility of PDA and BPD in ELBW infants, with rs1512288 being independently associated with PDA. We speculate that smooth muscle differentiation orchestrated through SHH signaling in the HHIP pathway may interfere with closure of the ductus arteriosus and, that this impaired signaling will repress FGF10, leading to impaired lung growth and hypoplasia, resulting in BPD.

Table II: Genotype Comparison of Study Groups with and without PDA and BPD

HHIP SNP Genotype %	rs1355601 (p=0.81)		rs923783 (p=0.11)		rs949567 (p=0.20)		rs923782 (p=0.59)		rs1828591 (p=0.34)		rs131477588 (p=0.87)		rs1542725 (p=0.52)		rs1512288 (p=0.006)*	
	PDA	No PDA	PDA	No PDA	PDA	No PDA	PDA	No PDA	PDA	No PDA	PDA	No PDA	PDA	No PDA	PDA	No PDA
WT	46.5	40.6	19.2	33.3	23.7	39.2	43.2	38.3	33.8	27.5	41.5	45.6	48.5	38.4	42.8	54.2
HZ	36.2	37.5	49.1	25.9	64.4	57.1	40.5	36.9	40.8	55	44.5	42.1	45.5	50	45.2	17.1
Minor Allele	17.2	21.8	31.5	40.7	11.8	3.5	16.2	24.3	25.3	17.5	13.8	12.2	5.8	11.5	11.9	28.5
Any Minor Allele	53.4	59.3	80.7	66.6	76.2	60.7	56.7	61.6	66.1	72.5	58.4	54.3	51.4	61.5	57.1	45.7
	rs1355601 (p=0.41)		rs923783 (p=0.57)		rs949567 (p=0.91)		rs923782 (p=0.83)		rs1828591 (p=0.70)		rs131477588 (p=0.02)*		rs1542725 (p=0.11)		rs1512288 (p=0.12)	
	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD
WT	43.7	41.0	39.5	32.3	29.1	27.7	42.1	40.9	33.3	31.2	51.0	41.9	46.6	42.4	50	38.7
HZ	41.6	33.3	35.4	47.0	62.5	61.1	35.9	40.9	48.3	43.7	43.4	38.7	50	42.4	34.7	30.1
Minor Allele	14.5	25.6	25	20.5	8.3	11.1	21.8	18.1	18.3	25	5.4	19.3	3.3	15.1	15.2	30.1
Any Minor Allele	56.2	58.9	60.4	67.6	70.8	72.2	57.8	59.0	66.6	68.7	48.9	58.0	53.3	57.5	49.9	61.2

p value <0.05* WT- Wild Type HZ- Heterzygous

Table I: Demographic distribution of Study Groups

	No BPD	BPD	p value
Gestational Age (GA) Median (25%, 75%)	26 (25, 27) weeks	25 (24, 26) weeks	0.0003*
Birth Weight Mean ± SD grams	835 ± 132 grams	715±153 grams	0.0001*
Female Gender %	43	56	0.37
Race %			0.46
Caucasian	32	22	
Black	29	36	

Hispanic	35	36	
Others	3	5	

p value <0.05*

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Abstract: 147

Effects of Early Caffeine Therapy on Invasive Ventilation and Weight Gain in Very Preterm Infants

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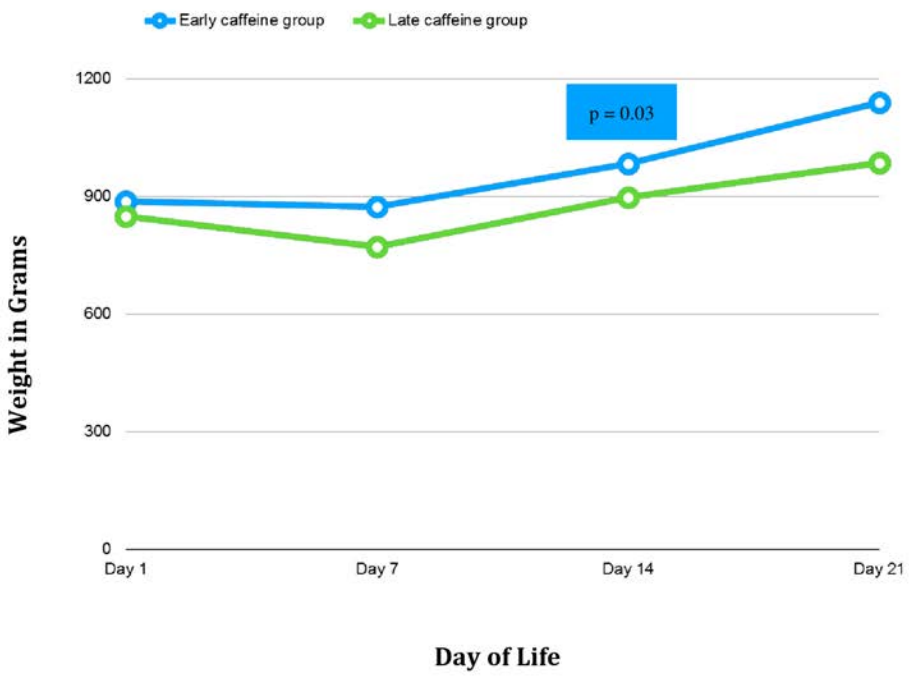
Background In very preterm infants, early caffeine use is associated with a reduction in bronchopulmonary dysplasia and patent ductus arteriosus.Schmidt et al reported that premature infants have poor weight gain for the first 3 weeks after initiating caffeine therapy due to its diuretic action. No later studies have analysed the practical impact of this adverse effect.
Objective To determine the effect of early caffeine therapy on duration of invasive ventilation and weight gain in the first 3 weeks of life in very preterm infants born at a community hospital in Brooklyn, NY.
Design/Methods A retrospective cohort study was conducted including preterm infants born at < 31 weeks gestation admitted to our NICU between June 2013 and June 2016. Infants were divided into 2 groups based on the timing of caffeine initiation: less than the first 48 hours after birth (early) and 48 or more hours after birth (late). Infants with major congenital anomalies and those who died within 72 hours of birth were excluded. The outcome were extubation to room air or noninvasive respiratory support measured as days of life and weight change in grams at the end of 3rd week compared to birth weight. Independent t-test and multivariate analysis of variance (MANOVA) were used for analysis.
Results Thirty-nine (84.6%) out of 46 infants born < 31 weeks gestation with a birth weight < 1250 grams and started on invasive ventilation within 6 hrs of birth were included in the study. Of the 39 infants, 22 received the first dose of caffeine in < 48 hours of birth and 17 received it >/= 48 hours. Subjects in both groups were comparable except for gestational age, which was controlled during the analysis (table 1). All infants included in the study had planned extubation. Infants who received early caffeine had a shorter duration of invasive ventilation with a mean of 8 days vs.16 days (p= 0.1). Even though the difference wasn't statistically significant, there was a trend towards early extubation in early caffeine group. The effect size was significant (Cohen's d = 0.5). On comparing the weight at 3 weeks of age between the two groups, the early caffeine group had a significantly better weight gain with a mean weight at 3 weeks being 1140 grams vs 985 grams (p=0.03) (graph1).
Conclusion(s) In very preterm infants who received early caffeine therapy, there was a trend towards shorter duration of invasive ventilation. Early caffeine use was associated with better weight gain in the initial 3 weeks of life.



Graph 1.

Table 1. Characteristics of Preterm infants included in the study

Variable	Early caffeine group No, (%) N = 22 (56)	Late caffeine group No.(%) N = 17 (43)	p value
Gestational age (weeks)			0.021
< 25	4 (18.2)	2 (11.8)	
25 - 28	11 (50)	15 (88.2)	
29 - 31	7 (31.8)	0 (0)	
Birth Weight - median in grams (min - max)	887 (555 - 1219)	850 (567 - 1185)	0.550
Sex			0.789

Male	12 (54.5)	10 (58.8)	
Female	10 (45.5)	7 (41.2)	
Race			0.574
African- American	18 (81.81)	14 (82.3)	
Hispanic	1 (4.5)	1 (5.9)	
White	2 (9.09)	1 (5.6)	
other	1 (4.5)	0 (0)	
Dose of caffeine (mg/kg/day)			0.451
Continued at 5	10 (45.5)	12 (70.6)	
Increased to 6	7 (31.8)	3 (17.6)	
Increased to 7	4 (18.2)	2 (11.8)	
Increased to 8	1 (4.5)	0 (0)	

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Abstract: 148

Handoff Quality after Adapting I-PASS to the Neonatal Intensive Care Unit (NICU)

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Background The I-PASS Handoff Program demonstrated a reduction in medical errors and improved handoff process. Our group adapted I-PASS by modifying the educational curriculum for the NICU (NICU I-PASS). While I-PASS implementation has shown significant improvements in the inclusion of key elements of the mnemonic in pediatric verbal and written handoffs, data on NICU handoff quality is lacking.

Objective To study the quality of verbal and written handoffs by assessing adherence to the I-PASS mnemonic after implementation of NICU I-PASS.

Design/Methods Medical providers in an academic level IV NICU, including residents, fellows, NNPs and PAs, were trained on NICU I-PASS curriculum. Random observations of verbal and written handoffs, by a member of the study team, were done 1-3 times per month for 10-month period to assess 5 key elements; I-PASS study group handoff evaluation tools were used. Random sampling in 1 week blocks was done 4 times to assess 2 of the key elements. The NICU I-PASS study team consisted of 3 neonatal fellows and 2 neonatologists.

Results Three hundred sixteen written and verbal patient handoffs were evaluated during 15 handoff sessions. In verbal handoffs, patient summary and action plan were always included 88% and 91% of the time. Illness severity, situation awareness/contingency planning and synthesis were always and usually included 86%, 95% and 70%, respectively (Figure 1). In written handoffs, illness severity and patient summary were included 97% of the time. Action plan and situation awareness/contingency plan were always and usually included 97% and 94% of the time (Figure 2). Block sampling included 553 written patient handoffs. Illness severity was accurately labeled 99.8% of the time and the number of watcher/unstable patients with situation awareness/contingency plans was 94%.

Conclusion(s) Implementation of NICU I-PASS led to remarkable adherence to 4 of the 5 mnemonic components in verbal and written handoffs. Block sampling of written handoffs demonstrated excellent accuracy of illness severity and situation awareness/contingency plans for high-risk infants. Synthesis was the most challenging, however, observer feedback and refresher sessions may improve adherence to this vital element. This study demonstrates that fidelity to the I-PASS mnemonic can be achieved with adaptation to the NICU in order to improve the quality of neonatal handoffs. We speculate that NICU I-PASS will promote widespread, high quality, standardized handoffs to ultimately improve the safety and quality of neonatal care.

Figure 1.

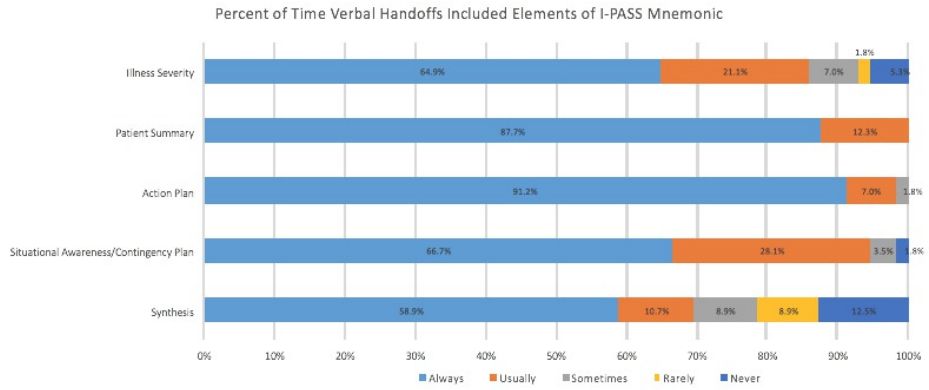
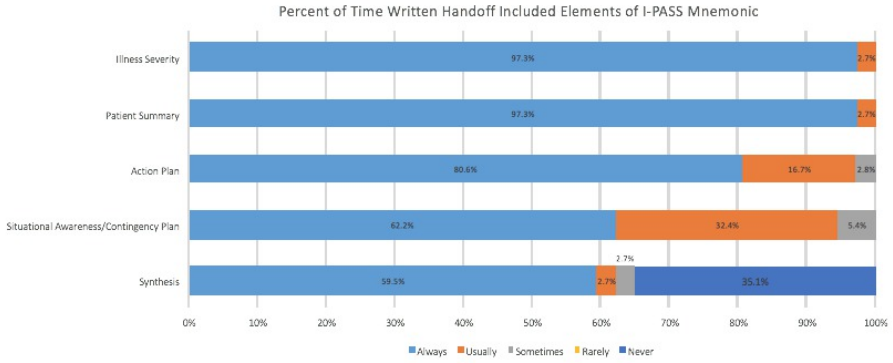


Figure 2.



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Abstract: 149

Decreasing Extrauterine Growth Restriction (EUGR) in Very Low Birth Weight (VLBW) Infants After Implementation of a Nutritional Protocol

Joseph A. Asaro[1], Ruth Snyder[2], Christin Aikey[2], Ian Griffin[2], Aimee Herdt[3], Marta R. Rogido[2]

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Background The occurrence of EUGR in VLBW infants has been associated with significant neurodevelopmental impairment. Even though EUGR is common in this population, it could be ameliorated with a standardized nutritional protocol. Several studies have confirmed the strong influence of nutritional practices on growth, especially on weight gain. However, nutrition must support not only weight but also brain and linear growth.

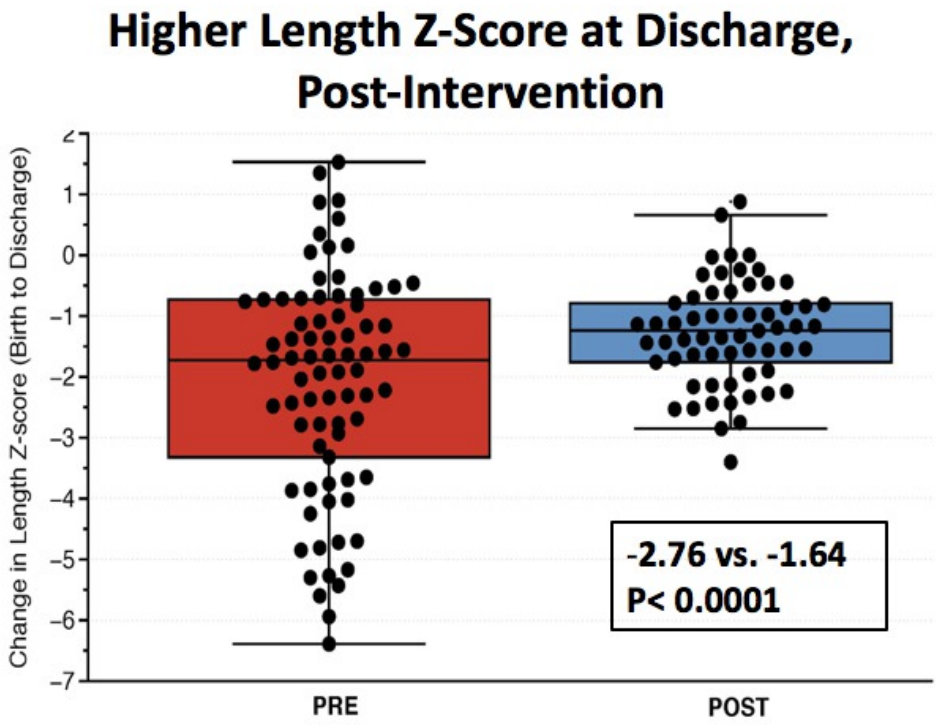
Objective The purpose of our study was to evaluate the effect of a new protocol focused on higher protein and energy intake on the postnatal growth of VLBW infants.

Design/Methods In 2015, we implemented new evidence-based nutritional guidelines for VLBW infants, focusing on improving protein intake. We prospectively collected demographic, nutritional, and growth data for infants born in the 12 months before and after the changes in practice who survived to discharge. Anthropometric data were converted to gender and age-specific z-scores using the 2013 Fenton dataset. A decrease in z-score from birth to discharge of 1-2 was defined as mild-moderate EUGR, and a decrease in z-score of >2 was defined as severe EUGR. The effects of the intervention on the change in weight (Wt), length (L), and head circumference (HC) z-score between birth and discharge, and in the incidence of severe Wt, L, or HC EUGR were examined by linear and logistic modeling respectively, correcting for gender, ethnicity, birth z-scores, gestational age, and length of stay.

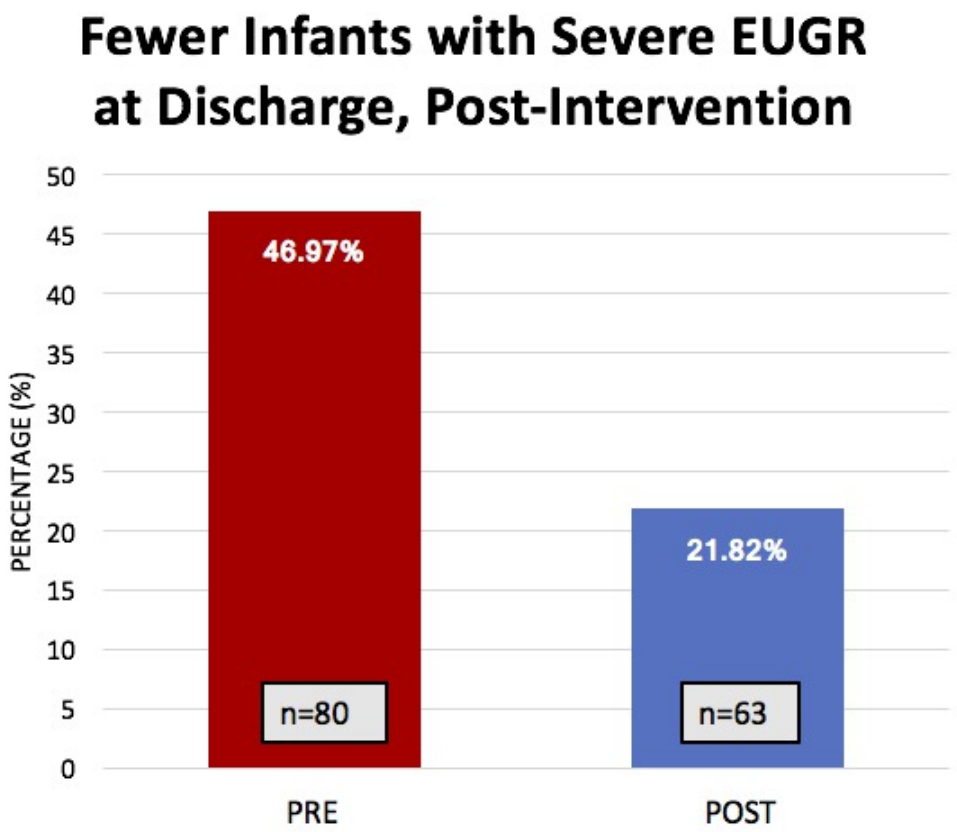
Results We included 143 VLBW infants: 80 infants before and 63 after the new guidelines were implemented. Discharge length z-score was significantly higher after the intervention (-2.76 v -1.64; $p<0.0001$) even adjusting for differences in birth weight z-score. There was no effect on discharge Wt z-score (-1.26 v -1.46; $p = 0.17$), or discharge HC Z-score (-0.54 v -0.77; $p=0.21$). The odds of

severe EUGR in length was significantly less after the intervention (OR 0.11, 95%CI 0.03 – 0.33; p < 0.0001). There were no significant changes in the odds of severe EUGR in Wt (OR 0.7, 95%CI 0.16 – 2.79; p = 0.2), or in HC (OR 0.52, 95%CI 0.06 – 3.56; p = 0.5).

Conclusion(s) In our NICU, a nutritional intervention focused on increasing protein intake significantly improved the growth of VLBW infants. Significant improvements were seen in linear growth, without any significant change in Wt or HC. These results demonstrate that improvements in linear growth do not necessarily accompany by increases in weight gain in VLBW infants.



The mean discharge length z-score was significantly higher at discharge in the post-intervention group (-2.76 v -1.64; p < 0.0001).



Post-intervention, the percentage of infants with severe EUGR for length at discharge was decreased (46.97% v 21.82%).

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Abstract: 150

Trends in Medication Errors Following Electronic Health Record Implementation in an Academic NICU

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Background Medication errors (MEs) are responsible for significant morbidity and increased costs in hospitalized patients. Infants in the Neonatal Intensive Care Unit (NICU) are particularly at risk because their drug dose is dependent on weight and age, which change over time. One of the goals of implementing Electronic Health Record systems (EHR) with computerized physician order entry (CPOE) is to reduce medication errors and adverse drug events (ADEs). Our NICU has a rigorous medication error tracking program and implemented an EHR with CPOE throughout the hospital. Immediately after implementation of any new system, there could be a steep learning curve, but this is expected to improve over time. We evaluated the frequency and types of medication errors before and after the implementation of EHR in our NICU.

Objective To evaluate the frequency and types of MEs before and after the implementation of an EHR in the NICU over several years.

Design/Methods EHR was implemented in our tertiary care academic NICU in September 2013. All physicians including Attendings, Residents, Fellows, Nurse Practitioners, Nurses and dispensing Pharmacists were trained on the use of the EHR. The accuracy of all orders was checked by the pharmacist and bedside nurse. The frequency and types of all MEs were recorded over a 4 year period after EHR and compared to the 1 year before EHR. Data were analyzed using Chi-square. $p < 0.05$ was considered as significant.

Results Our overall ME rates were low. There was an increase in all errors in the first year after EHR implementation. The number of errors continued to decline annually with the biggest change seen in the prescription error rate compared to nursing and dispensing errors. Although new residents and fellows come into the program every year, there were no significant changes in our patient population or staffing patterns during the period under observation.

Conclusion(s) Implementation of EHR based CPOE was initially associated with an increase in medication errors in the NICU likely related to the steep learning curve associated with implementation of new systems. Medication error rates improved over the years as users got accustomed to the system, but error rates were still no better than before EHR implementation. EHR may streamline the care process across systems but MEs still occur. A vigilant error monitoring and tracking system is still needed to prevent/reduce medication errors in the NICU.

Trends in Medication Errors Before and after EHR/CPOE Implementation

	Pre CPOE 2013 (Period 1)	Post CPOE 2014 (Period 2)	Post CPOE 2015 (Period 3)	Post CPOE 2016 (Period 4)	Post CPOE 2017 (Period 5)
Total # Orders	29,102	47,177*	38,832*	39,872*	38,841*
Total # Errors	35	92*	72*	42	55
Total # Patient Days	6805	7404	6861	7051	7180
Total Error Rate/1000 Patient Days	5.14	12.4*	10.5*	6	7.7
Total Error rate/100 orders	0.12	0.19	0.18	0.1	0.14
Prescription Error Rate/100 Orders	0.08	0.14	0.09	0.04	0.06
Dispensing Error Rate/100 orders	0.02	0.03	0.05	0.04	0.038
Nursing Error Rate/100 Orders	0.01	0.02	0.03	0.025	0.025

*=P<0.05 compared to pre CPOE

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Abstract: 151

Improving Lost to Follow-Up Rates in the Neonatal Comprehensive Care Program

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Pediatrics, New York University, New York, New York, United States

Background High risk infants who are cared for in the neonatal intensive care unit (NICU) are at risk for neurodevelopmental delay. Developmental evaluation during the first few years of life can help to identify those infants with delay and advocate for supportive therapies to optimize long term outcomes. The Neonatal Comprehensive Care Program (NCCP) at New York University performs formal developmental evaluation of NICU graduates from New York University and Bellevue Hospital Center (BHC) who meet eligibility criteria and assists in accessing therapy services when recommended. We noticed a high lost to follow-up rate to this program from our BHC patient population which is a diverse, socio-economically disadvantaged population from a large geographical catchment area.

Objective The aim is improve the lost to follow up rates for the BHC NICU patients by 50% over one year from September 2016 through August 2017.

Design/Methods Baseline data was collected from May through September 2016. A multi-step intervention was developed:

PDSA #1 (Oct 2016): Communication with Families: The BHC NICU serves a diverse patient population of which the majority identifies Spanish or Chinese as their preferred language. We sought to improve our communication with families through three interventions: a) addition of Spanish speaking NCCP staff, b) appointment reminder letters sent one month prior to scheduled appointments, and c) Spanish and Chinese language program brochures. These brochures were given to families at time of discharge and mailed to them along with the reminder letter.

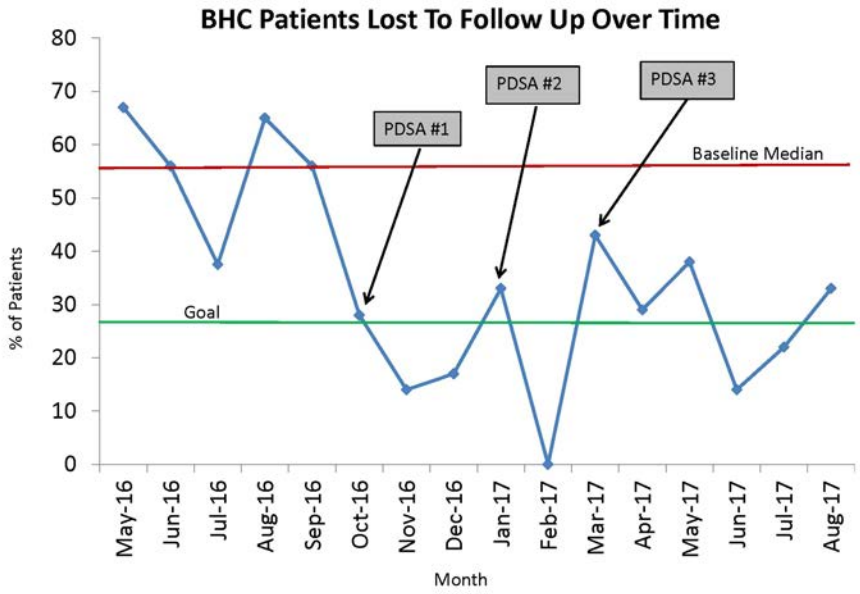
PDSA #2 (Jan 2017): Patient Scheduling: A formalized process for scheduling patients was established.

PDSA #3 (Mar 2017): NICU Provider Education: We held monthly education session about NCCP with the NICU BHC staff.

Data was collected at the end of each calendar month by reviewing the electronic medical record to assess the number of patients from BHC scheduled for NCCP during that month and the number who came. The data was recorded and reviewed monthly at a QI team meeting.

Results The baseline median lost to follow-up rate for BHC NICU patients referred to NCCP between May and September 2016 was 56%. The average lost to follow-up rate from November 2016 through August 2017 was 24%. Please see run chart.

Conclusion(s) Follow-up rates in a neonatal developmental follow-up program can be improved using a targeted, multi-step intervention of formalized patient scheduling, communication with the patients' families and education for the NICU staff.



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Abstract: 152

Hand- held Precordial Doppler Ultrasound Detects Heart Rate Faster than Electrocardiogram in Neonatal Resuscitation

Mary C. Haggerty, Robert Koppel, federica picozzi, Howard S. Heiman

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Background A fast and accurate newborn heart rate (HR) assessment is critical to neonatal resuscitation. The 7th edition of Neonatal Resuscitation Program (NRP) guidelines recommends initial use of precordial auscultation (PA) and then the use of pulse oximetry (PO) and electrocardiogram (ECG) if the HR is unobtainable via PA or if advanced resuscitation is necessary. Studies have shown that PA is inaccurate. PO and ECG are subject to motion artifact and adhesion difficulties. We have previously shown that precordial Doppler ultrasound (PDU) is a faster method of HR assessment than PA and PO at both low- and high- risk deliveries. PDU has not been directly compared to ECG at high- risk newborn deliveries.

Objective Compare HR values and acquisition time between PDU, PA, and PO methods during high- risk newborn resuscitations.

Design/Methods In a non-randomized, prospective, blinded study, both a resuscitation and study team attended high-risk deliveries. After initial thermal and respiratory optimization (~30 sec) the resuscitation team assessed HR via PA, PO and ECG. The study team assessed HR via PDU. The resuscitation team was blinded to the PDU HR.

Results We attended 14 high- risk deliveries. Mean HR assessment time was faster using PDU (5.6s) vs. PA (8.7s), PO (50s), and ECG (28s) (Table). There was good correlation between ECG and PDU HR values ($r=0.92$, $r^2=0.85$). There is weaker correlation between ECG and PA ($r=0.75$, $r^2 = 0.56$).

Conclusion(s) Hand- held PDU is faster than PA, PO, and ECG. It is more accurate than PA. There is good agreement between PDU and ECG HR values. PDU measures flow so is not subject to false detection of HR due to pulseless electrical activity. It is available in low resource areas and birthing centers. However PDU requires a team member to hold the device to provide continuous HR during resuscitation whereas ECG permits that team member to be free for other tasks. PDU can be as used a complementary technique to ECG and is superior for initial HR assessment within the first minute of resuscitation.

Time (sec) to HR Assessment

	PDU	PA	PO		ECG	
			Total time	Time after probe placement	Total time	Time after lead placement
Mean	6	9	52	44	28	12
Median	5	7	41	30	27	16
Range	3-10	6-20	25-123	16-113	10-84	1-18

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Abstract: 153

Implementation of buccal dextrose gel to reduce NICU admissions: a quality improvement project

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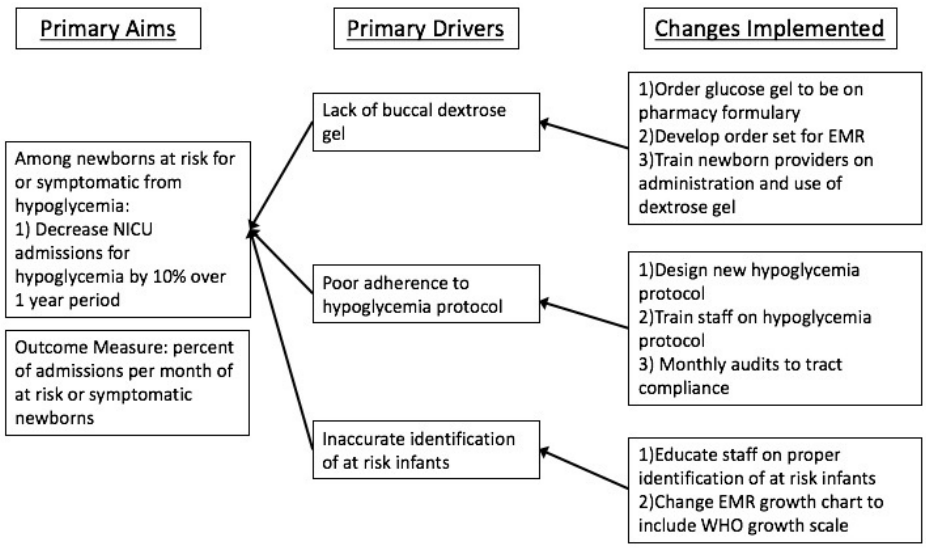
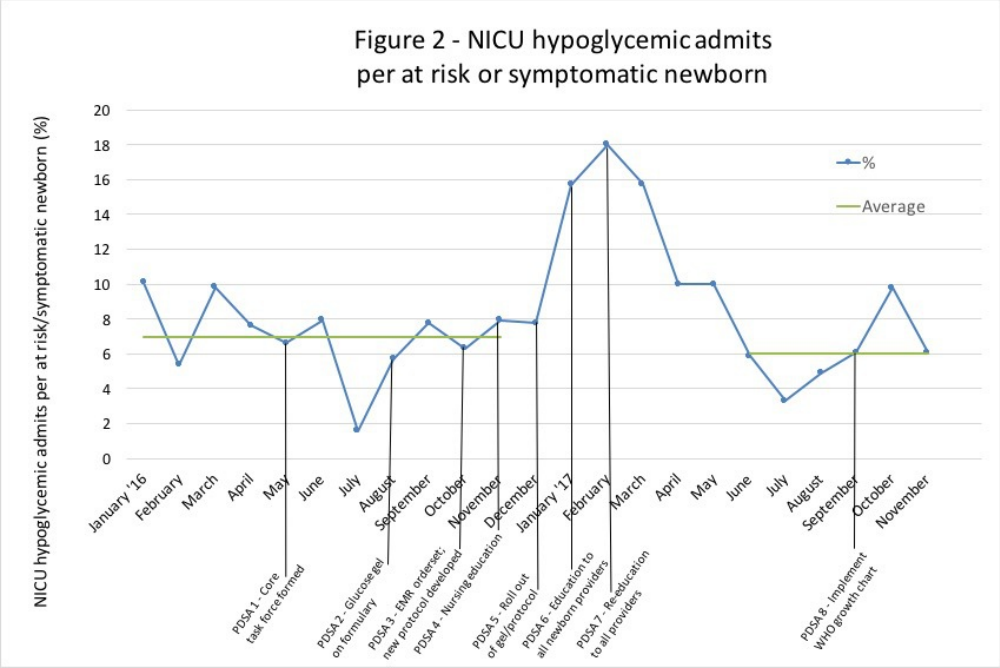
Background Neonatal hypoglycemia is a common problem among at-risk newborns that can result in NICU admission, mother-infant separation, less breastfeeding, intravenous access, prolonged hospitalization, increased costs, and potential detrimental neurologic effects if untreated. Buccal 40% dextrose gel is an evidence-based treatment for hypoglycemia that has been shown to reduce some of these adverse consequences.
Objective Primary aim is to decrease NICU admissions for neonatal hypoglycemia at Baystate Medical Center (BMC; Springfield, MA) by ≥15% over a 2-year period and secondary aims are to decrease length of stay, increase breastfeeding rates, and minimize healthcare costs.
Design/Methods A key driver diagram was developed and subsequent PDSA methodology was implemented to reduce NICU admissions for hypoglycemia (Figure 1), with the most prominent PDSA cycle being the introduction of buccal 40% dextrose gel for hypoglycemic newborns in December 2017. Inclusion criteria include ≤48 hour old, inborn newborns that are either symptomatic or defined as "at risk" for hypoglycemia to include small- or large-for-gestational age, late preterm, or infant of a diabetic mother. Excluded are newborns admitted directly to the NICU after birth or those with metabolic conditions predisposing them to glucose abnormalities. Compliance is tracked by random monthly audits, and any adverse outcomes related to hypoglycemia are documented.
Results At baseline, there are 120.3 at risk or symptomatic infants born at BMC each month requiring glucose screening, with 7% of these requiring NICU admission for hypoglycemia (average of 8.4 NICU admissions per month). After implementation of process measures and PDSA cycles to include implementation of dextrose gel, there has been a 14% decrease in hypoglycemic admissions over the last 6 months (Figure 2), which is on target for our primary aim. Protocol compliance was only 57% over first few months of gel initiation, and likely related to the initial spike in NICU hypoglycemic admissions during that time. With increased staff education and training, compliance has improved to 79% over last few months. No adverse outcomes have been documented. Secondary aims are currently being analyzed.
Conclusion(s) In an ongoing QI initiative at our institution, adherence to a buccal dextrose gel protocol can lead to decreased rates of NICU admissions for treatment of neonatal hypoglycemia without increasing identifiable complications.

Figure 1 - Key Driver Diagram: Implementation of buccal dextrose gel to reduce NICU admissions: a quality improvement project





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Adults Born Preterm: Epidemiology and Biological Basis for Long-term Outcomes

Tonse Raju
Eunice Kennedy Shriver National Institute, Bethesda, Maryland, United States

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Abstract: 154

18-month-old with fever and hepatosplenomegaly: A Diagnostic Potpourri

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History (including chief complaint, history of present illness and relevant past and family medical history) CC:
18 months old M who presents with:
Fever, cough, rhinorrhea and a non-pruritic, diffuse confluent rash on the extensor surface of both legs X 3 days.
Swelling of both hands and feet X 1 day.
Tender right-sided neck swelling X 1 day.

HOPI:
Parents removed a tick from scalp 3 days prior to onset of symptoms. Initially treated with clindamycin for lymphadenitis with temporary improvement. Continued to be febrile, with elevated inflammatory markers, and hence received IVIG and high-dose Aspirin from Day 3-10 of illness for concerns of incomplete Kawasaki disease. By Day 6, pancytopenia began to evolve, and fever continued to persist. Lymphadenitis returned. Received PRBC transfusion X1 for Hgb 5.4 mg/dl on Day 8. Discharged on Day 12 following recovering CBC. Re-admitted on Day 15 with persistent fever, and severe anemia (Hgb 3.8 mg/dl). ANC and platelet count reported normal. Bone marrow biopsy unremarkable. Moderate hepatosplenomegaly noted. Given a dose of IV methylprednisolone, with no resolution of fever. Careful physical exam (see attached figure), followed by serology testing for suspected organism clinched the diagnosis. Was started on relevant antibiotic and defervesced by Day 20.

FH: No history of auto-immune disorders, arthritis.
PMH: None relevant.
Physical examination findings (including vital signs) Vitals:
Temp: 102°F
HR 112
RR 24
BP 96/54 mm Hg

HEENT: Mild pharyngeal erythema, (-) tonsillar hypertrophy, (-) conjunctival injection, (-) TM erythema, (-) cracked lips. Small 1x1 cm scab noted over posterior scalp.
Neck: 2X2 cm round, soft, tender right-sided posterior lymphadenopathy.
Resp: Lungs clear to auscultation. (-) wheeze, (-) crackles.
CV: S1, S2 normal. No murmur. CRT < 2 sec. Good peripheral pulses.

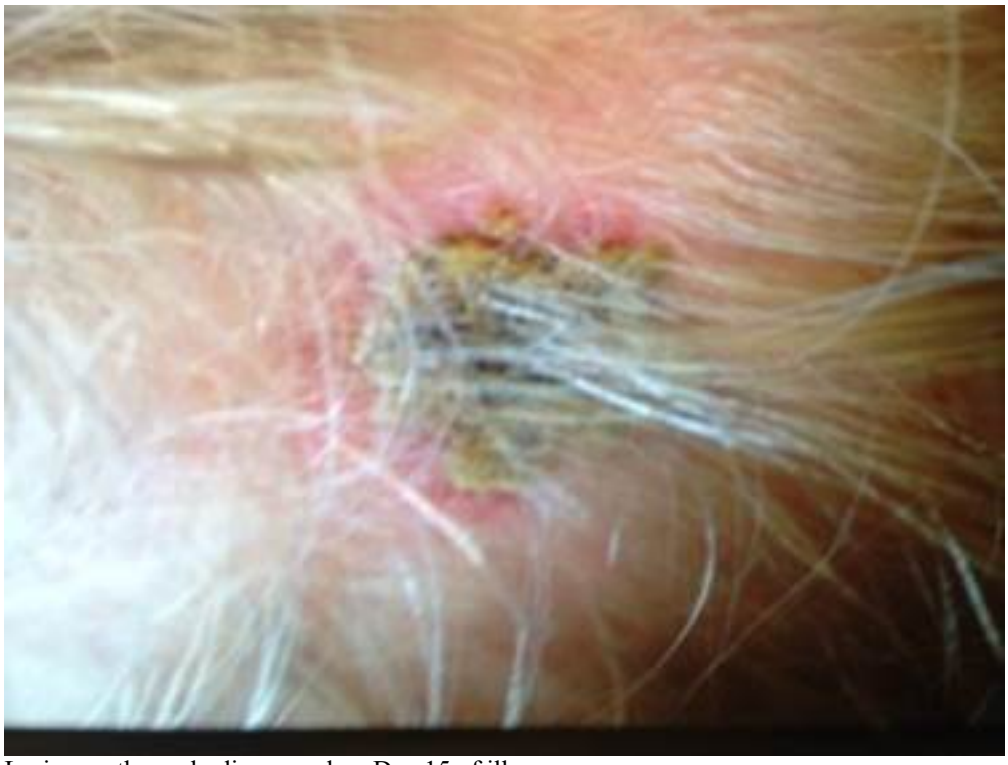
GI: Soft, non-distended. No organomegaly on initial presentation.
Skin: Diffuse maculopapular rash over extensor surfaces of both legs, non-pruritic, blanchable.
Musculoskeletal: (-) joint pain, (-) effusion, (-) erythema. Full range of motion.
Laboratory or Diagnostic imaging or Procedures CBC: (in order WBC, Hgb, Platelets):

Day 3
28,000, 11.4, 101,000

Day 6
3,000 (ANC 350), 5.4, 80,000

Day 15
12,000 (ANC 6,040), 3.8,120,000

Rapid Strep Antigen: NEG
Blood Culture (X3): NEG
Urine Culture (X2): NEG
CRP: 155 mg/dl
ESR: 56 mm/hr
Ferritin: 224 ng/ml
Triglyceride: 98 mg/dl
Hepatitis Panel (including EBV): NEG
Parvovirus Serology: NEG
RF: <30 U/mL
ANA: 1:40
Cardiac Echo: (-) cardiomegaly, (-) aneurysms, (-) vegetations.
Chest XR: Normal
Abdominal US: Moderately enlarged liver and spleen (on Day 15), no abscess.
Bone Marrow Bx: Unremarkable.
Tularemia Serology DAT titres: 1:10,240
Final Diagnosis Tularemia; ulcero-glandular type.


Lesion on the scalp discovered on Day 15 of illness.

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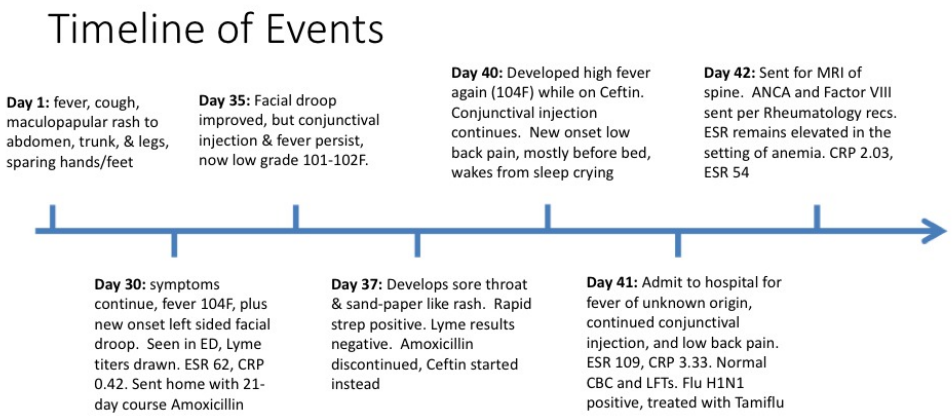
Abstract: 155
Abnormally Prolonged Course of Fever with a Year of Sequelae

Sarah Kollar[1], Olga Toro-Salazar[2], Colleen Jo[2], Heather Tory[3]
[1]Pediatrics, Connecticut Children's Medical Center, Hartford , Connecticut, United States, [2]Pediatric Cardiology, Connecticut Children's Medical Center, Hartford, Connecticut, United States, [3]Pediatric Rheumatology, Connecticut Children's Medical Center, Hartford, Connecticut, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A 2-year-old male presents to the ED with left sided facial droop, in the setting of one month of fever, rash, and cough. Maculopapular rash over trunk and extremities, sparing hands and feet with ESR of 62. Diagnosed with Bell's palsy and discharged on 21-day course amoxicillin for presumptive Lyme. Over the next week, facial droop improved, but fever persisted. He then develops bilateral conjunctival injection, sore throat, and sandpaper-like rash. Went to the PCP, was rapid strep positive and prescribed Ceftin in place of Amoxicillin since Lyme negative. Day 4 of Ceftin, developed diarrhea and continues to have conjunctival injection. A few days later, high grade fevers return with new onset low back pain. Admitted for over one month of fever with ESR 109 and CRP 3.33. Influenza H1N1 positive and started on Tamiflu. Continued with low grade fevers, back pain, and conjunctival injection, but improving CRP and ESR 102. Back pain mostly at night, waking from sleep, but MRI was nonspecific. Ophthalmology consult suggested viral conjunctivitis and no iritis.

Family history: Maternal great aunt - Lupus; Maternal grandfather - MI age 56
Physical examination findings (including vital signs) HEENT: +Nasal discharge +Bilateral injected conjunctiva. No tonsillar exudate
Neck: +Shotty cervical adenopathy. Normal ROM/supple
Cardio: +Tachycardia. RRR, no murmur
Pulm: Clear breath sounds. No wheezes or retractions
Abdomen: Soft, normal bowel sounds. No distension, hepatosplenomegaly, or tenderness
GU: No scrotal swelling
MSK: Normal ROM
Neuro: Alert. No cranial nerve deficit. Normal tone
Skin: Cap refill < 3 sec. No rash or desquamation
Laboratory or Diagnostic imaging or Procedures MRI 3/21:
Trace presacral edema. No abnormal enhancement

Abdominal U/S 3/29:
Mild dilatation of intrahepatic and extrahepatic bile ducts. Pancreas and gallbladder appear normal
Final Diagnosis Atypical course of incomplete Kawasaki disease with abnormal pattern of coronary aneurysms continuing to dilate one year later. Initially had medium sized aneurysms of LMCA, LAD, RCA requiring two doses of IVIG and pulsed steroids with resolution of coronary findings. Recurrent aneurysms at outpatient visit one month later, therefore, started IV Cyclosporine therapy and oral steroids. Additional IVIG and IV Cytoxan infusion given four months out for recurrent aneurysms. Prolonged need for oral Cyclosporine and Prednisone of one-year duration due to worsening coronary dilatation anytime either drug was weaned. Few case reports in the literature of Bell's palsy associated with Kawasaki disease having higher risk of coronary aneurysms, likely related to delayed diagnosis.



Progression of Symptoms

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Abstract: 156

Back to the Basics: Assessing Respiratory Failure in a Neonate

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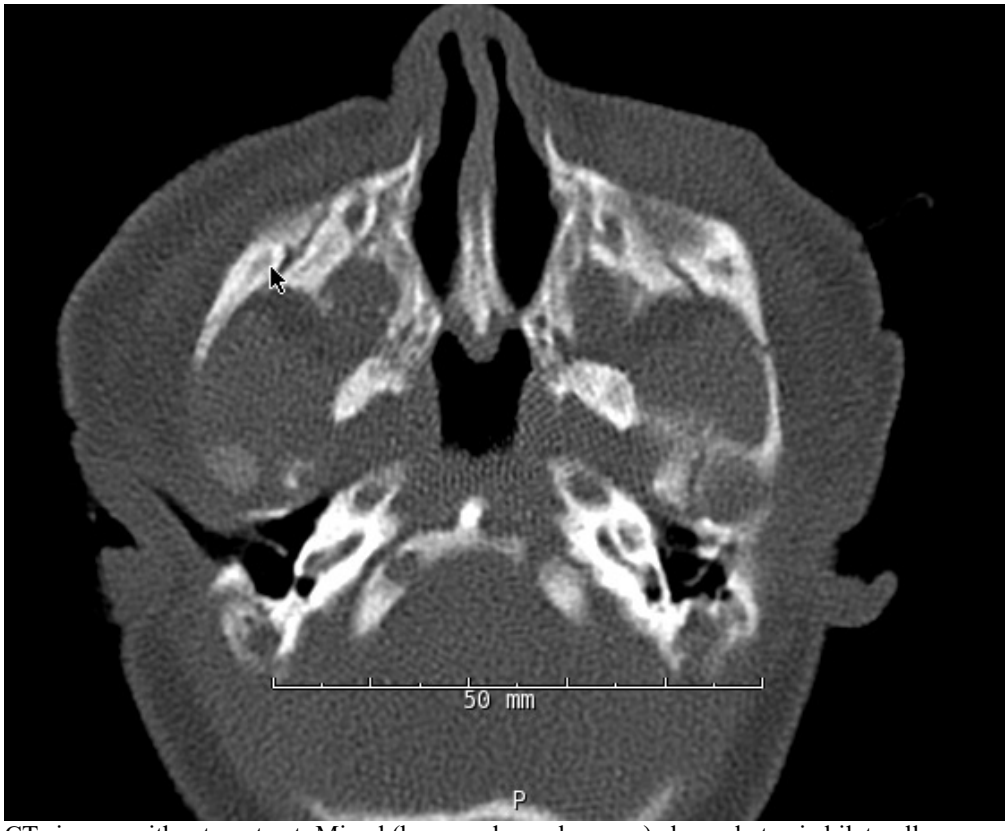
History (including chief complaint, history of present illness and relevant past and family medical history) CC: Failed extubations
HPI: Patient is a 2 day old former 32.4 week baby boy with a prenatal diagnosis of a right-sided aortic arch transferred in the setting of failed extubations
Birth hx: Mother is a 29 YO G1P0->1 with normal labs except GBS unknown. She has been followed by a cardiologist for a prenatal diagnosis of a right-sided aortic arch. She had normal SNP microarray. She received steroids X1 on the day prior to delivery but went into preterm labor and delivered the next day.
Delivery: born via SVD with poor respiratory effort requiring intubation and admitted to the NICU. Apgars: 3/6/8.
Previous Hospital Course:
He received 2 doses of surfactant; however, he failed 2 extubation attempts with profound apnea and bradycardia requiring chest compressions and reintubation. He was started on caffeine following birth. He had a post-natal echo that confirmed a R-sided aortic arch as well as an isolated left subclavian artery arising from a left PDA. He remained NPO on fluids. He had a head ultrasound given multiple code events that did not show any hemorrhage.
Family hx: Mother and father are healthy. No history of congenital heart disease, genetic syndrome, or early childhood death.
Physical examination findings (including vital signs) Vitals: T 37.4 C, HR 132, BP 61/44 , RR 104, SpO2 92%
Pre and post ductal SpO2: 98%. 4 ext BP normal.
Wt: 75%ile, Length 70%ile, HC 25%ile
General: caucasian male infant, non-dysmorphic
HEENT: AFOSF, eyes closed, palate intact, R helix folded over, OG tube in place
Resp: RR 100s with retractions, good aeration
CV: RRR, normal S1/S2, II/VI early to mid systolic murmur heard throughout precordium, brachial and femoral pulses 2+ bilaterally, cap refill 2 seconds
Abd: soft, no HSM, UAC/UVC
Back: no sacral dimple
GU: normal male genitalia, patent anus
Skin: jaundiced
Neurologic: sedated but moves extremities with appropriate tone
Laboratory or Diagnostic imaging or Procedures ABG on arrival: 7.32/40/45/21/-5
CXR on DOL 2: consistent with RDS
Echo on DOL 6: Right PDA with left to right shunting. The left subclavian artery arises from the main pulmonary artery via left sided PDA
Bronchoscopy on DOL 14: normal
Cardiac MRI on DOL 27: no vascular ring, L PDA supplying aberrant L subclavian artery
22q11.2 testing negative
Ophthalmologic exam: normal
RBUS: normal
CT sinuses w/o contrast on DOL 14 following bronch: Mixed (bony and membranous) choanal atresia bilaterally
CHD7 mutation for CHARGE syndrome positive
*An NG tube had never been placed. He was fed via OG tube throughout both hospital courses.
Final Diagnosis CHARGE Syndrome: bilateral choanal atresia, abnormal ears, cardiac anomaly and confirmed mutation



CT sinuses without contrast: Mixed (bony and membranous) choanal atresia bilaterally.

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Mentor of the Year: What I Have Learned

George A. Porter

University of Rochester Medical Center, Rochester, New York, United States

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Abstract: 157

Determining the optimal length of time to monitor newborns for neonatal abstinence syndrome (NAS) .

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Background The American Academy of Pediatrics recommends that infants born to mothers with a prenatal history of opioid use be observed for 4 to 7 days for symptoms of withdrawal, yet most mothers are discharged within 72 hours and individual centers vary widely in their policies on NAS length of stay. Unnecessary length of stay leads to disrupted breastfeeding limited maternal-infant bonding in the first week and increased hospital costs.

Objective To determine whether hour-by-hour distributions of the modified Finnegan Scoring tool (MFS) scores for infants could be used to guide clinicians regarding whether infants could be safely discharged home after 72 hours for outpatient follow-up versus extended inpatient monitoring.

Design/Methods MFS recorded in the medical record were examined prior to pharmacologic treatment in the first 7 days after birth on term infants monitored for NAS born between Jan. 2011 to Dec. 2016 at the Penn State Milton S Hershey Medical Center. In accordance with clinical practice, mean MFS scores were calculated from the 3 most recent scores. Quantile regression was used to estimate the percentiles of mean MFS scores as a function of time after birth and prior to treatment.

Results Estimated percentile curves (Fig. 1) were based on 5066 mean MFS scores from 202 infants obtained prior to treatment, of which 81 (41%) were treated for NAS within the first 72 hours. Among the remaining 121 infants not treated or discharged at 72 hours, 42 had a mean MFS below 25th percentile at 72 hours and none were ultimately treated; 69 infants had a mean MFS between 25th and 90th percentile and 5 of them (7%) were eventually treated; 10 infants had a mean MFS score above 90th percentile and 7 of them (70%) eventually treated. The trend is highly significant ($p<0.001$) using a Cochran-Armitage test.

Conclusion(s) This is the first study to evaluate percentiles of MFS in neonates with NAS. It is hoped this work will be the starting point for collecting data on a larger, multi-institutional sample of infants to develop an evidenced-based tool for providers to safely

make discharge plans for infants being monitored for NAS. These data will have significant implications for length of stay, hospital costs, breastfeeding success and maternal-infant bonding.

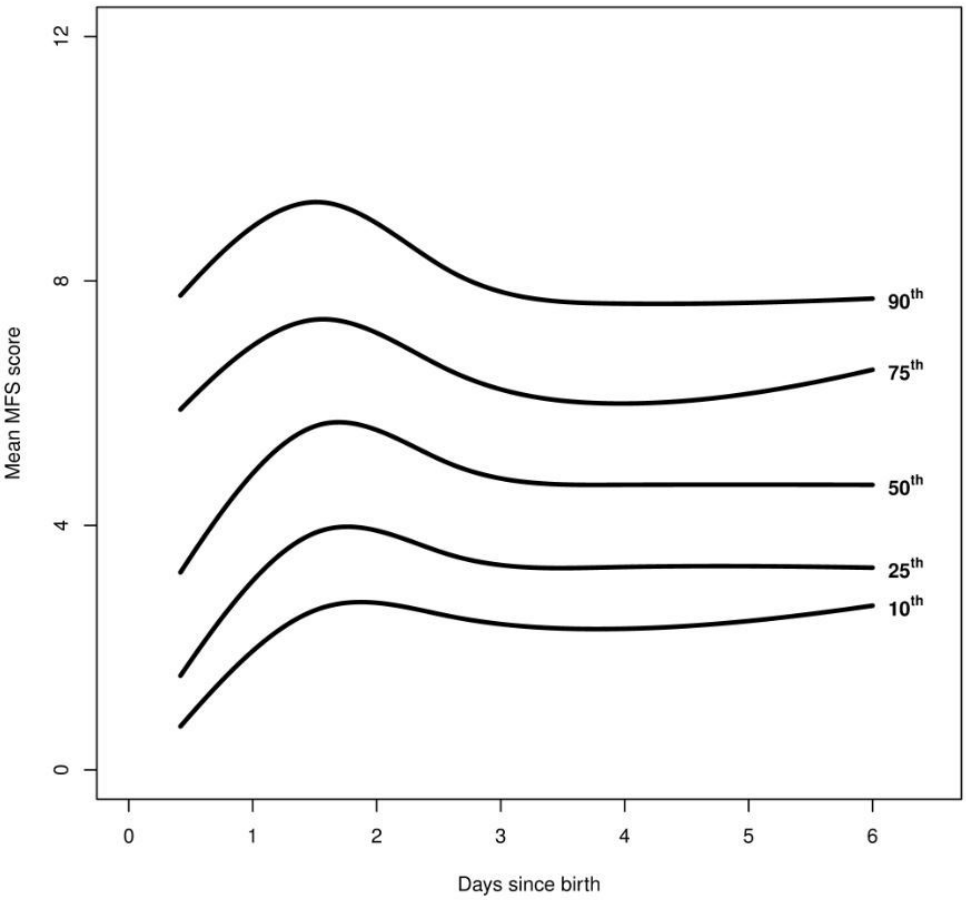

Figure 1. Estimated percentile curves based on mean Finnegan scores for all patients with NAS, for scores prior to treatment.

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Abstract: 158

Neonatal Hypoxia-Ischemia interrupts maturation of hippocampal GABAergic interneurons

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Background Hippocampal GABAergic interneurons (INs) are known to mature functionally, biochemically and morphologically during the postnatal period to strengthen the inhibitory network required for memory formation. Our group has shown that in the hippocampus, neonatal HI prevents the rise in the number of parvalbumin (PV) + INs, decreases the expression of GAD65/67 (pre-synaptic GABAergic marker) and induces somatodendritic attrition of INs 8 days after the exposure. Therapeutic hypothermia (TH) does not fully prevent these effects.

Objective To study if delayed cell death, compromised neurogenesis or impaired maturation accounts for the decrease in the number of PV+INs at 8 days after HI.

Design/Methods We induced cerebral HI in C57B6 mice at p10 with right carotid ligation and 45m of hypoxia (FiO_2=0.08), followed by normothermia (36°C, NT) or TH (30°C) for 4h with anesthesia-shams as controls. We assessed cell death (TUNEL assay), neurogenesis (Ki67 IHC), migration (DCX IHC), and functional maturation (K^+ channel RT-PCR) at 24h and 8 d after HI. One-way ANOVA was used for analysis. Additionally, correlations between the number of PV+INs and the loss of pyramidal cells (micrometer) or astroglyosis (GFAP IHC) were performed at p18.

Results Hippocampal cell death was vast at 24h, and rare at 8d after HI. INs in close proximity to dying pyramidal cells remained morphologically intact at 24h after HI. INs showing somatodendritic attrition at 8d after HI lacked of nuclear evidence of cell death. Nuclear Ki67 or cytoplasmatic DCX did not co-localized with PV IF-staining at either 24h or 8d after HI. The expression of K^+ channels known to be involved in mature fast-spiking electrical activity of PV+INs (Kv3.2, Kv3.1, Kir2.2, K2p1.1 and K2p9.1) increased between p11 and p18. Neonatal HI decreased the expressions of Kv3.2, Kv3.1 and Kir2.2 by 40 to 50% (vs. sham) 8d after HI but not earlier. TH only attenuated the described changes. Neither pyramidal cell loss, nor astroglyosis correlated with PV+INs

counts at 8d after HI.
Conclusion(s) Delayed cell death or compromised neurogenesis do not explain the shortfall in the number of hippocampal INs expressing PV by 8d after HI. Instead, the impaired expression of specific K^+ channels involved in mature fast-spiking electrical activity of PV+INs, suggests along with previously reported biochemical and morphological disturbances, that HI interrupts postnatal maturation without producing a significant loss of INs. TH provides only partial protection.

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Abstract: 159

Anticonvulsant drugs exposure in the neonatal period and neurodevelopmental outcomes in the rodent model

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Background Neonatal seizures are associated with adverse neurological outcomes, including mental retardation, and learning disorders. Treatment with anticonvulsants or anti-seizure medications (ASMs) is needed to avoid adverse neurodevelopmental outcomes(NDO) associated with uncontrolled seizures. However, ASM exposure, even in the absence of a seizure or epileptic condition (gestational or prenatal exposure), has been linked to adverse cognitive outcomes (NEAD study). The complicated clinical reality is that seizures and ASMs are present in the same population, which makes it difficult to differentiate the relative contributions of each insult to impaired neurodevelopment.

Objective

Phenobarbital (PB) and Levetiracetam (LEV) are two commonly used ASMs in the NICU. PB triggers enhanced neuronal apoptosis (ENA) during brain development, while LEV does not. My overarching hypothesis is that drugs known to cause induction of neuronal apoptosis in the preclinical model will adversely affect NDO. I hypothesize that PB but not LEV, will adversely impact NDO in rodent model. The study compares the profile of behavioral toxicity induced by early-life exposure to PB and LEV, commonly used ASMs in the NICU, in a rodent model.

Design/Methods

We treated Sprague Dawley rat pups with PB, LEV and saline(negative control) with anticonvulsant doses that have been previously established, from P(7) to P(13) (7 days, similar to multiple doses in clinical setting). A battery of neurodevelopmental tests for rodents that evaluates short and long-term memory, learning behavior, anxiety like behavior, social interaction, aggression and motor function were performed on the adult animals between P(45) to P(60).

Results

Exposure to PB in the neonatal period impaired reflex ontogeny in early postnatal period in neonatal rat pups when compared to LEV(Fig A). Early life exposure to PB induced alterations in anxiety-like behavior and caused deficits in sensorimotor gating in adulthood. We found decreased exploration of the open field and reduced exploration of the open arms of the elevated plus maze (Ps<0.05) in PB treated rats. We also found impaired prepulse inhibition in PB treated rats as opposed to LEV. We also noted differences in response based on gender in the two drug groups.

Conclusion(s) Based on our preliminary studies, the profile of neurotoxicity and neurodevelopmental outcomes following exposure to phenobarbital in neonatal period is different from that of animals exposed to levetiracetam and spans several domains .

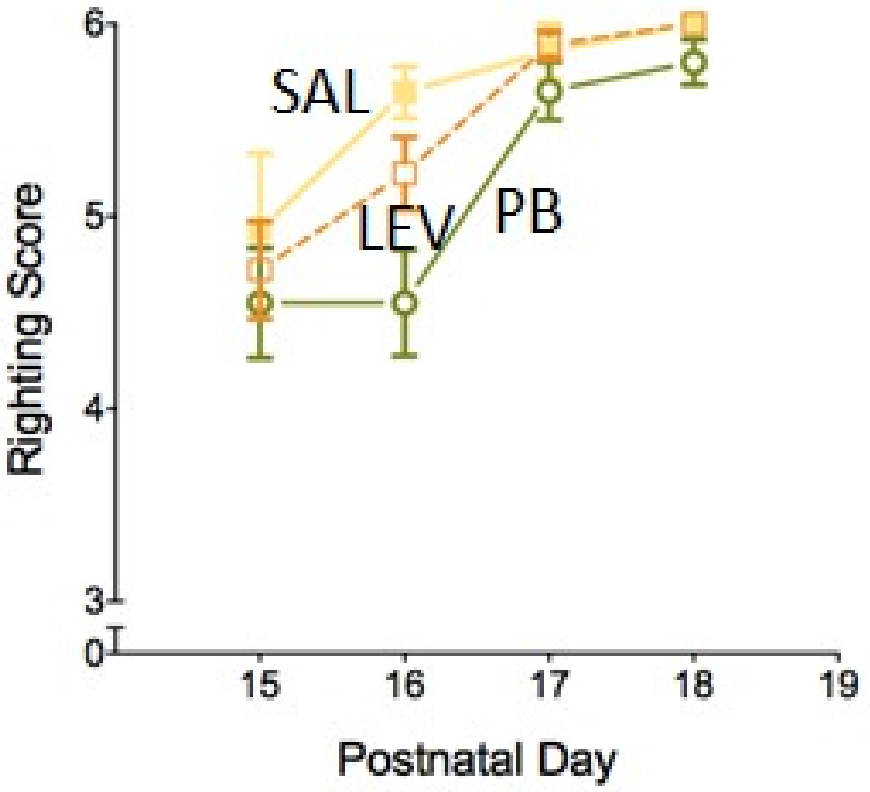

Fig A. PB but not LEV impairs reflex ontogeny. PB or LEV was given on P7-P13 and the mid-air righting reflex was evaluated on P15-18. A score of 6 indicates full development of reflex. In this task, animals are held dorsally recumbent and dropped onto a padded surface. When the reflex is present, rats land on all four paws.

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Abstract: 160

Comparison of Premature Death from Firearms versus Motor Vehicles in Pediatric Patients

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Background Gun violence is the second leading cause of pediatric trauma death after motor vehicles. Though federally-funded scientific data have driven life-saving policy from lead poisoning to SIDS, there remain little data on pediatric gun violence. While Congress spends $240 million annually on researching traffic safety, it explicitly bans gun violence research despite the fact that guns and cars kill equal numbers of Americans annually.

Objective To describe demographic and clinical characteristics of pediatric firearm (PF) and pediatric motor vehicle (PMV) injuries and compare their impact on years of potential life lost (YPLL). We hypothesized that these two mechanisms have similar impact on premature death, thus highlighting this staggering research disparity.

Design/Methods We analyzed National Trauma Data Bank data for patients ≤21 years presenting to an ED with a PF or PMV event from 2009-2014. We examined demographic and clinical characteristics of PF and PMV cases using descriptive statistics. YPLL was calculated using 75 years of age as reference. Because the large sample size yielded $p<0.0001$ for all comparisons, clinical rather than statistical significance was assessed.

Results 1,047,018 ED total visits were identified with 5.7% PF and 27.8% PMV cases. PF cases declined significantly from 2009 (6.2%) to 2014 (5.3%). Demographics for PF cases were: mean age 17.9 years, 89.0% male, 60.0% African American, 16.9% Hispanic. For PMV: mean age 15.5 years, 60.6% male, 60.3% Caucasian, and 16.5% Hispanic. PF cases were more likely to die in the ED (12.5% vs 3.2%) and had similar admission rates (77.5% vs 78.3%) and median lengths of stay (2.0 days). Assault accounted for 79.3% of PF cases, self-inflicted, 4.8%, and accidental, 11.7%. Self-inflicted PF cases had a higher median Injury Severity Score (13) than assault (9) or accidental (4) and were more likely to die (40.2% vs 11.4% vs 6.7%). Accidental PF cases were younger (15.7 years) as compared to assault (18.2 years) and self-inflicted (17.8 years). Among all pediatric ED visits, YPLL from a PF case was 4.1

per 10 visits versus 5.4 from a PMV.
Conclusion(s) Motor vehicles and firearms each remain a major cause of premature death. For traumatized children brought to an ED, four children die from a gun for every five who die from a motor vehicle, leading to similar and profound YPLL. An evidence-based approach has saved millions of lives from motor vehicle crashes; the same federal funding and research should be directed at the epidemic of pediatric firearm injury.

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Abstract: 161

Cardioplegia-Induced Myocyte Arrest Decreases Electron Transport Chain Supercomplex Formation During Neonatal Cardiac Surgery

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Background While cardioplegia-induced myocyte arrest (CIMA) is necessary during the repair of neonatal congenital heart defects, it often leads to low cardiac output and increased mortality. Neonatal cardiac myocytes have immature mitochondria compared to later in infancy, predisposing them to dysfunction after CIMA. We have previously demonstrated in a mouse model that inhibition of the mitochondrial protein cyclophilin D increases mitochondrial function and myocyte differentiation, perhaps by increasing assembly of electron transport chain (ETC) components into highly efficient multimers called supercomplexes. Whether CIMA alters ETC supercomplex assembly in large mammals and/or humans is unknown.
Objective To determine whether ETC supercomplex assembly is altered following CIMA in both ovine and human myocardium.
Design/Methods Neonatal lambs (n=5) were placed on cardiopulmonary bypass and underwent CIMA using antegrade cardioplegia. Left ventricular ejection fraction (LVEF) was assessed by echocardiography. Right ventricular (RV) muscle samples obtained at baseline and after 60 minutes of CIMA were examined for ETC supercomplex formation by native immunoblot (IB). RV muscle samples from one infant and one neonate requiring surgical repair of congenital heart disease were similarly examined.
Results In the ovine model, ETC supercomplex formation was intact at baseline and absent following CIMA (n=1, 4 additional samples in progress). LVEF was unchanged from baseline 2h post-CIMA (pre: 81.1 ± 11.6% vs. post 88.8 ± 5.7%, p=0.32, n=3) but decreased 8h post-CIMA (LVEF 74.2%, n=1). Human samples demonstrated intact supercomplex formation in a 54 day old infant with Tetralogy of Fallot following 20 minutes of CIMA, but absent supercomplex formation in an 11 day old neonate with coarctation of the aorta following 57 minutes of CIMA.
Conclusion(s) CIMA may decrease LVEF in an ovine model of neonatal cardiac surgery, and alters myocardial ETC supercomplex formation in ovine and human neonates. Restoration of ETC supercomplex assembly following neonatal CIMA is a potential avenue to improve postoperative cardiac function.

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Abstract: 162

Genetic Variants Affecting Myosin Light Chain Phosphorylation are Associated with PDA and BPD in ELBW Infants

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[1]The Regional Neonatal Center, Division of Newborn Medicine, New York Medical College; Maria Fareri Children's Hospital at Westchester Medical Center, Valhalla, New York, United States, [2]New York Medical College, Valhalla, New York, United States, [3]Department of Pediatrics, Div of Neonatology, Harlem Hospital - Columbica University Medical Center, New York, New York, United States

Background PDA and BPD lead to significant morbidity in ELBW infants. Genetic contributions to PDA and BPD have been confirmed by twinning studies, although identification of specific genes have been elusive. The smooth muscle isoform encoded by MYLK gene mediates cell movement and signaling in smooth muscle cells. MYLK gene also encodes the non-muscle isoform which affects the endothelial barrier integrity. Increased myosin light chain (MLC) kinase activity leads to ductus arteriosus closure. MYLK gene variants have been associated with asthma, susceptibility to acute lung injury, sepsis and pulmonary edema. Similarly, ROCK-2 gene encodes ROCK protein that inhibits dephosphorylation of MLC. Its variants have been associated with RDS in preterm neonates and with arterial stiffness in the adult population. We hypothesized that MYLK and ROCK-2 gene variants are associated with the development of PDA and BPD in ELBW infants.
Objective
Design/Methods DNA was collected and isolated from 229 ELBW neonates via buccal swabs after obtaining parental consent. SNP genotypes were identified by RT-PCR using specific probes for MYLK gene SNPs - rs820336, rs936170, rs9844173, rs9840993, rs4678047, rs40305, rs9844173 and rs3796164; and for ROCK-2 gene SNPs - rs2290156, rs726843, rs978906 and rs2230174. BPD was defined as the need for oxygen at 36 weeks PMA. PDA was defined as need for medical or surgical treatment for ductal closure. Chi-square, Mann-whitney rank sum, t- and z-tests were performed for statistical analysis, with $P<0.05$ considered significant.
Results Out of the eight MYLK SNPs tested, rs820336, rs3796164, rs9840993 were found to be significantly associated with the development of PDA. The association with PDA was significant for rs820336 and rs3796164 even after multiple logistic regression for gestational age and gender. Minor allele frequency was significantly lower in the PDA group for rs3796164. MYLK gene SNP rs9840993 was significantly associated with BPD. No significant associations were found with other MYLK or ROCK-2 gene SNPs.

Conclusion(s) Three MYLK genetic variants were found to be significantly associated with PDA. We speculate that the promoter SNP (rs820336) may affect PDA closure by augmenting smooth muscle MLCK activity; that the nmMLCK signaling variant (rs3796164) may affect PDA closure by enhancing nmMLCK signaling; and, that the SNP (rs9840993) that enhances nmMLCK mRNA stability may result in higher expression, contributing to altered responsiveness in both BPD and PDA in ELBW infants.

Table 1: Demographic characteristics and genotype distribution in the study population for PDA

		No PDA (n=75)	PDA (n=154)	p value
Gestational age, wks (IQR)		25 (24, 27)	25 (24, 26)	0.05
Birth weight, g (IQR)		780 (660, 890)	750 (630, 860)	0.11
Male Gender , n (%)		43 (57%)	66 (43%)	0.04
Race	Non-Hispanic White	22 (30%)	48 (32%)	0.42
	Non-Hispanic Black	21 (29%)	46 (31%)	
	Hispanic	27 (38%)	44 (30%)	
	Other	2 (3%)	11 (7%)	
Genotype				
rs820336	CC	23 (31%)	76 (49%)	0.03
	Ct	32 (43%)	49 (32%)	
	tt	20 (27%)	29 (19%)	
	CC	23 (31%)	76 (49%)	0.005
	Any t	52 (70%)	78 (51%)	
rs9840993	AA	35 (62%)	71 (74%)	0.046
	Ag	10 (18%)	19 (20%)	
	gg	11 (20%)	6 (6%)	
	AA	35 (62%)	71 (74%)	0.138
	Any g	21 (38%)	25 (26%)	
rs3796164	AA	23 (50%)	57 (66%)	0.008
	Ag	10 (22%)	23 (26%)	
	gg	13 (28%)	7 (8%)	
	AA	23 (50%)	57 (66%)	0.082
	Any g	23 (50%)	30 (34%)	

Table 2: Demographic characteristics and genotype distribution in the study population for BPD

		No BPD (n=83)	BPD (n=146)	p value
Gestational age, wks (IQR)		26 (25, 27)	25 (24, 26)	<0.001
Birth weight, g (SD)		822 (SD 119)	705 (SD 140)	<0.001
Male gender , n (%)		33 (40%)	76 (52%)	0.073
Race	Non-Hispanic White	26 (33%)	44 (31%)	0.801
	Non-Hispanic Black	22 (38%)	45 (31%)	
	Hispanic	27 (34%)	44 (31%)	
	Other	4 (5%)	11 (6%)	

Genotype				
rs9840993	AA	47 (66%)	59 (73%)	0.028
	Ag	11 (16%)	18 (22%)	
	gg	13 (18%)	4 (5%)	
	AA	47 (66%)	59 (73%)	0.374
	Any g	24 (34%)	22 (27%)	

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Abstract: 163

Neonatal CD4 T cells display altered expression of lineage-specific genes

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Background The fetal peripheral T cell compartment is composed of naïve T cells that are ready to respond to foreign antigens, and successful immunity after birth depends upon the commitment of lymphocytes to specific effector lineages. Several transcription factors have been identified as crucial for the commitment of T cells to specific lineages, however, the expression patterns of these proteins at the single cell level is poorly understood. The identification of how these master regulators of lineage commitment are regulated during neonatal immune development will provide insight into previously unrealized therapeutic options for neonates.
Objective We hypothesize that genes identified to be necessary for the development of specific T cell lineages display variable expression patterns at the single cell level. Furthermore, we hypothesize that this differential expression represents unique stages of development that have been previously undetected.
Design/Methods WBCs were isolated by gradient centrifugation from umbilical cord blood from infants delivered at term by elective uncomplicated cesarean section, or through venipuncture of healthy adults as controls. Naïve CD4 T cells were sorted on a BD Biosciences Influx High Speed Cell Sorter. We developed high throughput assays to define BTB-ZF expression patterns in discrete populations of lymphocytes at the single cell level using the Fluidigm BioMark™ HD System.
Results Analysis of single cell expression data in Naïve CD4 T cells collected from cord blood displays variable expression of genes thought to be necessary for the maintenance of this lineage. Remarkably, individual cells within this population express genes associated with the development of other lineages of T cells. This suggests that our understanding of the transcriptional control of T cell development has thus far been limited by our ability to interrogate gene expression at the single cell level. Expression patterns of these genes in neonatal samples is different than observed in T cells isolated from adult PBL, suggesting this differential expression plays an important role in neonatal CD4 T cell maintenance.
Conclusion(s) The expression of transcription factors thought to be necessary for the development of the naïve CD4 T cell population exhibits previously unidentified variability. This variability may provide important clues for CD4 T cell development, and possible therapeutic options.

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Abstract: 164

Inhibition of microRNA miR-451 is associated with mitigation of hyperoxia induced lung injury in a murine model of bronchopulmonary dysplasia

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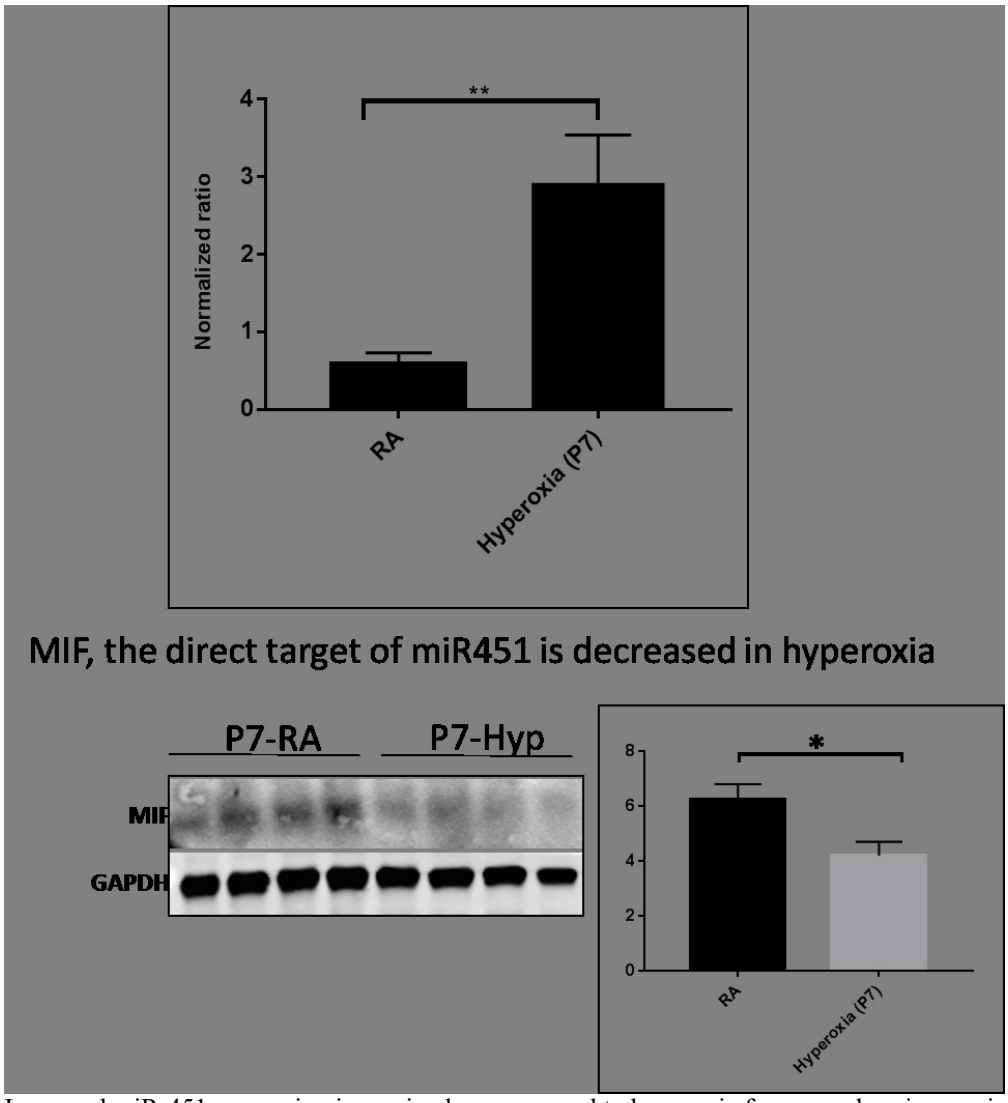
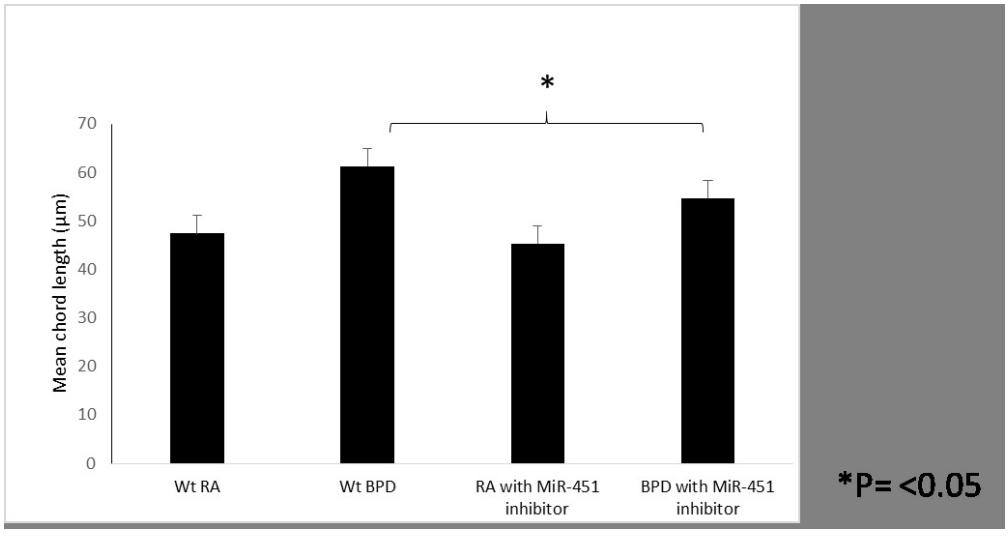
Background miR-451 is a microRNA known to inhibit expression of macrophage migration inhibitory factor (MIF), a cytokine that has been implicated in the pathogenesis of bronchopulmonary dysplasia (BPD). The relationship between miR-451 and MIF expression within the context of hyperoxia induced lung injury has not yet been described.
Objective To describe the relationship between hyperoxia-induced lung injury and miR-451 expression and to investigate the role of MIF as a possible target for miR-451 within this context.
Design/Methods We extracted RNA from both cultured murine lung endothelial cells (MLEC) and murine (C57Bl6 mouse strain) lungs exposed to hyperoxia and then used quantitative PCR to measure miR-451 expression. We then administered a miR-451 inhibitor to newborn mice and studied these animals in both room air and in a BPD model. The results of lung morphology, protein quantification and bronchoalveolar lavage (BAL) cell counts were then compared to those of wild type (WT) mice exposed to the same conditions.
Results Increased expression of miR-451 was noted in MLEC cells exposed to hyperoxia for 16 hours and in mice lungs exposed to hyperoxia for 7 (Fig. 1) and 14 days. Exposure to hyperoxia was also associated with a decreased expression of MIF in WT mice lungs (Fig. 1). Using the BPD mouse model, animals who had received the miR-451 inhibitor were noted to have significantly ($P = 0.016$) improved mean chord length (54.8 ± 1.5 μm) compared with the WT control BPD group (61.4 ± 1.8 μm; Fig. 2). In addition, the miR-451 inhibitor treated BPD group lungs demonstrated significantly ($P = <0.01$) reduced septal thickness (6.64 ± 0.12 μm) when

compared with control BPD group (10.6 ± 0.36 μm). No significant differences in total cell count or total protein quantification in the BAL were noted between the WT BPD animals and those treated with the miR-451 inhibitor.
Conclusion(s) Our findings suggest that miR-451 may play an important role in the mediation of hyperoxia-induced lung injury in the mouse model of BPD.



Increased miR-451 expression in murine lungs exposed to hyperoxia for seven days is associated with a decrease in expression of macrophage migration inhibitory factor (MIF)



Comparison of chord length values in WT mice and mice treated with a miR-451 inhibitor studied in both RA and hyperoxic conditions

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Abstract: 165

Placental Transfusion During Resuscitation of a Partially Asphyxiated Preterm Model

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Background Delayed cord clamping (DCC) is recommended by neonatal resuscitation program (NRP) in preterm infants not requiring immediate resuscitation at birth (Perlman, 2015). However, there is insufficient evidence to recommend an approach to placental transfusion for preterm infants who need resuscitation immediately after birth. A recent feasibility study showed DCC (5 min) improved cerebral oxygenation and blood pressure in term infants at risk of resuscitation (Katheria, 2017). Umbilical cord milking (UCM), maybe an alternative in infants at risk of resuscitation, while a recent study showed UCM may cause hemodynamic fluctuations (Blank, 2017).

Objective To study the effect of DCC, UCM, UCMV and Early cord clamping (ECC) on red cell volume and hemodynamic changes in a partially asphyxiated transitioning preterm lamb model during resuscitation.

Design/Methods Twenty-three (127-128 d) preterm lambs were randomized to DCC, UCM, UCMV & ECC. Post instrumentation, asphyxiation by cord occlusion resulted in fetal bradycardia (HR<90/min) and perinatal acidosis. In ECC, the cord was clamped immediately, and the lambs were resuscitated. In DCC, resuscitation was initiated and continued for 5 minutes with an intact cord. The cord milking was performed by allowing the cord to refill from the placenta before each milk (Fig 1A). A total of 4 milks were performed to restrict the time to 30 seconds in both cord milking groups. In UCMV, ventilation and cord milking was initiated simultaneously (Fig 1B). Biotin-labeled red blood cells to determine volume, blood gases, and hemodynamic parameters were obtained.

Results The percentage of fetal & placental blood cell volume was higher and significantly differed with UCMV compared to the rest of the intervention (Table 1). Resuscitation with DCC resulted in better ventilation and higher pulmonary blood flow (Table 1, Fig 2D). The carotid flow was significantly higher in lambs who were resuscitated after UCM (Table 1). The fluctuations in carotid flow and pulmonary flow were 24.3±6.2% & 22.6±13.6% from the baseline during UCM (Fig 1A) while these fluctuations were 6.9±2.6% & 4.8±4.4% in UCMV ($p<0.05$) (Fig 1B).

Conclusion(s) Resuscitation with an intact umbilical cord resulted in better ventilation and pulmonary blood flow but not increased red cell volume. Cord milking with ventilation resulted in higher blood cell volume and reduced fluctuation in carotid flow in an asphyxiated preterm model delivered by C-section with an atonic uterus. Clinical trials are needed to validate this translational study.

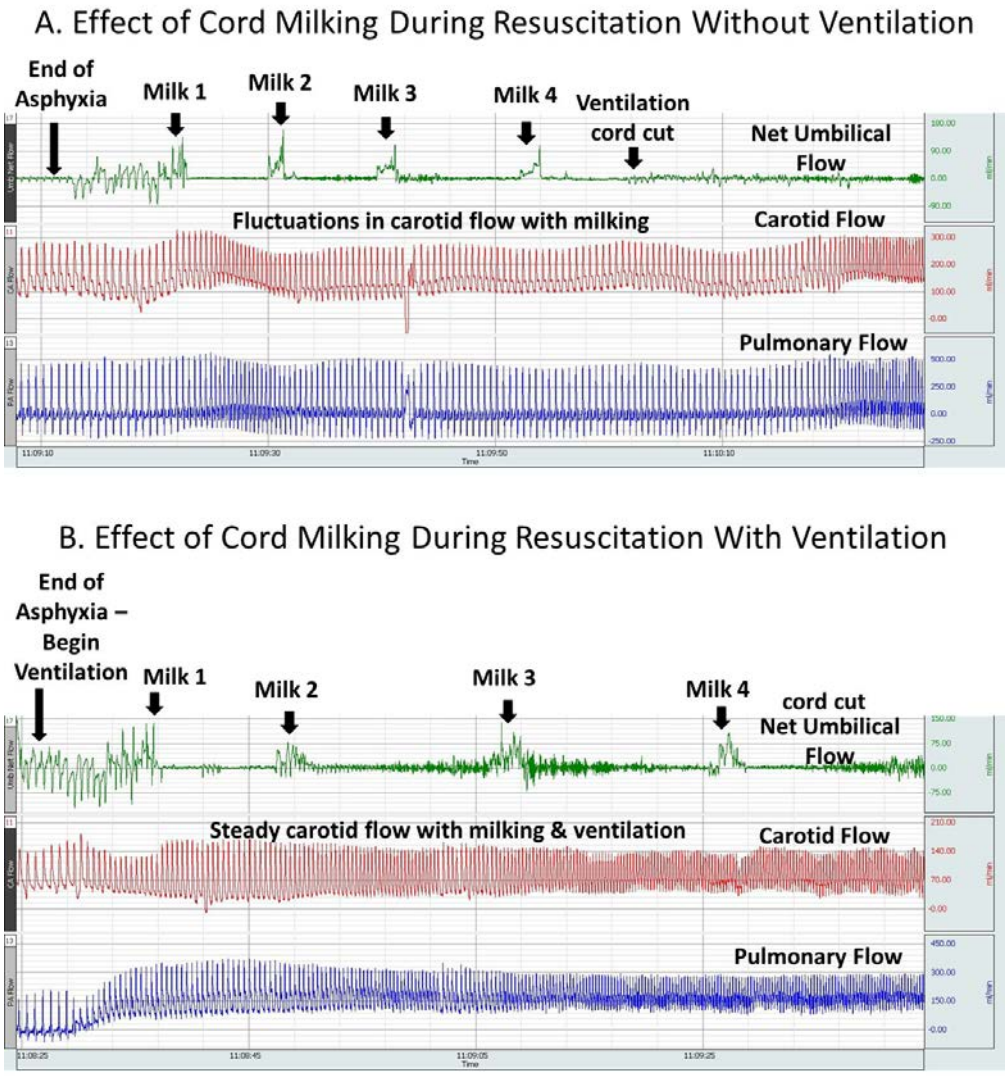

Figure 1 shows the BIOPAC snapshot with 3 different rows showing, net flow (Umbilical venous – umbilical arterial flow), carotid flow and pulmonary flow. Figure 1A shows the effect of umbilical cord milking (UCM) before ventilation and the corresponding fluctuation in carotid flow. Figure 1B shows the effect of umbilical cord milking with ventilation (UCMV) with steady carotid flows.

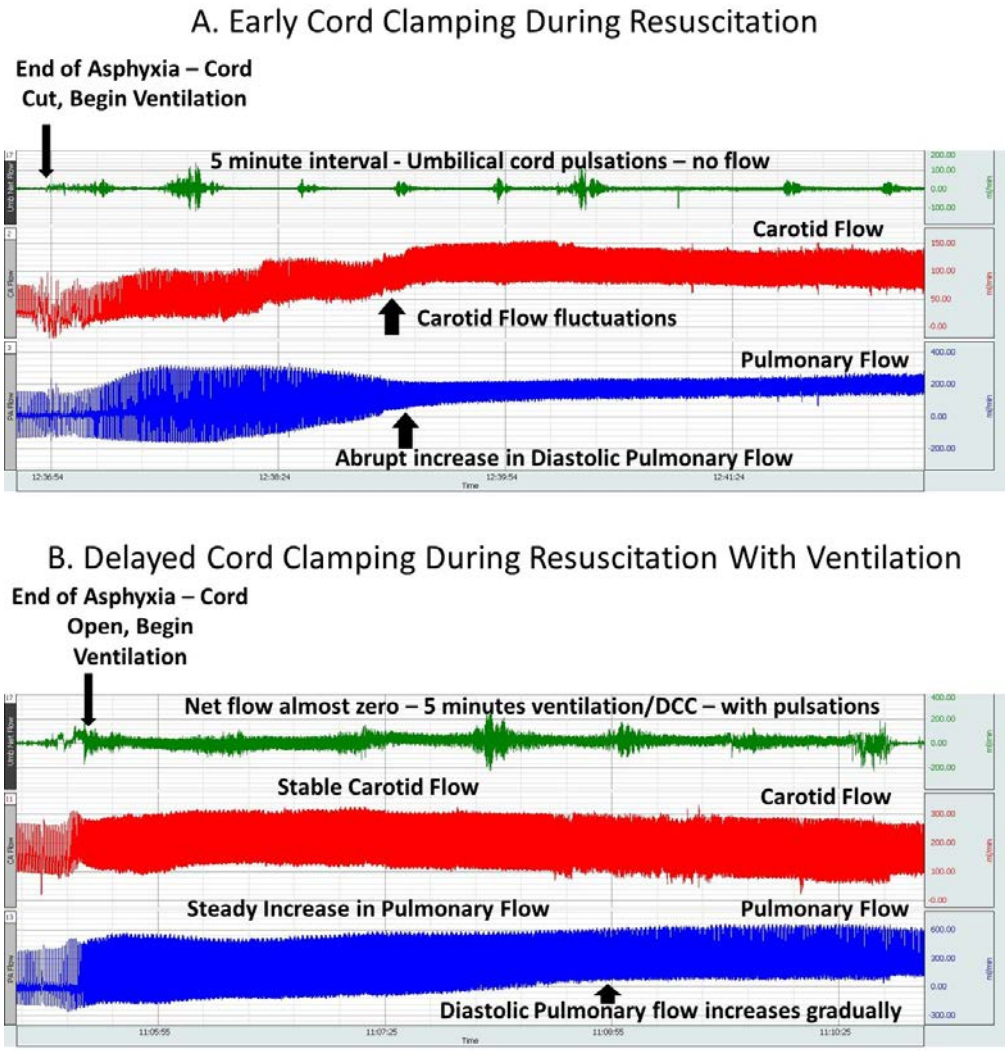

Figure 2 shows the BIOPAC snapshot with A) early cord clamping (ECC) with ventilation for 5 minutes and cord pulsations. Note the abrupt increase in diastolic pulmonary flow. B) the effect of ventilation with delayed cord clamping (DCC) for 5 minutes before clamping. The diastolic pulmonary blood flow gradually increases from negative to positive flow.

Placental transfusion during preterm resuscitation

Parameters	ECC (n=6)	DCC (n=5)	UCM (n=6)	UCMV (n=6)
Gestational age (days)	127±0.4	127±0.5	127±0.4	127±0.4
Birth weight (kg)	3.6±0.5	3.1±0.6	3.3±0.5	3.0±0.6
Gender (n)	M-3, F-3	M-2, F-3	M-3, F-3	M-2, F-4
Multiples (n)	2	1	2	2
At Asphyxia				
HR (per min) Mean BP (mmHg) pH $PaCO_2$ (mmHg)	88±8 36±8 7.0±0.06 95±15	86±10 34±10 7.0±0.05 97±18	87±11 30±10 7.0±0.05 99±13	70±25 37±6 7.0±0.1 96±18
HR (per min) -	96±9	104±10	100±9	105±9

1st minute resuscitation				
1 - 5 minutes of resuscitation				
HR (per min) SpO_2 (%) $PaCO_2$ (mmHg) PaO_2 (mmHg) Mean BP (mmHg) Systolic QPa (ml/kg/min) Diastolic QPa (ml/kg/min) Systolic QCa (ml/kg/min) Diastolic QCa (ml/kg/min)	197±80 53±15* 85±18 33±14 50±13 114±30 -5±25 37±8 13±11	204±68 66±12 67±11* 34±10 48±10 128±56* 4±39* 56±22 17±11	203±84 61±20 108±17* 30±19 58±18 91±38 -12±24 87±25* 10±17	198±72 62±19 93±24 29±14 52±15 109±51 -8±38 60±20 11±10
Red cell volume (%)	68.6±13.5	60.6±10.2	69.4±9.6	85.1±18.0*

*p<0.05 by ANOVA and post hoc test. All values presented as numbers, mean and standard deviation. HR- heart rate, BP - Blood pressure, QPa - Pulmonary artery blood flow. QCa- Carotid artery blood flow.

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Abstract: 166

Postnatal Microbial Colonization Augments Sympathoadrenal Response to Hypoglycemia

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Background Gut microbiota plays an important role during early development via bidirectional signaling between the gut-brain axis. Postnatal colonization is determined by genetics, maternal flora, antibiotic use, mode of delivery, and diet. A mutually beneficial relationship between host and gut microorganisms arises in part from short chain fatty acids (SCFAs), byproducts of bacterial fermentation of dietary carbohydrates. We have shown SCFAs increase tyrosine hydroxylase (TH) gene expression & catecholamine biosynthesis in vitro. TH is the rate limiting enzyme in catecholamine synthesis. Catecholamines may provide a survival advantage in adapting to common postnatal stressors such as hypoglycemia.

Objective To determine if absence of gut microbes alters the sympathoadrenal response to acute insulin-induced hypoglycemic stress.

Design/Methods 8 week old male mice (C57 BL/6) were raised conventionally (control), germ free in sterile conditions with a sterile diet (GF), and conventionally raised mice kept for 1 week in sterile conditions with a sterile diet (SPF). Mice were acclimatized for 1 week, injected with insulin (2IU/kg) or an equivalent volume of 0.9% saline, then sacrificed after 60 or 90 min. Glucose was monitored every 30 min using a handheld glucometer. Urine was collected at baseline, urine and blood were collected immediately at sacrifice for hormone analysis. Cecum was dissected for SCFA analysis, and adrenal TH gene expression levels were determined using real-time RT-PCR. The study was approved by the IACUC at NYMC.

Results Sterile diet for 1 week resulted in lower levels of cecal SCFA in the SPF group, while as expected, GF mice had no cecal SCFA. Female control mice had lower levels of propionate compared to males. In the absence of a microbiome (GF), both basal urine epinephrine levels and insulin induced epinephrine release were significantly lower compared to control ($p<0.05$). Furthermore, GF mice had dysregulated adrenal TH gene expression when compared to control mice. Plasma corticosterone and glucagon levels were similar between control and GF mice.

Conclusion(s) Our data indicates a significant interaction between commensal microbiota and catecholamine baseline levels and responses to hypoglycemic stress. Presence of a microbiome positively correlates with the amount of SCFAs in a diet and gender dependent manner. We speculate that byproducts of gut flora may serve an evolutionary survival advantage in newborns by augmenting catecholamine biosynthesis and sympathoadrenal stress responses.

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Abstract: 167

Inter-Alpha Inhibitor Proteins (IAIPs) Reduce Neutrophilic Infiltration into Brain and Relative Increases in Systemic Neutrophils in Neonatal Rats after Hypoxic-Ischemic (HI) Brain Injury

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Background IAIPs are anti-inflammatory serine-protease inhibitors that we have previously shown to exhibit neuroprotective properties. IAIPs reduce histopathological brain injury, apoptotic cells in the brain, and improve neurobehavioral outcomes in neonatal

rats after HI. However, the mechanism(s) of neuroprotection remain to be determined. Neutrophils are systemic immune cells that can penetrate the blood brain-barrier (BBB) after HI brain injury exacerbating neuroinflammation.
Objective To determine the effects of IAIPs on neutrophilic infiltration into the brain and systemic effects by measuring the Complete Blood Counts (CBCs) in neonatal rats after exposure to HI brain injury.
Design/Methods Postnatal day 7 rats were assigned to one of three groups: a non-ischemic sham-control group (Sham), a right carotid ligation and hypoxia-exposed (8% oxygen for 90 min) placebo-treated group(PL-HI), or an IAIP treated group (IAIP-HI). Rat sex was recorded. IAIP (30 mg/kg) or PL was given intraperitoneally at 0, 24 and 48 h after HI. Number/group/sex ranged from 6-11. 72 hours after HI brain tissue and whole blood were collected. We performed immunohistochemistry with MPO (neutrophil selective) and MMP9 fluorescent markers. Stereological analyses with the StereoInvestigator 10.0 Fractionator probe was performed without knowledge of group assignments to quantify neutrophils and MMP9 positive cells in the brain. CBCs were analyzed (Siemens Advia Analyzer) on whole blood to quantify the total number of white blood cells (WBCs) and % neutrophils per total WBCs.
Results Immunohistochemical analyses showed that MPO positive cells were significantly reduced in male IAIP treated rats compared with PL-HI in the overall damaged hemisphere ($p<0.01$) and the corpus callosum ($p<0.05$). MPO and MMP9 staining co-localized. Treatment with IAIPs reduced the number of MMP9 positive neutrophils in the cortex of male rats vs the PL-HI group ($P<0.05$). CBC analyses showed no significant differences in the number of WBCs between PL-HI and IAIP-HI groups. However, % neutrophils was reduced in male, but not female, IAIP-HI rats as compared to the PL-HI group ($p<0.05$).
Conclusion(s) Taken together our findings suggest that IAIPs may exert their neuroprotective effects in part by reducing the percent of circulating neutrophils resulting in a potential reduction in neutrophil infiltration in the brain of HI male but not female rats.

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Abstract: 168

Mucosal Dysregulation with Increased Pro-Inflammatory Cytokine Expression and Decreased CD4 T-cell Marker Expression is Persistent Months After Recovery from Surgical NEC

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Background Necrotizing enterocolitis (NEC) is a significant cause of morbidity and mortality among premature infants, affecting 7% of extremely low birth weight infants. Other risk factors include prematurity and formula feeding. NEC is a multifactorial disease, but immune system dysregulation has been implicated in its pathogenesis. Several immune markers, such as IL6, IL8, and TNFα, are consistently elevated in patients with NEC. However, the precise pathophysiology leading to NEC is poorly understood.
Objective To identify the inflammatory pathways altered in NEC, we analyzed mRNA expression of immune markers in infants with NEC (n=6), infants who had recovered from surgical NEC (n=3) and age matched controls (n=3).
Design/Methods RNA was extracted from formalin fixed and paraffin embedded slides (RNeasy FFPE Qiagen Kit) and analyzed by nanoString using human immunology panel and nSolver software. Ileal samples were obtained during NEC surgery and 3-6 months later at reanastomosis. Control samples were obtained from infants with ileal atresia. Fold change (FC) ratios of mRNA expression between NEC samples and controls and post-NEC samples and controls were performed. Ingenuity Pathway Analysis (IPA, Qiagen) analyzed FC ratios to determine altered pathways.
Results IPA analysis showed that mucosal CD4 T-cells, particularly Th1 and Th2, including upstream and downstream components, were significantly downregulated in infants with NEC (z score -4.74 and -2.92) and in infants recovered from NEC (z score -2.3 and -1.6) (Table 1). In contrast, pro-inflammatory cytokines such as IL6, IL8, IL1β and calprotectin were upregulated in both NEC and post-NEC samples compared to controls (Table 2).
Conclusion(s) Prior work has shown both up and down regulation of Th1/2 related transcription factors and cytokines in NEC mucosa. Our findings suggest that Th1/2 cell signaling is downregulated in NEC. This downregulation persists after recovery from NEC, implying that infants with NEC have inherent Th1/2 cell dysfunction that continues after NEC. Alternatively, NEC treatments, such as antibiotics, prolonged NPO status, and parental nutrition, could contribute to decreased Th1/2 signaling post-NEC. Interestingly, increased pro-inflammatory cytokine expression was not only observed, as previously described, at the time of NEC surgery, but also was persistent at reanastomosis suggesting a continued disruption in mucosal homeostasis in infants recovered from NEC.

Table 1: Th1 and Th2 pathways downregulated in NEC and post-NEC samples

Gene	NEC FC Ratio	Post-NEC FC Ratio	Pathway
STAT4	-3.19	-2.34	Th1 transcription factor
GATA3	-4.06	-2.76	Th1 and Th2 transcription factor
IL27	-5.4	-4.54	Th1 activation
IL2	-3.79	-2.79	Th1 product and Th2 activation
TBX21	-3.38	-3.37	Th2 activation

CD80	-3.65	-3.15	Th1 and Th2 activation
CD86	-4.67	-2.62	Th1 and Th2 activation
IL12β	-4.91	-3.68	Th1 activation
IL3	-3.37	-2.25	Th2 product
CXCR6	-3.35	-3.21	Th2 product
IL9	-4.55	-2.84	Th2 product
IL17β	-3.28	-2.13	T helper cell differentiation
RORC	-3.73	-2.67	T helper cell differentiation
IL4	-2.91	-1.3 (not significant)	Th1 product

Significant FC ratio defined as >2.

Table 2: Upregulated genes in NEC and post-NEC samples

Gene	NEC FC Ratio	Post-NEC FC Ratio	Pathway
SOCS3	2.42	2.46	Th1 inhibition
IL6	13.02	5.09	IL6 signaling
IL1β	3.34	2.75	Acute phase response signaling
CEBPB	3.15	1.86 (not significant)	IL6 signaling
IL8	26.68	13.68	IL8 signaling
S100A8	6.81	3.2	Calprotectin
S100A9	5.31	2.55	Calprotectin

Significant FC ratio defined as >2.

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Abstract: 169

Pediatric dyslipidemia in a minority and mostly-immigrant inner city population

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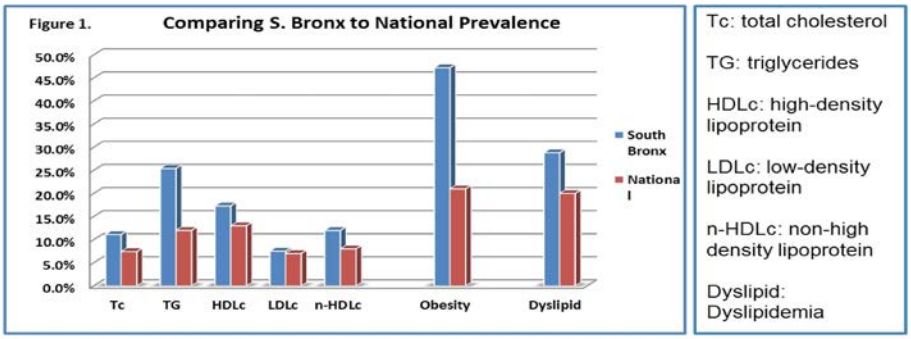
Background Childhood dyslipidemia and obesity have been associated with increased risk of lifelong atherosclerosis and adverse cardiovascular outcomes. Age appropriate universal or risk-based selective lipid screening is now recommended for early disease identification. Despite screening, the true burden of pediatric dyslipidemia has been masked by paucity of published data.
Objective To compare the prevalence of dyslipidemia and obesity in the South Bronx pediatric population to national prevalence and to explore the association between BMI and risk of dyslipidemia
Design/Methods We conducted a retrospective chart review of children aged 3-21 years who had lipid screening at the Bronx-Lebanon Hospital Center pediatric outpatient clinic from June 2012 to June 2017. Study was IRB-approved and data was obtained using ICD-9 and 10 codes for key words. Dyslipidemia was defined as any derangement in total cholesterol (Tc), non-high-density-lipoprotein-cholesterol (n-HDLc) or low-density-lipoprotein-cholesterol (LDLc) levels. We calculated mean serum levels for Tc, n-HDLc, LDLc, and Triglycerides (TG), while BMI was categorized based on age and gender specific percentiles. Serum lipid cut-offs were based on AAP Expert Panel recommendations, while data on national prevalence was based on NHANES and CDC data. Chi-square test of proportions and Logistic regression were used to compare prevalence and test associations at $\alpha=0.05$ significance level using SAS 9.3®.
Results Records for 8644 children were reviewed - half were male (50.1%) and mean age was 13 years. Majority (82%) identified as Black or Hispanic, with 47% of the population having BMI $\geq 95^{th}$ percentile. In general, compared to national data, South Bronx pediatric population showed a significantly higher prevalence of dyslipidemia (29% vs. 20%, $p<0.0001$) and obesity (47% vs. 21%, $p<0.0001$) (Table 1). Compared to subjects with normal BMI, obese (OR=1.6, 95%CI=1.46-1.75) and overweight (OR=1.08, 95%CI= 0.96-1.21) subjects were more likely to have increased odds of dyslipidemia. About 1% (86/8644) required use of statins or immediate referral to a specialist due to very high LDL or TG levels. See supplementary data for details

Conclusion(s) There is a higher prevalence of dyslipidemia in the South Bronx pediatric population compared to national prevalence, placing this population at risk of adverse cardiovascular health outcomes. Targeted public health and patient-level interventions are needed to reduce the risk of adverse cardiovascular events in this and similar populations.

Table 1: Proportion of patients with deranged serum lipid compared (N = 8644)

Parameter	Average	% of patients (South Bronx vs. National)			
	Mean (s.d)	Variable mg/dl	South Bronx	National	P-value
Tc	160.9±32.9	Tc ≥ 200	11.1%	7.4%	<.0001
TG	101.6±68.2	TG ≥ 130	25.4%	12.0%	<.0001
HDLc	52.6±14.3	HDLc < 40	17.3%	13.0%	<.0001
LDLc	88.0±29.2	LDLc ≥ 130	7.5%	7.0%	0.026
n-HDLc	108.3±32.8	nHDLc ≥ 145	12.0%	8.0%	<.0001
Tc-HDL ratio	3.3±1.0	Dyslipidemia	28.8%	20.0%	<.0001

total cholesterol (Tc); non-high-density-lipoprotein-cholesterol (n-HDLc); low-density-lipoprotein-cholesterol (LDLc); triglycerides (TG), high-density-lipoprotein-cholesterol (HDLc); standard deviation (s.d).



Supplementary data

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Abstract: 170

The Paternal Psychosocial Environment: Race, Stress & Perinatal Outcomes

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Background Evidence supports the association between maternal race & psychosocial environment with adverse birth outcomes. However, little is known regarding the impact of paternal factors.

Objective To determine whether paternal race & psychosocial factors influence birth outcomes.

Design/Methods This is an interim analysis of a cross-sectional survey completed by ≥18 y/o English speaking parents of live singletons. Items were adapted from pre-validated tools(Pregnancy Risk Associated Monitoring System & Population Assessment of Tobacco & Health) & linked to birth certificate data. Psychosocial stress included events such as partner incarceration, job loss, homelessness & was categorized as 0, 1, or ≥2 stressors. Self-reported race/ethnicity included Hispanic(H), Non-Hispanic White(NHW), Non-Hispanic Black(NHB), & Other. Social services included WIC/food stamps, counseling for family/personal problems, help to quit smoking & reducing domestic violence. High risk pregnancy conditions (HRP) were maternal age ≥35 or <20 yrs, previous preterm delivery & pregnancy-related conditions such as preeclampsia. Toxic habits were use of alcohol, tobacco or drugs during pregnancy. Outcomes assessed were NICU admission, small-for-gestational age (SGA), prematurity, & adverse birth outcome (composite of all 3). χ^2, Fisher's Exact test, & logistic regression were used.

Results 146 sets of parents were included with 67% NHW fathers, 12% NHB, 17% H & 4% Other. 42% of fathers reported no stressors, 24% reported one & 34% ≥2. HRP, social services, SGA & adverse birth outcome were not associated with paternal race or stress. Paternal race, not stress, was significantly associated with toxic habits, NICU admission & preterm birth. Logistic regression adjusting for parental stress, maternal race/ethnicity, HRP, social services, & parental toxic habits showed increased odds of adverse outcomes in NHB fathers [OR 9.6; 95%CI 1.4-64.1] but not H or Other compared to NHW. Of the adverse outcomes, there was a higher likelihood of NICU admission but not SGA or prematurity for NHB fathers [OR 372.2; 95%CI 10.7-12920.8] & H fathers [OR

33.0; 95%CI 2.8-391.1] & no difference with Other.
Conclusion(s) Adverse birth outcomes, especially NICU admissions, is associated with paternal race/ethnicity even when taking into account both maternal & paternal psychosocial risk factors as well as maternal race/ethnicity. Paternal race/ethnicity confers additional stress via racism that is challenging to quantify, but should be recognized by providers as a contributor to perinatal health.
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Abstract: 171
Digital Dependence in Diapers: An Examination of Internet Addiction Symptoms in Children Aged 0-3 Years
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Background Internet addiction (IA), now included in the DSM-V, has been described in adults as having 4 components: 1) excessive use of electronic media, 2) withdrawal when removed, 3) tolerance, and 4) negative repercussions, including arguments and tantrums when removed. While studies have identified IA symptoms in adolescents, there has been little research examining this in younger children. Anecdotally, even parents of toddlers are reporting more than recommended digital device (DD) use and severe resistance/temper tantrums after removal of DD, all of which parallel early signs of IA.
Objective To examine the presence of IA symptoms in toddlers and whether these symptoms predict severity and duration of negative emotional reactions (NE) due to DD removal.
Design/Methods In an anonymous Amazon Mechanical Turk survey, parents of children aged 0-3 years were asked to measure IA symptoms in their child using a modified Young's IA Test, the official diagnostic tool for adult IA. Parents were asked 13 questions on their child's DD usage, each graded from 1 (Never) to 5 (Always), for a total score from 0-65. Young's scoring categories were adjusted:16.5≤ (non-addicted), >16.5 to 26.95 (mild), >29.65 to 39.5 (moderate), and >39.5 (severe). Parents were also asked about frequency and duration of child NE to DD removal. Linear regressions were used to determine whether IA score predicted NE.
Results Of the 637 survey participants, 511 completed all questions (43.6% female, mean age of 29.7 months), of which 90.6% of children used at least 1 DD. Of these children, 40% were non-addicted, 29% mildly, 22% moderately, and 9% severely addicted according to Young's scoring categories, with a mean IA score of 21.1 (mildly-addicted). 63.5% of children were indicated as getting upset after DD are taken away, with an average NE episode lasting 11 minutes and a mean severity of 2.4 on a scale of 1 (not very upset) to 5 (extremely upset). In addition, higher child IA scores were associated with parents being more likely to indicate that their child would get upset ($p<0.001$), be upset for longer ($p<0.001$), and be more severely upset ($p<0.001$).
Conclusion(s) Although many of the symptoms described above can be part of natural emotional growth processes in children, the fact that these symptoms may be exacerbated by DD usage may be detrimental to future emotional regulatory development. The AAP and clinicians need to encourage strict limit setting with DD and the use of other toys/objects to help distract and soothe children.

Figure 1: Modified Young's IA Test for Toddlers Questions
Do you find that your child spends more time on digital devices than you wanted?
Do you find it difficult to take a digital device away from your child?
Do you find that you wish you could set a digital screen-time limit or block for your child?
Does your child lose sleep due to time spent on digital devices?
Do you find your child passing time on a digital device rather than on **learning** activities, such as reading a book?
Do you find your child passing time on a digital device rather than **physical** activity, such as playing outside?
Do you find your child passing time on a digital device rather than spending time with friends or family?
Do you find your child spending more time with "virtual characters", such as characters from TV shows, as opposed to real people?
Do you find it hard to remove or limit digital technology from your child because of an emotional or physical reaction, such as throwing a temper tantrum or crying?
Do you find your child feeling uneasy when they have no access to a digital device?
Does your child have a digital device readily accessible to them whenever they want?
Has the amount of time that your child spends on digital devices been increasing?
Does your child get upset after you remove a digital device from him/her?

Figure 1: Modified Young's IA Test for Toddlers Questions

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Abstract: 172

Timely completion of pediatric inpatient discharge summaries: a quality improvement project.

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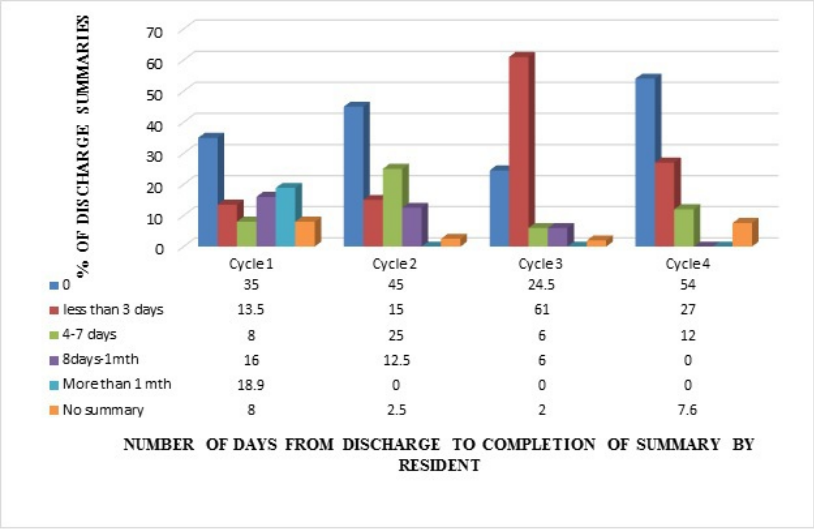
Background We recognized that a delay in the completion of discharge summaries (DS) could affect patient care, transfer of medical information and billing. Previous studies have shown that taking more than 3 or 7 days to complete a discharge summary was associated with an increased odds for readmission.

Objective We undertook this project in July 2016 with an aim to assess and rectify the potential causes of delayed pediatric inpatient DS completion and to ensure completion of good quality inpatient DS within 3 days of discharge.

Design/Methods A formal quality improvement (QI) curriculum that included didactic lectures and mandatory small group discussions provided the team with guided education on QI concepts and strategies. A pilot study to collect baseline data on completion rates of discharge summaries was done to assess the magnitude of the problem. A resident survey was then administered to elucidate contributing factors to the delay. QI strategies of establishing process maps, performing a fish-bone analysis and laying out ideas on impact diagrams were applied to generate action plans. Participating stake-holder groups included residents, faculty, nursing, pharmacy, medical informatics, and clinician education. Data was collected and analyzed quarterly, sampling all DS completed during the third week of resident inpatient rotations. We implemented new interventions with each PDSA cycle (see table 1).

Results The resident-based survey revealed that delay in timely completion of DS was largely secondary to unclear assignment of DS and lack of communication between residents. After extensive inpatient resident training at the beginning of every month, the rate of completion of DS by residents within 72 hours of discharge increased from 48.5% in PDSA cycle 1 to 60%, 85% and 81% in the second, third and fourth PDSA cycles, respectively (see figure 1). Rate of completion of DS within 1 month of discharge increased from 72.5% in cycle 1 to 93% in cycle 4.

Conclusion(s) Lack of resident training, poor resident knowledge about the importance of DS completion, and difficulties using the current DS templates on EMR caused delays in timely completion of DS. Timely education and training for residents, use of acronym expansions, timely assignment of DS to the primary resident, effective communication amongst residents, and attending feedback incorporation into resident evaluations led to significant improvement in timely completion of DS.



Details of PDSA Cycles

PDSA	CYCLE 1 (Baseline)	CYCLE 2	CYCLE 3

PLAN	Timely completion of DS.	To complete > 90% of DS within 72 hours.	To complete >90% of DS within 72 hours.
DO	Define SMAART (specific, measurable, attainable, realistic, time-bound) aims and objectives, quarterly data collection and data analysis (DA).	Resident survey; Reviewed literature and Joint Commission requirements for DS; Inpatient resident training and introduction to ideal DS process map.	Prepare for new interventions as per impact diagram
STUDY	First and second DA showed 48.5% and 60% of DS were completed within 72 hours of discharge respectively.	Third DA showed significant improvement with 85% of DS completed within 72 hours.	Fourth DA showed 81% of DS were completed within 72 hours
ACT	Implementation of DS QI clinic with formal curriculum.	Reinforce current interventions.	Monthly orientation for all inpatient residents; Discharging resident responsible for DS; Hard stop for supervising attending assignment for DS signature; Created a pediatric specific DS template.

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Abstract: 173

Incidence of Car Seat Tolerance Screening Failure Among Infants Who Were Not Preterm or Low Birth Weight

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Background Car Seat Tolerance Screening (CSTS) was developed to identify infants at risk of hypoxia and bradycardia when placed in a car seat. Currently, the AAP recommends CSTS prior to discharge for all infants born preterm, and ~50% of NICUs also include full term low birth weight (LBW, <2.5kg) infants in testing protocols. Many neonatal providers have additional inclusion criteria for CSTS that are "off protocol," or not specifically recommended by the AAP, including respiratory support requirements, abnormal neuro exams, etc. Although data exist for CSTS failure in premature (~5-25%) and LBW (~5%) infants, data on CSTS performance and failure incidence in these other groups are limited.

Objective To identify variables associated with performing "off protocol" CSTS as well as incidence and risk factors of CSTS failure in those born full term and not LBW.

Design/Methods Retrospective medical record review of subjects born in 2013-2014. Inclusion criteria: born ≥37 weeks gestational age (GA), BW ≥2.5kg, survival to discharge. Exclusion criteria were: family declined CSTS or transferred prior to appropriate time for CSTS. We compared demographic and clinical characteristics between eligible subjects who did vs. did not undergo CSTS and between those who failed vs. passed the initial CSTS. Analysis was conducted using T-test, Fisher Exact, Chi-square, Wilcoxon Rank Sum as appropriate.

Results During our study period, 2528 neonates met inclusion/exclusion criteria. Of these, 128 (5.5%) underwent CSTS testing and we had results for 127 (99.2%). Those tested were significantly more likely (p<.001) to be diagnosed with hypoxic ischemic encephalopathy, require positive pressure ventilation (PPV) during resuscitation, be treated with respiratory support, be small for gestational age (SGA), and be initially admitted to the NICU. Of those tested, 5.5% failed (n=7). Those who failed were significantly less likely to have required PPV during initial resuscitation (p=0.04) and were more likely to be SGA (p=0.04).

Conclusion(s) This is the first study to assess incidence of CSTS testing in full term, non-LBW infants. We found a similar incidence of failure in this cohort as has been previously reported in LBW and preterm infants. We identified clinical variables that predicted CSTS testing in neonates, though few of those were predictors of CSTS failure. Additional studies of these "off protocol" subjects are needed to further identify which characteristics are driving providers to perform CSTS and if this is warranted.

Table 1. Predictors of Undergoing CSTS Prior to Discharge in Full Term non-LBW Infants

	Underwent CSTS (n=128) N (%) or mean (SD)	No CSTS Performed (n=2400) N (%) or mean (SD)	P-Value
Male Sex	76 (59%)	1267 (53%)	0.3428
Race: African American Caucasian Other	80 (63%) 36 (28%) 12 (9%)	1800 (75%) 462 (19%) 138 (6%)	0.0064
C-section Delivery	49 (38%)	633 (26%)	0.0032
Positive Pressure Resuscitation in Delivery Room	47 (37%)	201 (8.4%)	<0.0001
Location of Admission: NICU Newborn Nursery	77 (60%) 51 (40%)	269 (11%) 2126 (89%)	<0.0001
Ever in the NICU	92 (72%)	333 (14%)	<0.0001
Small for Gestational Age (SGA)	26 (26.8%)	48 (2%)	<0.0001
Birth Weight, gm	3121 (574)	3284 (416)	0.0020
Birth Gestational Age, wk	39.1 (1.3)	39.4 (1.1)	0.1157
Intraventricular Hemorrhage	6 (5%)	6 (0.3%)	<0.0001
Hypoxic Ischemic Encephalopathy	8 (6.3%)	9 (0.4%)	<0.0001
Maternal Anesthesia: General Spinal/Epidural	2 (2%) 82 (87%)	27 (1.4%) 1584 (80%)	0.1542
Apgars: 1 minute 5 minutes (median and IQR)	8 (3) 9 (1)	9 (1) 9 (0)	0.8585 0.9988
Surfactant Treatment	3 (2.4%)	1 (0.04%)	<0.0001
Ventilator Requirement	21 (17%)	23 (1%)	<0.0001
CPAP requirement	33 (26%)	63 (2.6%)	<0.0001
Low Flow Nasal Canula Requirement	35 (27%)	39 (1.6%)	<0.0001
Post-natal Steroid Treatment	5 (4%)	4 (0.2%)	<0.0001
Positive Maternal Urinary Toxicology	5 (8%)	166 (7.7%)	0.9420

CPAP, continuous positive airway pressure; CSTS, car seat tolerance screen; GA, gestational age; IQR, interquartile range; NICU, neonatal intensive care unit; SGA, small for gestational age

Table 2. Predictors of Failing Initial CSTS in Full Term non-LBW Subjects

	Passed Initial CSTS (n=120) N (%) or Mean (SD)	Failed Initial CSTS (n=7) N (%) or Mean (SD)	P-Value
Male Sex	71 (59%)	4 (57%)	0.8949
Race: African American Caucasian	74 (62%) 35 (29%)	4 (57%) 1 (14%)	0.1845
Maternal General Anesthesia	2 (2.3%)	0 (0%)	0.6467
C-section Delivery	45 (38%)	4 (57%)	0.4295
Location of Admission: NICU Nursery	74 (62%) 45 (38%)	2 (29%) 5 (71%)	0.1129

Ever in the NICU	88 (74%)	3 (43%)	0.0743
SGA	22 (24%)	4 (67%)	0.0442
Birth Weight, gm	3142 (580)	2862 (456)	0.1639
Birth GA, wk	39.1 (1.3)	39.1 (1.4)	0.9097
Apgars: 1 minute 5 minutes (Median and IQR)	9 (4) 9 (1)	8 (1) 9 (1)	0.3757 0.4406
Intraventricular hemorrhage	6 (5.2%)	0 (0%)	0.5373
Hypoxic Ischemic Encephalopathy	8 (6.7%)	0 (0%)	0.4784
Resuscitation with Positive Pressure Ventilation in Delivery Room	47 (40%)	0 (0%)	0.0444
Ventilator Requirement	21 (17.5%)	0 (0%)	0.6004
CPAP Requirement	33 (27.5%)	0 (0%)	0.1112
Low Flow Nasal Canula Requirement	34 (28.3%)	1 (14%)	0.6723
Multiple Gestation	3 (2.5%)	0 (0%)	0.6707
Positive Maternal Urinary Toxicology	4 (7%)	1 (14%)	0.3529
Weight at CSTS, gm	3296 (810)	2806 (455)	0.0298

CPAP, continuous positive airway pressure; CSTS, car seat tolerance screen; GA, gestational age; IQR, interquartile range; LBW, low birth weight; NICU, neonatal intensive care unit; SGA, small for gestational age

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Abstract: 174

Healthcare Utilization in CenteringParenting® and Individual Well Baby Care in a Low Income Community

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Background CenteringParenting® is an innovative, dyad model of group well baby care. Little is known about the impact of the CenteringParenting® model on healthcare utilization among children in high risk communities.

Objective To assess healthcare utilization in patients participating in CenteringParenting® (group well baby care) vs. traditional individual well baby care in a low income, minority community.

Design/Methods We conducted a cross sectional study at a pediatric academic practice in an urban, low income, minority community. A convenience sample of parents of newborns were offered participation in group well baby care or traditional individual well baby care, based on group appointment availability. In the group care model, a cohort of 6-8 infant/mother dyads and a provider come together for 2-hour long, well visits during the first 2 years of life. Group visits include 30-45 minute health assessments, 60 minute facilitated group discussion guided by a structured age-based curriculum, and 15 minute screening tests and immunizations. All providers – residents and faculty – are trained in group facilitation and participate in group and individual care. The study population includes all 6, 12, 18 or 24 month old infants seen Jan 2015-June 2017 who had at least 2 well baby visits and their well baby visits were either all in group care or all in individual care. Outcome measures include number of well visits, no shows and sick visits.

Results Patient demographics were similar in group and individual care: 95% were low income (public insurance) and 95% were ethnic minority (72% Black, 14% Hispanic). Infants in group care made a significant greater number of well visits in all age groups and had a greater number of no shows in the first 6 months. Sick visits were not significantly different. (Table)

Conclusion(s) In a low income, minority community, infants participating in the CenteringParenting® model of group well baby care had significantly greater number of well visits, but comparable number of sick visits than infants in individual care. Larger, controlled studies are need to further assess the efficacy of group care as an alternative model of care in low income minority communities.

Table: Well Baby Visits, No Shows and Sick Visits in Group Care and Individual Care

	Well Baby			No Shows			Sick Visits		
Infant Age	Visits (n)	SD	p-value	(n)	SD	p-value	(n)	SD	p-value
6 months									
Group care (N=42)	4.6	1.5	<0.001	1.6	1.7	0.006	1.5	1.5	0.435
Individual Care (N = 186)	3.0	0.8		1.0	1.1		1.8	1.8	
12 months									
Group care (N=34)	6.6	1.7	<0.001	1.6	1.8	0.363	1.7	1.6	0.012
Individual Care (N = 230)	3.9	1.3		1.9	1.9		2.8	2.5	
18 months									
Group care (N = 36)	7.5	2.1	<0.001	3.0	2.5	0.155	3.0	2.1	0.152
Individual care N = 203)	5.6	1.8		2.4	2.2		3.8	3.0	
24 months									
Group care (N=45)	9.7	2.3	<0.001	3.0	2.6	0.069	3.9	3.9	0.188
Individual care (N = 285)	6.3	2.3		2.3	2.3		3.2	3.2	

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Abstract: 175

Regional Tissue Oxygenation in Full-Term Infants with Presumed Sepsis

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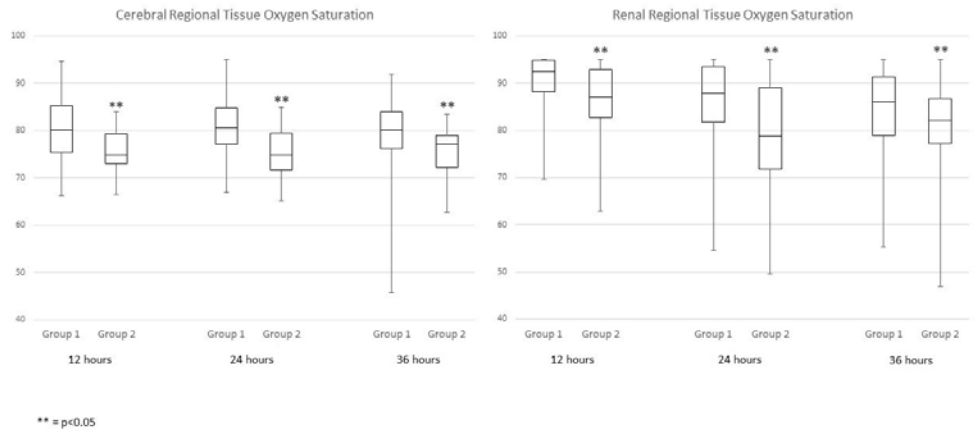
Background Presumed sepsis due to chorioamnionitis commonly results in admission of well full-term infants to the NICU for antibiotics. Currently, duration of therapy is determined by results of blood cultures and inflammatory markers, including complete blood count (CBC) and C-reactive protein (CRP) values. Adult studies have indicated that tissue oxygen extraction, derived using near-infrared spectroscopy (NIRS), correlates with sepsis severity.

Objective We hypothesized that infants with abnormal inflammatory markers would demonstrate elevated cerebral and renal oxygen extraction when compared to those with normal values.

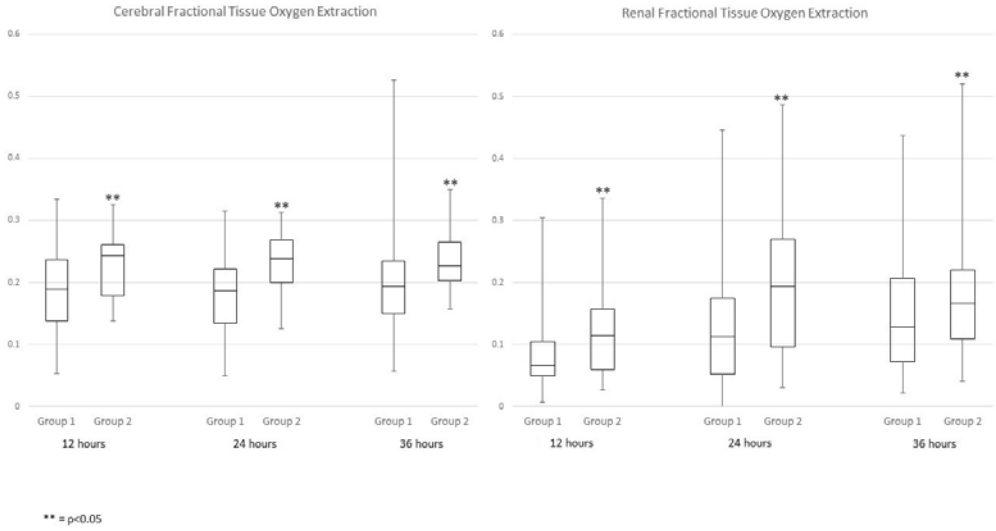
Design/Methods In this prospective observational study, we calculated cerebral and renal oxygen extraction among well full-term infants receiving antibiotics for presumed sepsis due to chorioamnionitis. Cerebral and renal NIRS-based oxygenation (rSO_2) data were collected for one-hour intervals at 12, 24, and 36 hours of life. Blood cultures were collected at birth, CBCs at 0 and 24 hours, and CRPs at 12 and 24 hours. Antibiotic duration was determined by attending neonatologists without knowledge of NIRS data. Infants were grouped based on length of treatment. Cerebral and renal fractional tissue oxygen extraction (FTOE), calculated using NIRS data, were compared between treatment groups at each time point.

Results Between June, 2016 and January, 2018, 343 term infants admitted to the Stony Brook Children's Hospital NICU for presumed sepsis due to chorioamnionitis were assessed for eligibility and 44 were enrolled, of which 36 (82%) received 48 hours of antibiotics and 8 (18%) received prolonged courses. Maternal fever was higher in the prolonged treatment group (38.9 vs. 38.4 °C, $p=0.002$), as were the immature/total white blood cell ratios (0.21 vs. 0.10, $p=0.001$) and CRPs (1.7 vs. 0.1 mg/dL, $p<0.001$). Blood cultures were negative in all subjects. The prolonged treatment group had a higher rate of funisitis on placental pathology (75% vs. 32%, $p=0.045$). At all comparison points, cerebral and renal rSO_2 were reduced in the prolonged treatment group (see figure; $p<0.001$). Consistent with our hypothesis, cerebral and renal FTOE were elevated in the prolonged treatment group at all time points (see figure; $p<0.001$).

Conclusion(s) Cerebral and renal NIRS have potential utility as a noninvasive screening modality for clinical sepsis among asymptomatic neonates receiving antibiotics due to chorioamnionitis. Further analysis is needed to determine the sensitivity and specificity of NIRS in guiding presumed sepsis evaluations.



Cerebral and renal tissue oxygen saturation data



Cerebral and renal fractional tissue oxygen extraction data

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Chorioamnionitis induces Differential DNA Methylation in Cord Blood Mononuclear Leukocytes

Gina Fong[1], Suhita Gayen nee Betal[1], Michael T. Favara[1], Sankar Addya[2], Zubair H. Aghai[1]

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Background Histological chorioamnionitis (CHORIO) is an infection of fetal membranes and complicates 5.2%-28.5% of all live births. The exposure to CHORIO has long-term consequences including abnormal neurodevelopment and an increased risk for allergic disorders and asthma later in childhood. CHORIO may incite epigenetic changes, which has the potential to modulate both the immune and neurological systems as well as increase the risk of immune and neurological disorders later in life. However, there is limited data on the impact of CHORIO on epigenetics, in particular DNA methylation, and changes to the immune and neurological systems in full-term human neonates.

Objective To determine differential DNA methylation in cord blood mononuclear leukocytes from neonates exposed to histological CHORIO.

Design/Methods Cord blood was collected from 10 term neonates (5 with histological CHORIO and 5 controls). Fetal membrane sections were stained with hematoxylin and eosin and were then reviewed by a blinded pathologist. Mononuclear leukocytes were isolated using Ficoll-paque plus density gradient. Genomic DNA was isolated using QIAamp DNA mini kit (Qiagen, Valencia, CA).

Genome-wide DNA methylation screening was then performed using Infinium MethylationEPIC BeadChip (Illumina, San Diego, CA).
Results Mononuclear leukocytes from the cord blood of CHORIO-exposed neonates showed differential DNA methylation of 68 probe sets compared to the control group (44 hyper-methylated, 24 hypo-methylated) with a p-value ≤ 0.0001. Several genes involved in immune modulation and nervous system development were found to be differentially methylated. Top hyper-methylated and hypo-methylated sites of our interest are listed in Table-1. Top-scored canonical pathways as revealed by Ingenuity Pathway Analysis (IPA) were D-myo-inositol-tetrakisphosphate biosynthesis, 3-phosphoinositide degradation, D-myo-inositol-5-phosphate metabolism, 3-phosphoinositide biosynthesis, superpathway of inositol phosphate compounds, sphingosine and sphingosine-1-phosphate metabolism and dopamine degradation. The diseases and disorders picked up by IPA are nervous system development and function, neurological disease, respiratory disease, immune cell trafficking, inflammatory response and immunological disease.
Conclusion(s) Histological CHORIO induces differential DNA methylation in cord blood mononuclear leukocytes. The differentially methylated genes may contribute to inflammatory, immunological and neurodevelopmental disorders in neonates exposed to histological CHORIO.

Table 1: Top hyper-methylated and hypo-methylated sites of our interest for the CHORIO group compared to the control group (p-value ≤ 0.0001):

CpG Site	Reference Gene Symbol	Chromo-some No.	Strand	Test Statistics	Methylation Status	p-values	Gene Location / Reference Gene Group	Island Location
cg19448065	VGLL4;VGLL4	chr3	+	15.189	HYPER-METHYLATED GENES	8.54E-08	Body;Body	OpenSea
cg00995577	AGR2	chr7	+	10.897		1.53E-06	TSS1500	OpenSea
cg12363975	AGAP1;AGAP1;AGAP1	chr2	+	10.709		1.78E-06	Body;Body;Body	OpenSea
cg09304034	SMIM15;CTC-436P18.1	chr5	-	9.534		4.75E-06	5'UTR;TSS1500	N_Shore
cg02086467	OTX2	chr14	-	7.855		2.34E-05	5'UTR	Island
cg14541152	SCAMP5	chr15	-	6.876		6.73E-05	3'UTR	N_Shelf
cg17130789	SLC11A1	chr2	-	6.806		7.29E-05	Body	Island
cg26933865	PPP4C	chr16	+	-6.904	HYPO-METHYLATED GENES	6.52E-05	TSS1500	N_Shore
cg14887613	MIER2	chr19	+	-7.674		2.82E-05	TSS1500	Island
cg24239266	OR13C2	chr9	+	-8.256		1.56E-05	1stExon	OpenSea
cg14469826	ABCC8	chr11	+	-10.509		2.09E-06	TSS1500	S_Shore

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Stomping Harm and Reducing Preventable Infections (SHARPI) Rounds - A novel strategy for harm prevention
Ursula Nawab, Kathleen Gibbs, Dave Munson, Theresa O'Connor, Megan Cunningham, Kaitlyn Donnelly, Cailin Tallent, Bridget Cei, Heather M. Monk
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Background Elimination of central line associated blood stream infections (CLABSI) is a patient safety priority. Our quaternary NICU struggles on our journey to zero harm. Apparent cause analyses identified lapses in bundle compliance, but did not impact CLABSI rates
Objective To utilize SHARPI rounds to discuss bundle compliance, line necessity and accesses at the bedside in order to reduce CLABSI rates.
Design/Methods An intra-professional team of physicians, nurses and pharmacists was created to round weekly on all infants with central lines. The aim was to frame conversations reinforcing bundle compliance, line necessity and limit line access. The team identified opportunities and used just in time coaching to increase use of enteral medications, standardize line care, identify high risk patients, and decrease line access and line days. Data collection via RedCap tracked interventions and trends in care. Bundle compliance, CLABSI rates, central lines accesses and provider concerns are discussed on SHARPI rounds. Control charts were used to track process and outcome measures.
Results CHOP NICU (98 beds) cares for medically/surgical complex infants. There were 13,952 line days in FY17 and ~30 lines/day. In 2007 SHARPI encounters, 48% had an intervention. Common interventions were related to medications (20%), bundle compliance (14%), and patient specific line care (18%) (Table 1). CLABSI rates decreased from 1.6 to 1.3 (Fig 1) with a 58% reduction in CLABSIs over FY17. Bundle compliance for FY17 was > 96%. Process measures related to CHG sign use increased and line access decreased. (Fig 2) Assuming no change in baseline rates, an estimated 5 CLABSIs were prevented after initiation of SHARPI rounds.
Conclusion(s) Intra-professional discussions focused on harm reduction is a novel strategy for CLABSI prevention. SHARPI rounds engage the front line in harm prevention and enhances the safety culture. Bedside assessment of medication regimens resulted in decreases in central line accesses, prevention of central line placement, and enteral conversions leading to earlier line discontinuation. Daily rounding at the bedside with a dedicated team fosters an environment in which concerns, deviations, standards of care are openly discussed and issues are proactively addressed.

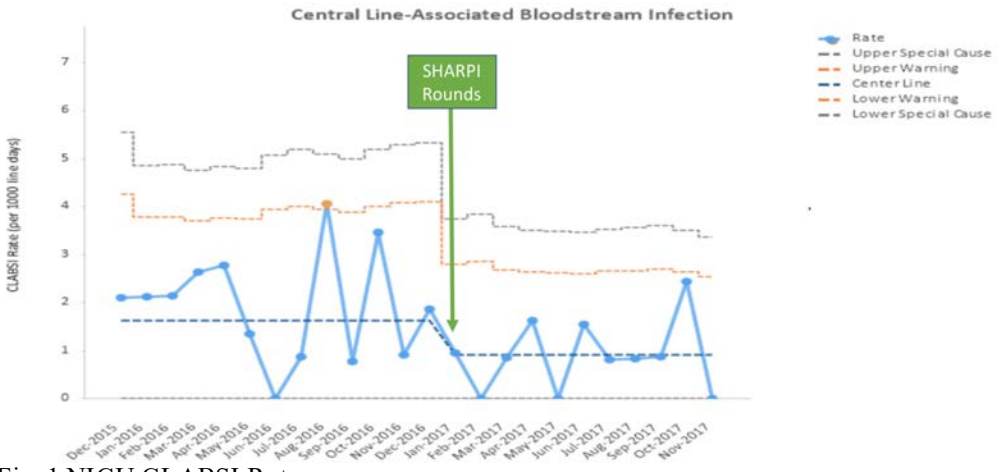

Fig. 1 NICU CLABSI Rates

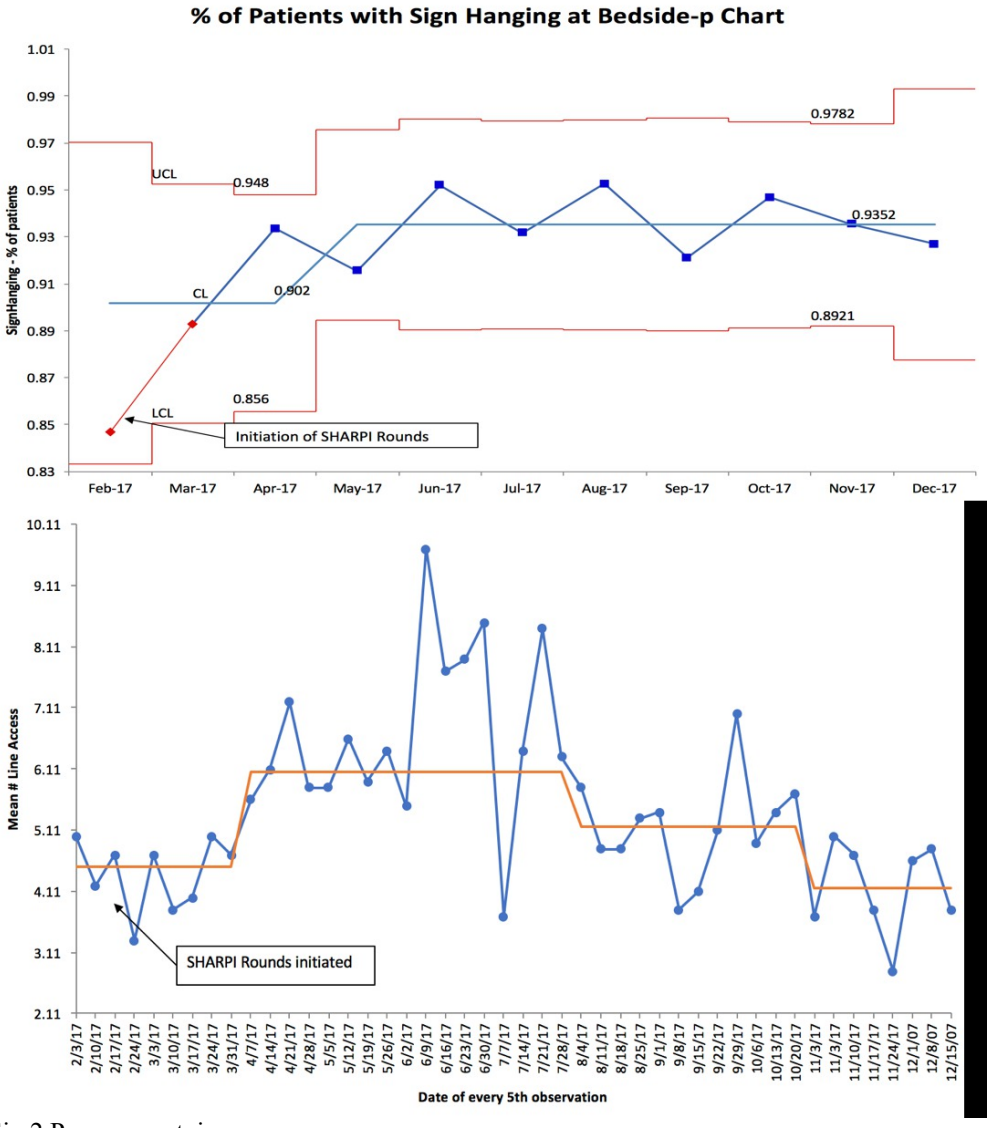

Fig 2 Process metrics:
a) CHG sign at the bedside with timing of CHG bath (part of bundle compliance)
b) Number of access over time.

SHARPI Interventions

No Intervention Required	52%
Pharmacy	
IV Compatibility Plan	8%
Develop Sedation Wean Plan	2%
Convert Meds to Enteral to decrease accesses	7%
Decrease number of accesses	3%
Bundle Compliance	
Hang CHG/SAGE sign	8%
Write date of transition to CHG on sign/write time on CHG sign	4%
Label Lines	2%
Proactive Recommendations	
Discuss line with medical team	4%
Place two person policy for blood draw at bedside	1%
Use PIV for intermittent meds	7%
High Risk - suggest two person cap/line change	0.4%
Update line plan/care in bulletin	2%
Other Line or dressing related concerns or patient specific issues (Contact IR, VAS team eval)	18%

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Abstract: 178

Socioemotional, communication and mental health outcomes at 10 years in extremely preterm newborns with late-onset bacteremia.

Kikelomo Babata[1], Reeves Bright[2], Elizabeth Allred[3], Carmina Erdei[4], Robert Joseph[6], Karl Kuban[7], Michael O'Shea[5], Olaf Dammann[8], Alan Leviton[3]

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Background

Compared to their term peers, extremely preterm infants (born before 28 weeks) are at increased risk of social and communication disorders. A constellation of mental health disorders known as the “preterm behavioral phenotype” has also been described. Bacteremia’s effect on mental health outcomes in the extremely preterm remains unclear.

Objective To study communication, socioemotional and mental health correlates of suspected and definite late-bacteremia among a contemporary US cohort of extremely preterm 10-year-old children (ELGAN Study).

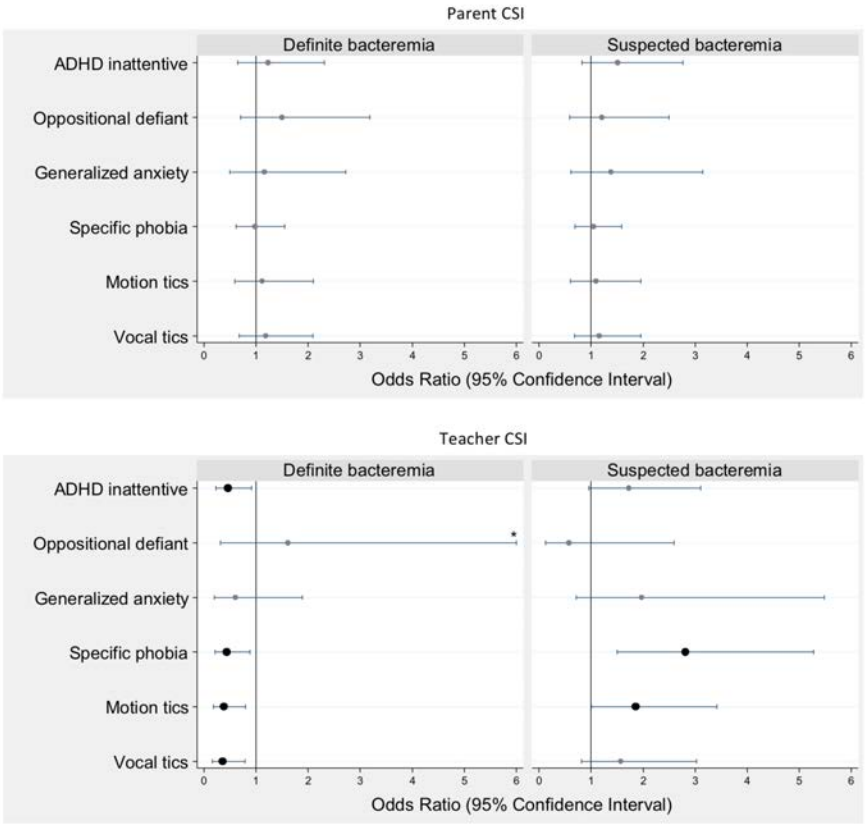
Design/Methods

Parents, teachers, and 10-year-olds completed evaluations which included the Child Symptom Inventory-4 (CSI-4), the Social Responsiveness Scale (SRS), the Autism Diagnostic Observation Schedule-2 (ADOS-2), and the Children's Communication Checklist-2 (CCC-2).

Results Of 889 ex-extremely preterm 10-year-olds, 26% had definite late-bacteremia and 14% had suspected late-bacteremia. After adjusting for medical and social variables, neither form of late bacteremia was associated with autism spectrum disorder [OR 1.7, 95% CI (0.89 -3.3); and 1.4, 95% CI (0.6 – 3.2)] or with behavioral problems identified by the Child Symptom Inventory-4. However, compared to their peers without late-bacteremia, extremely preterm who had either suspected late bacteremia or definite late bacteremia were at increased risk of social and communication impairments identified by the Social Responsiveness Scale and Children's Communication Checklist-2. [See figure]

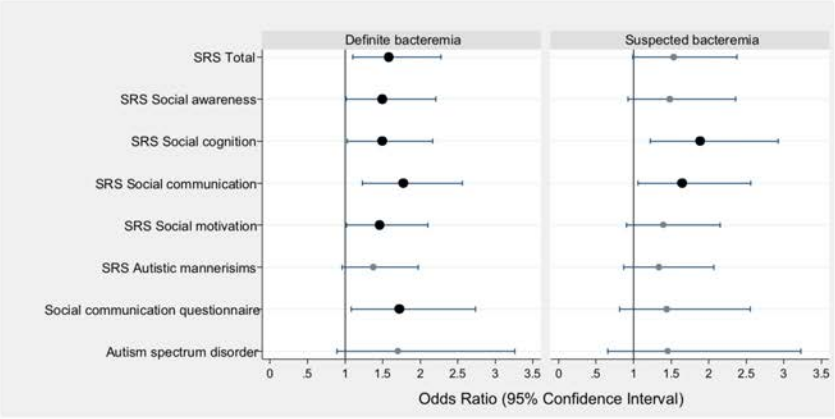
Conclusion(s) Compared to their school-age extremely preterm peers without late-onset bacteremia, extremely preterm children who were treated for suspected late bacteremia or definite late bacteremia were more likely to have indicators of social and communication impairments 10 years later.

Forest plots of odds ratios (ORs) and 95% confidence intervals of a positive screen on **Child Symptom Inventory (CSI-4) disorders.** ORs in the top panel are for parent report and ORs in the bottom panel are for teacher report. The ORs are adjusted for public insurance, sex, gestational age 23-24 weeks, birth weight Z-score < -1, and DAS IQ < 70. The upper bound of the confidence interval marked with * is truncated for this display.

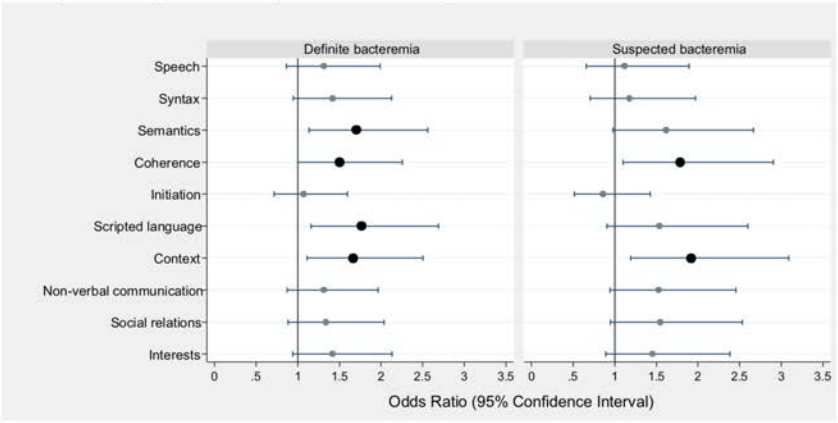


Forest plots of Odds Ratios and 95% confidence interval of a positive screen on Child Symptom Inventory 4 (CSI-4) disorders

Forest plots of odds ratios (ORs) and 95% confidence intervals of a T score ≥ 60 on the **Social Responsiveness Scale (SRS)** subtests, and of documented characteristics of ASD based on the **Autism Diagnostic Observation Schedule-2 (ADOS-2)** at age 10 associated with definite bacteremia and suspected bacteremia. Odds ratios are adjusted for Black race, maternal education (≤ 12 years), public insurance, gestational age (23-24 and 25-26 weeks) birth weight Z-score (< -2 and ≥ -2, < -1), and DAS IQ ≤ -1.



Forest plots of odds ratios (ORs) and 95% confidence intervals of a Z-score ≤ -1 on the **Children's Communication Checklist-2 (CCC-2)** subtests at age 10 associated with definite bacteremia and suspected bacteremia. Odds ratios are adjusted for Black race, maternal education (≤ 12 years), public insurance, gestational age (23-24 and 25-26 weeks) birth weight Z-score (< -2 and ≥ -2, < -1), and DAS IQ ≤ -1.



Forest plots of odds ratios and 95% confidence interval for results of the Social Responsiveness Scale (SRS), Autism Diagnostic Observation Schedule - 2 (ADOS - 2) on top and Child Communication Checklist - 2 (CCC - 2) below

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Abstract: 179

The Murine Intestinal Microbiome and Group B Streptococcus (GBS) Colonization

Michelle J. Vaz[1], Maryam Bonakdar[1], Tara Randis[2], Adam J. Ratner[2]

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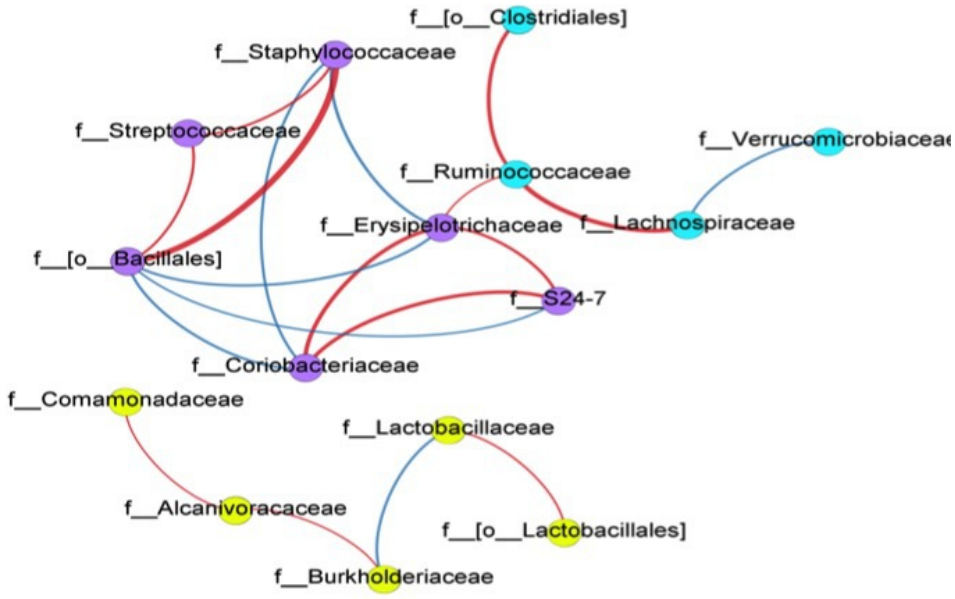
Background Late-onset (LO) disease is the most common clinical presentation of GBS infection during infancy. Gastrointestinal (GI) colonization with GBS is an important precursor to LO disease. We have previously demonstrated that juvenile mice develop sustained GBS colonization following gavage administration of GBS, while adult animals are resistant. We hypothesize that resistance to GI colonization may be mediated by the immature intestinal microbiota.

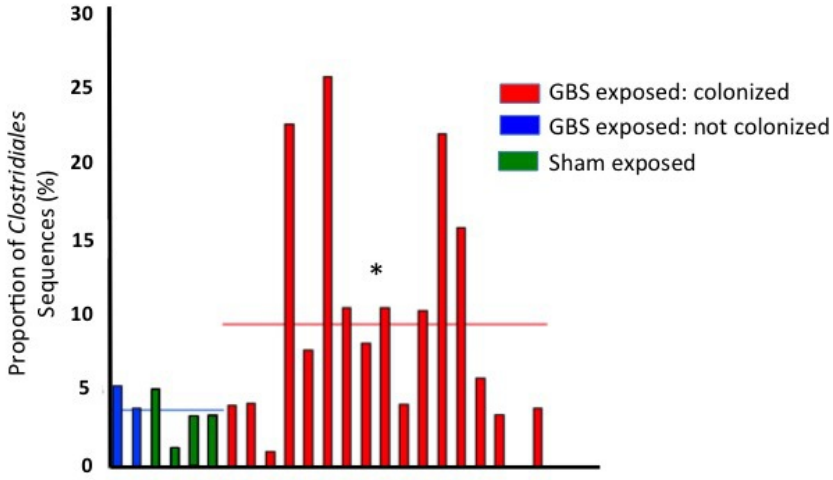
Objective To characterize the juvenile murine intestinal microbiome in the presence or absence of GBS exposure.

Design/Methods GBS (COH-1, serotype III, ST-17) or vehicle control was administered to juvenile (12-14 days, n = 23) mice via oral gavage. All animals were euthanized four days post-colonization. Ceca were excised for DNA extraction, and blood and tissue cultures were obtained. The V3 region of the 16S rRNA gene was amplified and sequenced using the Illumina MiSeq platform. Operational

taxonominc unit (OTU) assignment and statistical analyses were performed using QIIME and STAMP software packages.
Results Sustained GBS colonization, as determined by culture, occurred in 17 of 19 of GBS exposed mice. The intestinal microbiome network was examined in GBS-exposed mice (Figure 1). Sequences corresponding to the genus Streptococcus were detected in low abundance (< 3% of total sequences) in the ceca of GBS colonized mice, with the exception a single animal in which it predominated (87.3% of total sequences). That mouse was ill-appearing at time of euthanasia, with blood and brain cultures positive for GBS. GBS colonization of the GI tract was associated with a higher abundance of sequences corresponding to the Clostridiales order when compared to either sham-exposed or exposed but colonized mice (Figure 2).
Conclusion(s) GBS intestinal colonization in mice is correlated with the presence of specific microbial communities. Intestinal domination by GBS likely precedes disseminated infection. Further exploration of microbiome-mediated resistance and/or permissiveness to GBS colonization may yield novel strategies to prevent invasive LO disease in infants.



Intestinal microbiome network in GBS-exposed juvenile mice. Each node represents a microbial family and each link represents a correlation relationship (blue = negative, red = positive). The thickness of the link is proportional to the strength of their correlation (Spearman Correlation, the least absolute correlation coefficient is 0.3)



Increased abundance of *Clostridiales* order is associated with sustained GBS colonization of the murine intestine. Each vertical bar represents a single animal (*P=0.01).

##PAGE_BREAK##
Abstract: 180

Morbidity and Mortality in Neonates with ≤500 Grams Birth Weight in United States

apurv barche[1], David Carola[1], Erik A. Jensen[2], Kevin Dysart[2], Alison Cook[3], Jay Greenspan[1], Zubair H. Aghai[1]

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Background Advances in neonatal care have led to dramatic improvement in overall survival of extremely low birth weight infants and we continue to challenge the limits of viability. Birthweight (BW) in an important prognostic factor in overall morbidity and mortality of a neonate. Understanding the prognosis of infants born with a BW of ≤500 grams is important for parents and caregivers to make the best decision regarding resuscitation at birth. Recent studies from Canada and Japan reported overall mortality/morbidity of neonates born with a birth weight of ≤500 grams. However, there is a limited data on survival and morbidities in similar groups of infants admitted to the Neonatal Intensive Care Unit (NICU) in the United Sates.

Objective Our objective was to determine mortality and short term morbidities in infants born with a BW of ≤500 gram and admitted to the NICU.

Design/Methods This is a retrospective data analysis from the Alere Neonatal Database for infants born from 2008 to 2016, weighing ≤ 500 grams and were admitted to the NICU. The baseline demographics, clinical characteristics, and the neonatal outcomes were determined and compared between small for gestation age (SGA) and appropriate for gestational age (AGA) infants and the infants with a Z score of <-2 and ≥ -2.

Results A total of 203 infants met the inclusion criteria. Overall survival was 47.8%. The incidence of major morbidities ranged between 10-45% (Table). 177 infants (87.2%) were SGA, mortality and major morbidities were not significantly different between the SGA and AGA infants. Similarly, survival and major morbidities were not different in infants with a Z scores of <-2 and ≥ -2 (Table).

Conclusion(s) Approximately 48% of extremely premature infants with a BW of ≤ 500 grams who were admitted to the NICU survived. The survival and major morbidities were not different in SGA and AGA infants.

	All (n=203)	Z score <-2 (n=77)	Z score ≥ -2 (n=126)	p (Between Z score <-2 and ≥-2)
BW (g) (mean±SD)	444 ± 45	472 ± 25	429± 47	<0.0001
GA (w) (mean±SD)	24.9 ± 1.7	23.6 ± 0.7	25.7 ± 1.6	<0.0001
Male sex (%)	74 (36.5)	24 (31.2)	50 (39.7)	0.28
White race (%)	61 (30.1)	25 (32.5)	36 (28.6)	0.66
Prenatal steroids (%)	95 (46.8)	33 (42.9)	62 (49.2)	0.46
5 minutes Apgar (med, range)	6 (1-9)	6 (2-9)	7 (1-9)	0.32
Surfactant (%)	151 (74.4)	57 (74)	94 (74.6)	0.92
Survived (%)	97 (47.8)	39 (50.6)	58 (46)	0.62
NEC (%)	22 (10.8)	11 (14.3)	11 (8.7)	0.32
IVH grade 3 or 4	28 (13.8)	15 (19.5)	13 (10.3)	0.1
ROP stage 3 or 4	31 (15.3)	11 (14.3)	20 (15.8)	0.92
BPD	92 (45.3)	34 (44)	58 (46)	0.9
Length of stay	82.4 ± 72.3	90.4 ± 76.7	77.4 ± 69.3	0.21

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Abstract: 181

Skin conductance and facial dimensions of pain differ in opiate-exposed versus non-opiate exposed term neonates.

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[1]Division of Neonatal-Perinatal Medicine, Penn State Health Children's Hospital, Pennsylvania State College of Medicine, Hershey, Pennsylvania, United States, [2]Pennsylvania State College of Medicine, Hershey, Pennsylvania, United States

Background The rising issue of opioid use during pregnancy poses an increased risk of fetal exposure to opioids in-utero and the development of Neonatal Abstinence Syndrome (NAS). The cessation of exposure to opioids upon birth causes elevated levels of norepinephrine in circulation to induce sympathetic arousal. Skin conductance (SC) detects sympathetic-mediated sweating while Neonatal Facial Coding System (NFCS) depicts facial dimensions of stress and pain. We hypothesize that there will be a direct correlation between SC and NFCS scores, such that neonates with NAS will have higher SC and facial responses to pain/stress as

compared with controls.

Objective To determine the usefulness of SC combined with the NFSC scores in the measurement of pain response in term neonates with NAS compared with controls.

Design/Methods Thirty-seven term neonates (22 opiate-exposed and 15 non-opiate-exposed controls) were studied prospectively. Opioid exposure status was confirmed by meconium testing. Subjects were observed within 24-48 hours post birth for pain/stress during a single heel lance/squeeze (HLS) with simultaneously measured SC and videotaped facial expressions. SC was analyzed as electro-dermal responses over time (EDR/second), and the average amplitude of responses (mean of peaks [MP]). Video data were scored using the NFCS by 2 coders with inter-rater agreement > 85%. Spearman correlations were used to test the relationships among SC and NFCS. Non-parametric tests were used to evaluate between group and within group phase differences.

Results SC and NFCS were significantly associated. NAS neonates had significantly higher EDR/sec for the HLS phase and MP for HLS and post phases as compared with controls. Within the NAS group, there also were significant between-phase EDR/sec differences for pre HLS to HLS, HLS to post HLS, and pre to post HLS; while there were no differences in control neonates (Fig. 1). NAS neonates demonstrated higher NFCS at baseline. Also, for both groups, there were between phase NFCS differences for baseline to HLS and HLS to post (Fig.2).

Conclusion(s) NAS infants showed higher SC in both HLS and recovery phases as compared with healthy controls. In contrast, NAS infants showed higher NFCS in the baseline phase only. A multimodal system of assessment may be useful in understanding the complexity and severity of withdrawal associated with NAS.

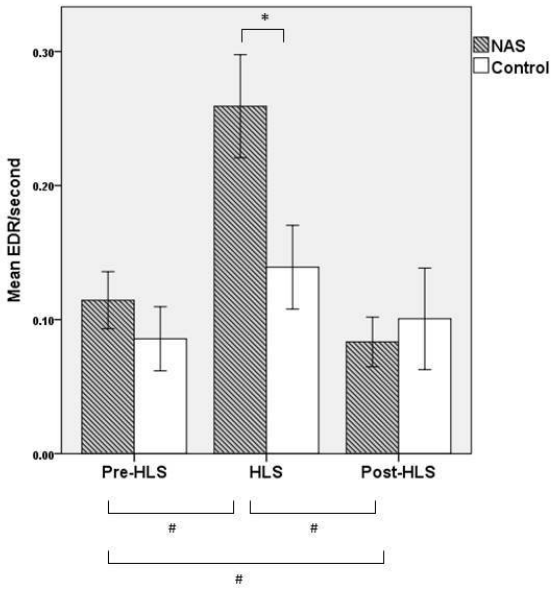

Figure 1: Skin conductance (EDR/second) measures in response to heel lance in NAS versus healthy controls.

*Between group Mann Whitney U, P<0.05

#Between phase Wilcoxon Signed Rank test, P<0.05

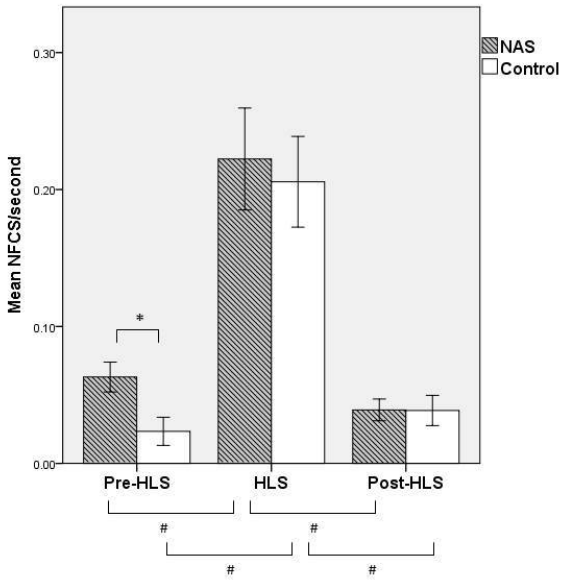

Figure 2: Neonatal Facial Coding System (NFCS) in response to heel lance in NAS versus healthy controls.

*Between group Mann Whitney U, P<0.05
#Between phase Wilcoxon Signed Rank test, P<0.05

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Abstract: 182

Does lactose reduced formula (LRF) decrease the severity of symptoms associated with Neonatal abstinence syndrome (NAS)?

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Background An increase in the prevalence of neonates affected by maternal opioid use during pregnancy has led to an intensification of research in the area of NAS management in the past decade. Despite this, gaps in knowledge still exist. Although there is strong evidence in the literature about the beneficial effect of maternal breast milk, whether specific formula use will result in decreasing the severity of NAS is unclear. In spite of this, it has become more common in some neonatal intensive care units/special care nurseries to feed these babies LRF.
Objective The purpose of this study was to assess the effect of LRF on the severity and outcomes of NAS.
Design/Methods We performed a retrospective chart review of infants with the diagnosis of NAS who were admitted to our level 4 neonatal intensive care unit between January 2011 and November 2016. Infants included in the study had gestational age ≥ 36 weeks, NAS due to maternal opioid abuse, and were without major medical or surgical morbidities. Infants were categorized into three groups based on the predominant type of nutrition consumed by the infant during their hospital stay. Student t.test was used to compare the means between the continuous variables.
Results 111 infants met inclusion criteria. The characteristics of the included infants are shown in table 1. 39 infants received predominantly LRF during their hospital stay. 14 received mostly maternal breast milk (either directly or expressed). 58 infants received predominantly term formula. 78% of patients receiving any type of formula required pharmacologic treatment vs. 47% in the MBM group. Although infants in LRF group started morphine later than the regular formula group (7.4±2.5) days vs. (6.5±1.8) days, P value (0.044); they required longer duration of pharmacologic treatment (24±19 days) vs. (15±13 days), P value (0.009), which in turn resulted in a longer hospital stay (30±19 days) vs. (21±12 days), P value (0.009). The maximum dose of morphine was not significantly different between the 2 groups. (table 2).
Conclusion(s) Lactose-reduced formula intake was associated with delayed onset of NAS symptoms, but longer duration of NAS treatment and length of hospitalization in our patient population compared with regular formula intake. If maternal breast milk isn't available, LRF lacks additional benefit over regular formula in our study. Prospective randomized controlled trials are needed to confirm these findings.

Table1 : Characteristics of Infants with NAS

Maternal age, y	28±4.7
Caucasian race, n (%)	93 (84%)
Regular perinatal care, n (%)	77 (69%)
Postive Maternal drug screen, n (%)	95 (86%)
Type of maternal drug use, Subutex, n (%) Suboxone, n (%) Methadone, n (%) Multiple drugs, n (%)	 34 (31%) 21 (19%) 19 (17%) 37 (33%)
Gestational age, wks	38.6±1.4
Birth weight, g	3110±500
Small for gestational age, n (%)	21 (19%)
Male gender, n (%)	64 (57%)
Normal vaginal delivery, n (%)	65 (59%)
APGAR at 1 min	8.02±1.7
APGAR at 5 min	8.6±1
Infant positive drug screen, n (%)	62 (67%)
Required pharmacological treatment, n (%)	81 (73%)
Age at first day of treatment, day	6.7±2.16
Maximum morphine dose, mg/kg/dose	0.06±0.09
Duration of treatment, day	17.6±16
Length of hopsitlization,day	24+15

Values are Mean±SD

Table 2: Comparison between the two groups.

Characteristics	Lactose reduced Formula (n=38)	Regular formula (n=57)	P-value
Maternal age, y	28±5.4	27±4.5	0.60
Gestational age, wk	38±1.3	38±1.5	0.29
Birth weight, g	3090±390	3060±500	0.69
APGAR at 1 min	8.4±1.3	7.9±1.75	0.09
APGAR at 5 min	8.9±0.6	8.4±1.2	0.06
First day of treatment, day	7.4±2.5	6.5±1.85	0.04
Maximum morphine dose, mg/kg/dose	0.068±0.04	0.065±0.02	0.99
Duration of morphine treatment, day	24.5±19	15±13	0.009
Length of hospitalization, day	30.2±19	21±12	0.009

Values are Mean±SD

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Abstract: 183

Postnatal growth velocity correlates with severity of retinopathy of prematurity in very low birth weight infants

Aaron W. Wallman-Stokes[1], Devin Gialleonardo[1], Joe R. Isler[1], David A. Bateman[1], Marilyn Weindler[1], Steven Brooks[2], Rakesh Sahni[1]
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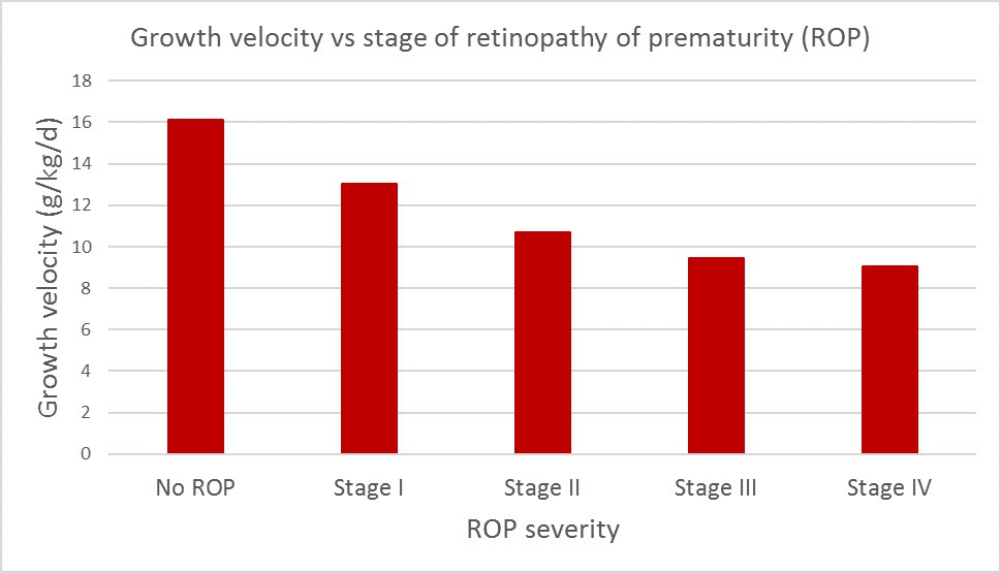
Background Retinopathy of prematurity (ROP), a neovascular disease of the retina afflicting almost exclusively very low birth weight (VLBW) infants, is a leading cause of preventable childhood blindness. Identifying the antecedents of ROP can provide additional information on relevant pathogenic mechanisms involved and has the potential to help reduce the occurrence of this disease and its consequences. Animal studies suggest a relationship between low serum insulin like growth factor-1 levels and associated poor weight gain with the development of more severe ROP. Tracking of postnatal growth velocity (GV) may help in identifying at-risk infants for interventions that may prevent or reduce the severity of ROP.
Objective To assess the relationship between postnatal GV with ROP severity among VLBW infants.
Design/Methods Electronic medical records on 315 VLBW infants (birth weight ≤1500g) admitted to the neonatal intensive care unit at Columbia Presbyterian Medical Center between Jan 2013 to Dec 2015 with serial ROP examination results were evaluated retrospectively. Infants were grouped by ROP severity and analyzed for postnatal GV from birth until hospital discharge. GV was computed as weight gain/kg/day from the clinical database. ROP severity was categorized as increasing worst developmental stage of ROP from no ROP to stage I-IV during the hospital course. Associations between postnatal GV and ROP severity were compared using multiple regression analysis.
Results Of the 315 VLBW infants studied, 172 (54.2%) developed ROP. 22% (69/315) developed stage I, 22.2% stage II, 9.8% stage III and 0.6% stage IV ROP. Table 1 shows the birth weight, gestational age and GV distributions associated with various stages of ROP. There was a linear association between postnatal GV and severity of ROP both in univariate ($p<0.00001$) and multivariate ($p<0.0001$) model accounting for GA and birth weight (Figure 1).
Conclusion(s) Suboptimal postnatal GV is an additional risk factor for development of severe ROP in VLBW infants. Our findings suggest that early detection of poor growth and efforts to improve the nutritional intake and weight gain during postnatal period in these infants might reduce the burden of sight-limiting ROP.



ROP stage by birth weight, gestational age and growth velocity

	No ROP	ROP				P
		Stage I	Stage II	Stage III	Stage IV	
n	143	69	70	31	2	
Birth weight (g)	1157±343	840±57	1025±268	655±148	585±121	<0.00001
Gestational age (weeks)	31.5±2.1	27.0±1.4	26.5±0.7	25.5±2.1	24.5±0.7	<0.00001
GV (g/kg/d)	16.1±0.2	13.0±1.4	10.7±1.7	9.4±2.7	9.0±3.3	<0.00001

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Abstract: 184

Stabilizing Minute Ventilation using a Fixed Servo Pressure in High-Frequency Jet Ventilation

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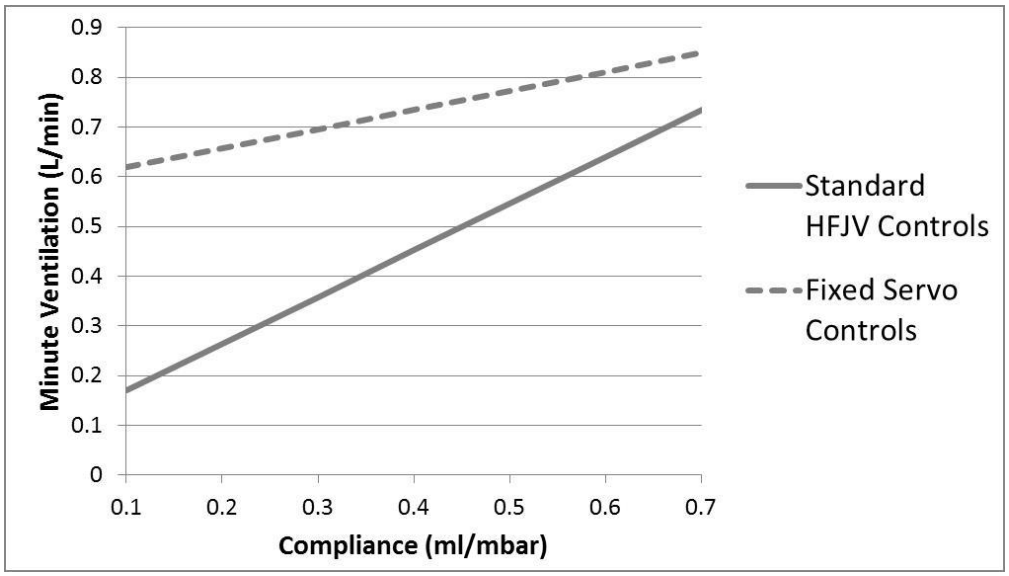
Background High-frequency Jet Ventilation (HFJV) is a commonly used form of ventilation for NICU patients. While newer models of conventional ventilators and high-frequency oscillators offer volume-targeted modalities, the Jet ventilator was designed to servo regulate the amount of gas delivered into the endotracheal tube to maintain a set peak airway pressure, thus mimicking pressure-controlled ventilation. Conventional volume-targeted ventilation stabilizes minute ventilation as lung compliance varies. This reduces drastic fluctuations in blood carbon dioxide levels and decreases incidence of pneumothorax, intraventricular hemorrhage, periventricular leukomalacia and chronic lung disease when compared to pressure-controlled modes.
Objective We performed a bench study to test the hypothesis that operating the Bunnell Life Pulse Jet Ventilator with a fixed servo pressure results in more stable minute ventilation during large changes in lung compliance when compared to the standard HFJV pressure controls.
Design/Methods A miniature plethysmograph chamber was designed and successfully tested for its ability to accurately measure HFJV minute ventilation (MV) and adjust lung compliance within the chamber. Utilizing an excised rat lung, compliance was adjusted over a 4-fold range while ventilator settings were held constant. MV was measured while using standard jet pressure controls (PIP and PEEP) and compared to MV using fixed-servo pressure controls. Data were analyzed using random intercept mixed models with point estimates and 95% confidence intervals reported.
Results MV was measured at 4 different control settings for both standard and fixed-servo modes. Three trials were performed at each setting. Standard HFJV pressure controls result in an increase in minute ventilation of 0.94 L/min (0.87, 1.01) for every 1 ml/mbar increase in lung compliance. Fixed servo controls increase minute ventilation by only 0.38 L/min (0.34, 0.43) per 1 ml/mbar increase in lung compliance. Fixed servo controls reduce changes in minute ventilation by 55.6% (47.1%, 64.0%).
Conclusion(s) When operating the HFJV with a fixed servo pressure, minute ventilation is significantly more stable than standard pressure controls. Utilizing the HFJV in this fashion keeps minute ventilation relatively stable despite large changes in lung compliance, thus reducing adverse complications of CO_2 fluctuations.



Effect on minute ventilation of an excised rat lung as compliance increases

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Abstract: 185

Effect of Nitric Oxide priming on Apoptosis Inducing Factor (AIF) in Hyperoxia-exposed Mesenchymal Stem Cells (MSCs) derived from Human Umbilical Cord (hUC) Wharton's jelly

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Background Bronchopulmonary dysplasia (BPD) is a chronic lung disease associated with premature infants who need respiratory support after birth. BPD results in impaired alveolar and vascular growth in the developing lung and is associated with brain injury and pulmonary hypertension (PH), resulting in increased morbidity and mortality. Previous studies suggest impaired nitric oxide (NO) production as one of the contributors to the pathogenesis of BPD. Furthermore, early iNO treatment has helped to reduce endothelial cell apoptosis in neonatal lungs in experimental models. MSCs and their secreted components have been shown to prevent BPD in rodent models.

Objective The aim of this study was to identify the role of NO priming on apoptosis-inducing factor (AIF) expression in hyperoxia-exposed human umbilical cord (hUC)-derived MSCs using an in vitro culture system.

Design/Methods MSCs derived from 25 and 30 weeks gestational age (GA) hUC Wharton's jelly were grown in vitro. On confluency, the cultures were exposed to hyperoxia (95% oxygen) and hyperoxia + NO (5 ppm NO) for 24 hours in serum-free MSC media. Cultures exposed to room air (RA) were used as controls. Western blotting was performed from the cell lysates for detection of expression of apoptotic marker, AIF. The experiment was done with a minimum of 3 replicates.

Results Statistically significant increase in the AIF expression was observed on hyperoxia exposure, both in 25 weeks (p=0.009) and 30 weeks (p=0.02) GA MSCs. However, NO priming of only the hyperoxia-exposed MSCs derived from 25 weeks GA hUC showed a significant decrease in AIF expression (p=0.015).

Conclusion(s) We show that priming of UC-MSCs with 5ppm NO decreases AIF expression in hyperoxia-exposed UC-MSCs derived from 25 weeks GA hUC. This suggests that hyperoxia-induced cell death markers can be decreased by NO priming. Further studies need to be done to show if NO-primed UC-MSCs or their secretome can make an impact on the pulmonary phenotype of BPD. The study establishes a new MSC cell culture system for understanding the role of NO in therapy of BPD.

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Abstract: 186

Are inflammatory markers useful in the prediction of histologic chorioamnionitis and funisitis in preterm neonates?

Lauren Blatt[1], Rebecca Baergen[2], Shari Gelber[3], Ericalyn Kasdorf[1]

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Background Histologic chorioamnionitis (HCA) and funisitis (HF) is a known risk factor for early-onset sepsis (EOS) in preterm neonates. Decisions regarding antibiotic duration are made before placental pathology is available, making providers rely on inflammatory markers in patients with negative blood cultures.

Objective To evaluate if an elevated C-reactive protein (CRP) or I:T (immature to total neutrophil ratio) is associated with HCA and HF in preterm neonates. To describe the frequency of HCA and HF in preterms and identify risk factors.

Design/Methods Retrospective chart review of neonates 24 0/7 to 33 6/7 weeks gestational age (GA) born due to preterm premature rupture of membranes (PPROM) and/or preterm labor (PTL) at NYPH-WCMC in 2015. Placental pathology also examined for neonates delivered for other indications (i.e. preeclampsia). Placental inflammation defined as HCA or HF. HF includes chorionic plate vasculitis, which also represents fetal placental inflammation. Elevated CRP (12-36 hours of life) defined as ≥2.0 mg/dL. Elevated initial I:T defined as ≥0.2. Additional maternal/neonatal clinical variables collected.

Results Placental pathology available in 77/80 in PPROM/PTL population; 47% with inflammation (HCA n=15, HF n=21). All with HF also had HCA. 60/62 pathology reports available for neonates delivered for other indications; none had HCA or HF. HCA or HF was more common at an earlier GA (mean 29.1 vs. 30.7 weeks, p=0.033). Mean GA with HF was earlier compared to HCA alone (p=0.039, Table 1). All 5 neonates with an elevated CRP had HCA or HF; 30/35 with HCA or HF had a normal CRP. Mean I:T with HCA or HF was higher compared to no inflammation (0.16 vs. 0.03, p <0.001, Figure 1). 11/36 with HCA or HF had an elevated I:T. Mean PPROM duration was longer with HCA or HF compared to no inflammation (84 vs. 20 hours, p <0.001). 11/11 neonates whose mothers received 7 days of antibiotics for PPROM had HCA or HF, compared to 7/29 who delivered before antibiotic completion. One blood culture was positive in a patient with HF.

Conclusion(s) HCA and HF is frequent in preterm neonates and should be considered when evaluating risk factors for EOS. HF, when compared to HCA alone, is more common at an earlier GA. Our findings suggest that an elevated CRP and I:T are highly specific for HCA or HF and never elevated without inflammation, but were also commonly normal in HCA or HF. Placental pathology provides valuable information and expedited results may be a useful focus of future research.

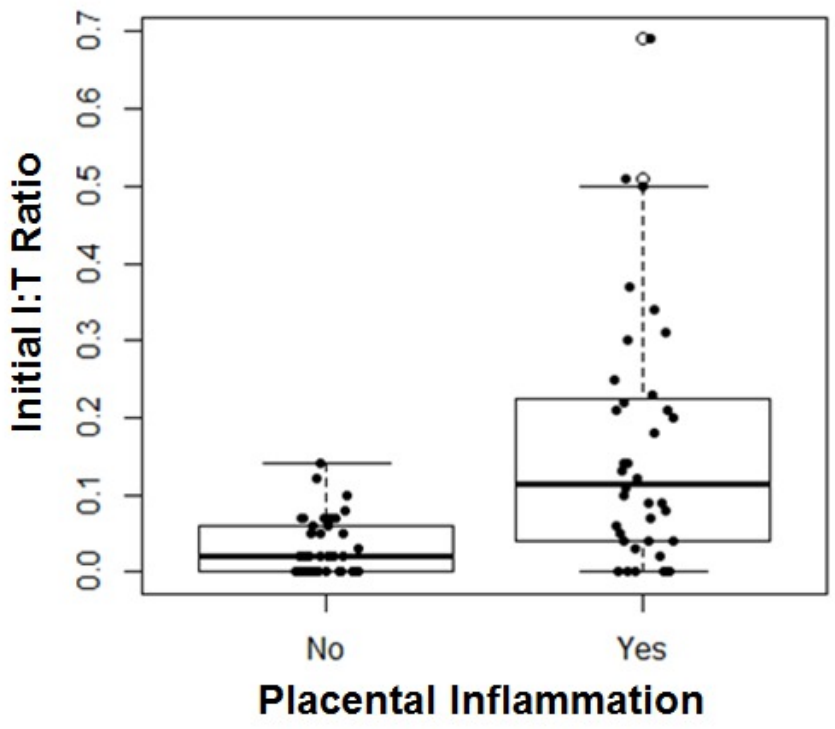

Figure 1: Initial I:T Ratio by Placental Inflammation Status

Table 1: GA (weeks) by Placental Inflammation Status

Placental Inflammation	N	Mean GA
None	41	30.7
Chorioamnionitis (HCA)	15	30.3
Funisitis and/or Chorionic Plate Vasculitis (HF)	21	28.1

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Abstract: 187

Does lumbar puncture increase the risk for intraventricular hemorrhage in very low birth weight preterm infants?

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Background Very low birth weight (VLBW) preterm infants have an increased risk for intraventricular hemorrhage (IVH). Most of the IVH occurs during the first 5 days of life. Multiple factors contribute to the pathogenesis of IVH. Hemodynamic instability due to fluctuation in blood pressure and heart rate is an important risk factor for IVH. Preterm infants also have an increased risk for early onset sepsis and requires lumbar puncture (LP) as a part of the evaluation for sepsis. Performing an LP can cause hemodynamic instability by altering the heart rate, blood pressure and cerebral perfusion. There is no data on the effects of LP on IVH in VLBW preterm infants.

Objective To determine if LP performed during the first 4 days of life increases the risk for IVH in VLBW preterm infants.

Design/Methods This is a retrospective analysis of VLBW (birth weight < 1500 grams) preterm infants admitted to the neonatal intensive care unit (NICU) between 05/2006 and 2/2017. The demographics, clinical characteristics and radiological data was collected from infants' medical records. Infants were divided in to two groups; 1) LP group: LP performed during the first 4 days of life and 2) No LP group: No LP performed. Infants were excluded if LP was performed after 4 days of life.

Results A total of 614 infants met the inclusion criteria (45 infants in LP group and 569 infants in no LP group). 126 infants were excluded as LP was done after 4 days of age. The median age of performing LP was 1 day (range, 1-4 days). There was no significant difference in the baseline demographics between the two groups (Table 1). Infants in the LP group had a significantly higher incidence of any IVH and Grade I or II IVH. There was no significant difference in severe IVH (grade III or IV) between the two groups (Table 2).

Conclusion(s) In VLBW preterm infants, performing an LP during the first 4 days of life was associated with an increased risk for any IVH or mild IVH (grade I or II). A larger prospective study is needed to evaluate the impact of LP on IVH in VLBW preterm infants.

Table 1: Demographics and clinical characteristics (mean ± SD).

	LP (n=45)	No LP (569)	p
Birth Weight (grams)	994 ± 252	950 ± 323	0.4
Gestational age (weeks)	27.3 ± 2.1	27.4 ±3.2	0.9
Male sex (%)	22 (49)	289 (51)	0.9
Black race (%)	23 (51)	210 (37)	0.08
Twin gestation (%)	6 (13)	143 (25)	0.1
C Section (%)	29 (64)	366 (64)	1.0
Apgar 5 minutes (%)	7 (1-9)	8 (0-10)	0.1
Outborn (%)	4 (9)	75 (13)	0.5
Delayed cord clamping (%)	2 (4)	15 (3)	0.4

Table 2: The incidence of IVH between the two groups.

	LP (n=45)	No LP (569)	p
Any IVH	20 (44.4)	97 (17.1)	<0.001
Grade I IVH	7 (15.5)	33 (5.8)	0.02
Grade II IVH	8 (17.7)	26 (4.6)	0.002
Grade I or II IVH	15 (33.3)	59 (10.4)	<0.001
Grade III IVH	4 (8.9)	26 (4.6)	0.3
Grade IV IVH	1 (2.2)	12 (2.1)	1.0
Grade III or IV IVH	5 (11.1)	38 (6.8)	0.2

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Abstract: 188

One year neurodevelopmental outcomes in ELBW infants fed an early exclusive human diet compared to formula

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Background In preterm infants, an exclusive human milk (EHM) diet in the NICU, compared to formula, may lead to a slower growth velocity. Past studies have associated a slower growth in these infants with poorer neurodevelopmental (ND) outcomes. Post-NICU growth and ND outcomes of extremely low birth weight (ELBW) infants who receive an EHM diet have not been evaluated, considering that EHM may have neuroprotective benefits which could mitigate the effects of slower growth.

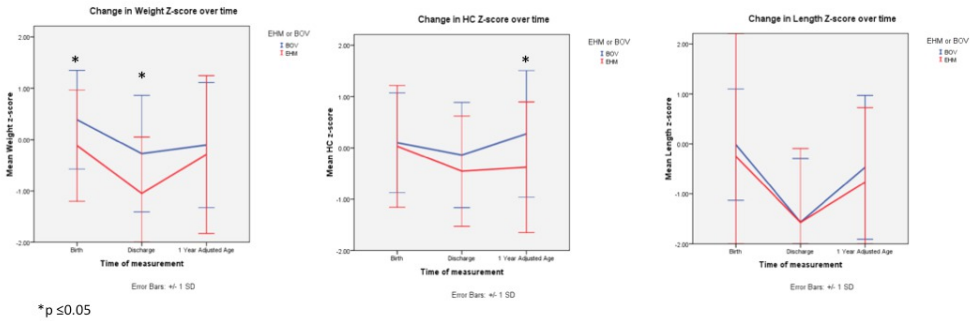
Objective To compare rates of ND delay at 1 year corrected age (CA) between 2 groups of ELBW (≤1000 grams) infants based on their diet until 34 weeks corrected gestational age: a) EHM only or b) mostly formula (BOV). Secondary aims were to evaluate differences in anthropometric measurements through 1 year CA and short-term morbidities in the NICU.

Design/Methods This is a retrospective cohort study of all ELBW infants born between Jan 2012-July 2016 who were assessed at the Regional Neonatal Follow-up Program at 1 year CA. We assessed the following ND outcomes: gross/fine motor and expressive/receptive speech. Categorical variables were compared using chi-square test and continuous variables using student's t-test.

Results 112 infants were evaluated: 61 (54%) EHM and 51 (46%) BOV. Maternal and neonatal demographics were similar. The EHM group had lower mean birth weight and head circumference (HC) and lower birth weight z-score (Figure 1). The rate of ND delay, overall and for each domain, was not different (Table 2). All morbidities were similar, except for lower NEC rate in the EHM group

(4% vs. 14%, p=0.04).
At discharge, EHM infants continued to have lower weight z-score (-1.05±1.10 vs. -0.27±1.14, p<0.001), and were more likely to be EUGR, but maintained adequate head growth. At 1 year CA there was no longer a statistical difference in weight z-score (Figure 1). HC z-score was lower at 1 year CA for EHM (-0.38±1.27 vs. 0.27±1.23, p=0.007), but for both groups, mean HC remained within normal range and the HC growth velocity until 1 year CA was 0.34 cm/week. There was no difference in the rate of microcephaly and lengths were not different.
Conclusion(s) Despite poorer weight gain in the NICU, EHM fed infants "caught up" by 1 year CA. In EHM infants, the observed slower head growth at 1 year CA did not lead to increased ND delay. This neuropreservation may be attributed to less morbidities, including inflammatory conditions such as NEC, or be the result of the direct neuroprotective effects of breast milk.

Figure 1: Changes in Anthropometrics over time



*p ≤0.05

Table 1: Maternal and Neonatal Characteristics and Morbidities

	EHM n=61	BOV n=51	p
Maternal age, mean (±SD)	31 (±6)	32 (±5)	0.576
African American race, n (%)	17 (28)	19 (37)	0.290
Preeclampsia, n (%)	12 (20)	9 (18)	0.785
PPROM, n (%)	16 (26)	14 (27)	0.884
Antenatal steroids, n (%)	56 (92)	42 (82)	0.132
Chorioamnionitis, n (%)	9 (15)	10 (20)	0.496
C-section, n (%)	39 (64)	34 (67)	0.762
Gestational age in weeks, mean (±SD)	25 (±2)	25 (±2)	0.880
Female, n (%)	31 (51)	26 (51)	0.986
Inborn, n (%)	52 (85)	45 (88)	0.644
Multiple gestation, n (%)	15 (25)	11 (22)	0.706
5 min APGAR <7, n (%)	33 (54)	21 (42)	0.173
Oxygen at DC, n (%)	22 (36)	11 (22)	0.094
ROP, n (%)	6 (10)	4 (8)	0.713
IVH, n (%)	3 (5)	6 (12)	0.184
NEC, n (%)	2 (4)	7 (14)	0.043
Sepsis, n (%)	8 (13)	5 (10)	0.586
PDA ligation, n (%)	15 (25)	12 (24)	0.896
CA at DC in weeks, mean (±SD)	41 (±5)	40 (±4)	0.144

Length of stay in days, mean (±SD)	114 (±36)	106 (±33)	0.189

Table 2: Neurodevelopmental and Growth Outcomes

	EHM n=61	BOV n=51	p
CA at 12 months, mean (±SD)	12.5 (±1.4)	12.5 (±1.4)	0.736
Overall ND delay, n (%)	35 (57)	26 (51)	0.498
Gross motor delay, n (%)	22 (36)	23 (45)	0.332
Fine motor delay, n (%)	23 (38)	19 (37)	0.961
Receptive language delay, n (%)	18 (30)	17 (33)	0.664
Expressive language delay, n (%)	28 (46)	18 (36)	0.292
Birth weight, grams, mean (±SD)	715 (±165)	776 (±130)	0.033
Birth HC, cm, mean (±SD)	22.2 (±1.7)	22.8 (±1.5)	0.030
Birth length, cm, mean (±SD)	32 (±5)	33 (±3)	0.440
SGA, n (%)	7 (11)	2 (4)	0.143
Microcephaly at birth, n (%)	5 (8)	3 (6)	0.636
DC weight, grams, mean (±SD)	3207 (±1016)	3357 (±1069)	0.450
DC HC, cm, mean (±SD)	34.1 (±2.6)	34.4 (±2.2)	0.591
DC length, cm, mean (±SD)	48 (±4)	47 (±4)	0.169
EUGR at DC, n (%)	22 (36)	5 (10)	0.001
Microcephaly at DC, n (%)	10 (16)	5 (10)	0.308
Daily weight gain, g/kg/day, mean (±SD)	13 (±3)	14 (±2)	0.089
12 mos weight, kg, mean (±SD)	9.1 (±1.3)	9.5 (±1.5)	0.125
12 mos HC, cm, mean (±SD)	45.1 (±1.9)	46.1 (±1.7)	0.008
12 mos length, cm, mean (±SD)	74 (±4)	75 (±4)	0.176
FTT, n (%)	10 (17)	4 (8)	0.163
Microcephaly at 12 mos, n (%)	6 (10)	2 (4)	0.217

SGA: ≤10%, EUGR: ≤10%, FTT: ≤5%, Microcephaly: ≤5%

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Abstract: 189

Head CT Scan in Children Undergoing Lumbar Puncture (LP) for Suspected Meningitis: Experience from an Urban Tertiary-Care Children's Hospital

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Background Bacterial meningitis affects > 4,000 children/year and is responsible for 500 deaths/year in the US. The Infectious Diseases Society of America (IDSA) guidelines delineated evidence-based (EBM) criteria for the use of CT scan before LP in adults with suspected meningitis. Our literature review indicated that no widely accepted EBM guidelines are currently used regarding CT

scan prior to LP in the pediatric population.
Objective To conduct a pilot study focusing on pediatric imaging practices in children with suspected meningitis requiring diagnostic LP, and identify potential predictors of test results.
Design/Methods 3-year retrospective cohort pilot study; electronic medical record query and manual confirmation; single urban tertiary care children's hospital, Philadelphia, PA. Inclusion criteria: children 6 month-20 y/o undergoing diagnostic LP for suspected meningitis.
Results 1,670 children underwent an LP procedure between 2014-2017; 140 children met the study inclusion criteria. Median age 5 y/o (6 month-18 y/o), 64% were male; 39% Black; 34% Hispanic; and 14% White. Documented clinical findings: fever (46%); headache or irritability (53%); emesis (39%); neck stiffness (31%); reduced level of consciousness (26%); generalized seizures (13%); and focal seizures (11%). Test results: 76% of children underwent head CT prior to LP; 18% had abnormal CT scans. None of the children had complications during or after the LP procedure. Only 3 children (2.1 %) had confirmed bacterial meningitis. "Reduced level of consciousness" was associated with normal vs. abnormal CT scan findings (24% vs. 40%, $p<0.05$%). Clinical course: 19% required PICU management; 61% received IV antibiotics. All patients were discharged home after ED evaluation or hospitalization.
Conclusion(s) Despite no widely accepted EBM pediatric guidelines focusing on suspected meningitis, most children underwent head CT prior to LP (76%). 1/5 had abnormal imaging results, which was associated with reduced level of consciousness. Regardless of imaging results, there were no LP procedure complications. We will soon expand our study to assess clinical predictors of normal head CT, towards providing evidence to safely minimize radiation exposure and resource utilization in children with suspected meningitis.
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Abstract: 190
Incidence of parenchymal brain hemorrhage following therapeutic hypothermia in neonates.
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Background Therapeutic hypothermia (TH) is an established treatment for hypoxic ischemic encephalopathy (HIE) in term neonates. Both HIE and TH have been associated with compromises in the coagulation cascade, potentially presenting risk for parenchymal brain hemorrhage (PH) to these neonates. Abnormalities in diffusion-weighted MRI images are well described following HIE and TH; but the incidence of PH are less well known. PH has been shown to have significant impact on both survival and neurodevelopmental outcomes.
Objective To document the true incidence and characteristics of PH in this population and evaluate for any associated risk factors.
Design/Methods All neonates treated with TH for HIE were included in this retrospective study. Between 2009 and 2017, 193 neonates were treated with TH; we excluded 25 due to death or transfer prior to completion of TH, leaving 168 neonates included in the study. All MRIs were completed after TH on either a 1.5T Siemens Avanto or 1.5T Siemens Aera unit, with sequences completed using a neonatal appropriate view, slice thickness, and gap. Studies were reviewed by pediatric radiology and hemorrhages characterized by location and size (1-3mm, 4-10mm, or >10 mm). Individual coagulation studies were correlated with presence and severity of PH.
Results Overall, 47 of the 168 neonates (28%) were identified to have PH. The most common site of hemorrhage was in the cerebral hemispheres, occurring in 22%. Cerebellar bleeds were found in 10% of patients, and basal ganglia/brainstem lesions were seen in 3% of the patients. Of cerebral hemisphere hemorrhages, 45% were 1-3 mm, 42% 4-10 mm, and 13% >10 mm. Cerebellar hemorrhages were 65% 1-3 mm and 35% 4-10 mm. 7.7% of neonates had hemorrhages identified in multiple intracranial sites. The majority (57%) of patients with PH had lesions 4mm or greater in size. The presence of a low fibrinogen did not strongly correlate with the presence of PH. The OR of having a PH if the fibrinogen was less than 150 mg/dl was 2.296 (95% CI 0.888 - 5.939; $p=0.096$).
Conclusion(s) There is a high incidence of PH in neonates with HIE receiving TH. The factors contributing to PH in these neonates remain unclear. The importance of intervention to address abnormal coagulation profile merits further study.
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Abstract: 191
Early life hypotension is associated with development of severe IVH in extremely preterm Infants.
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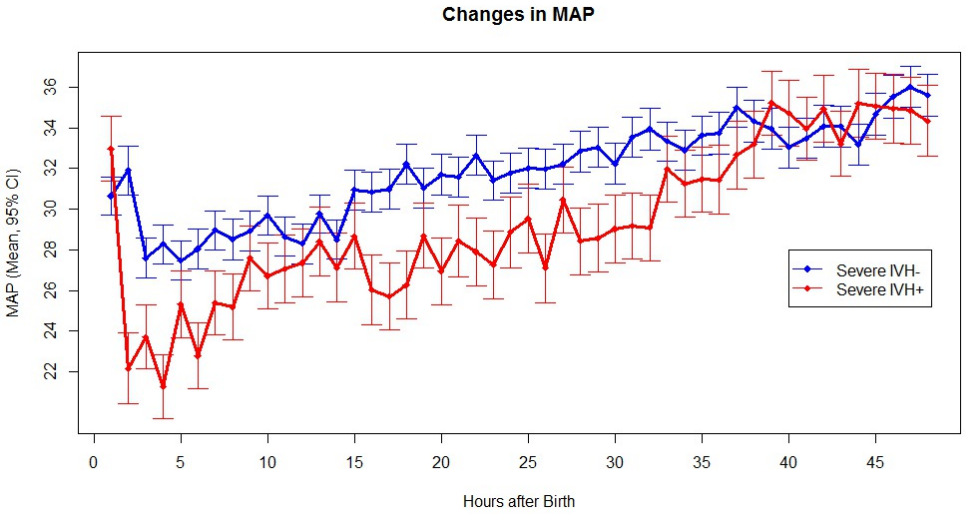
Background Intraventricular hemorrhage (IVH) is a common morbidity in the extremely preterm infant that is caused by a rupture of immature vasculature in the brain. These ruptures are associated with rapid changes in cerebral blood flow (CBF), due to the preterm infant pressure-passive cerebral vasculature. The majority of IVH occurs within the first 72 hours of life. We hypothesized that the greatest risk for severe IVH (> Grade II) was associated with early hypotension and maternal health conditions in this high-risk population.
Objective To identify blood pressure changes during the first 48hrs of life and its association with severe IVH.
Design/Methods A retrospective chart review was conducted on all preterm neonates admitted to the NICU at CHoR with a

birthweight ≤1250g from 1/1/14 to 1/1/17. Out born or expired infants without a head ultrasound, were excluded. Data collected included all MAP readings, treatments administered, abnormal blood gas values within the first 48 hours of life, maternal illness and other physiologic data. Statistical analyses included student t-test, chi-square test and mixed linear modeling for longitudinal data.
Results Of the 69 patients, 17 developed severe IVH. While similar in gender, race, and birthweight, the patients who developed IVH were of lower gestational age, 24.9 weeks ± 0.95 vs 24.1 weeks ± 0.90 (p=0.0037). The IVH group had decreased MAP during the hours of life 2-8 and 15-35 (p= 0.0006). Infants who developed IVH were 5X more likely to have a ≤10% drop below their expected normal MAP within the first three hours of life (OR: 95% CI 4.95[1.24, 19.73]). Additionally the IVH group were four times more likely to have a ≤25% drop in expected normal MAP at any time within the first eight hours of life (OR: 95% CI 4.13[1.30 , 13.11]). There were no significant relationships between maternal illness and IVH.
Conclusion(s) Extremely preterm infants who developed IVH had a significantly lower MAP during the early 8 hours of life compared to those who did not develop IVH. The first three hours of life seem to be the most critical in the development of IVH. Blood pressure variability during these critical times may be an important contributing factor that requires further investigation.



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Abstract: 192
Score for Neonatal Physiology with Perinatal Extension-II score for the prediction of neurodevelopmental outcomes in early infancy of premature infants
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Background Preterm infants are at risk for neurodevelopmental delay. Several factors such as birthweight, gestational age, APGARs, severe intraventricular hemorrhage, chronic lung disease, and blood transfusion are associated with poor neuro-developmental outcomes. Illness severity scores have been used to predict short term morbidity and mortality, but there is limited data on their use to predict neurodevelopmental outcomes.
Objective The objective of this study was to assess if an association exists between an illness severity score, the Score for Neonatal Physiology with Perinatal Extension-II (SNAPPE-II), and early infancy neurodevelopmental outcomes in a preterm cohort.
Design/Methods We conducted a retrospective chart review of infants born at ≤32 weeks gestational age admitted to the neonatal intensive care unit (NICU) at New York University (NYU) or Bellevue Hospital from 4/2014 to 6/2016 and had neurodevelopmental follow-up data available. We excluded patients with incomplete SNAPPE-II scores and out-born patients. The SNAPPE-II score is based upon data from the first 12 hours of life and includes lowest temperature, mean arterial pressure (MAP), PO2/FiO2 ratio, serum pH, multiple seizures, urine output, APGAR score, birthweight, and small for gestational age. We collected baseline demographics, prenatal and hospital course data. Neurodevelopmental outcomes at 12 months corrected age were determined by the Bayley Scales of Infant Development III. Pearson correlation coefficients were calculated comparing SNAPPE-II score to the scaled scores for each domain of the Bayley. Each component of the SNAPPE-II score was then individually compared to the scaled scores for each domain of the Bayley.
Results Eighty-two infants met eligibility criteria. Table 1 displays the population demographics. A significant negative correlation was found between the SNAPPE-II score and the Bayley scaled scores for cognitive (Pearson's r of -0.337, p=0.002), gross motor (-0.221, p=0.046), fine motor (-0.0249, p=0.024), and expressive language (-0.287, p=0.009). Specific components of the SNAPPE-II

(low pH, low 5 minute APGAR score, and low MAP) were independently negatively correlated with gross motor and expressive language neurodevelopmental outcomes.
Conclusion(s) High SNAPPE-II scores in the first 12 hours of life are negatively correlated with neurodevelopmental outcomes in a preterm population at 12 months corrected age.

Table 1. Population Demographics

	n (%)
Male Gender	46 (56.1)
Received Prenatal Steroids	67 (81.7)
Cesarean Delivery	58 (70.7)
Chronic Lung Disease	18 (22)
Retinopathy of Prematurity Requiring Intervention	7 (8.5)
Necrotizing Enterocolitis	6 (7.3)
High Grade Intraventricular Hemorrhage	3 (3.9)
	mean +/- standard deviation
Birthweight, grams	1197 +/- 370
Gestational age, weeks	28.6 +/- 2.4
Duration of Mechanical Ventilation, days	7 +/-12
Length of Stay, days	70 +/- 30
	median (range)
1 minute APGAR Score	6 (2-9)
5 minute APGAR Score	8 (4-9)

Characteristic (N=82)

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Abstract: 193
Neonatal Adipocytokines and Growth During Childhood
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Background Obesity is prevalent among children and may be related to fetal programming. Adipocytokines may play a role in programming obesity risk, but their association with childhood adiposity and growth is unclear.
Objective To examine associations of neonatal adipocytokines with longitudinal measures of adiposity during childhood using data from the HOME Study, an ongoing prospective birth cohort of pregnant women and their children in Cincinnati, Ohio.
Design/Methods We measured adipocytokine concentrations (leptin and adiponectin) in umbilical cord serum. Using WHO standards, age- and sex-specific body mass index (BMI) z-scores were calculated from weight and height/length obtained during study visits at 4 weeks and 1, 2, 3, 4, 5, and 8 years of age. We estimated covariate-adjusted BMI z-scores and the rate of BMI z-score change between age 4 weeks and 8 years by neonatal leptin (N = 257) and adiponectin (N = 271) terciles using linear regression with generalized estimating equations.
Results Median neonatal leptin and adiponectin concentrations were 9.8 ng/mL and 41 μg/mL, respectively. Across all ages, children in the middle (mean z-score difference: 0.2; 95% CI: -0.1, 0.4) and highest (0.4; 95% CI: 0.1, 0.6) leptin terciles had greater BMI z-scores than children in the lowest leptin tercile (p-value for trend = 0.001) (Figure 1). The rate of change in BMI z-scores did not vary by neonatal leptin concentrations (leptin-age interaction p-value = 0.48). Children in the lowest adiponectin tercile had lower BMI z-

scores at age 4 weeks and greater gains in BMI z-score between age 4 weeks and 8 years (change per year: 0.10; 95% CI: 0.08, 0.13) than children in the middle (0.07; 95% CI: 0.04, 0.09) and highest (0.04; 95% CI: -0.01, 0.05) terciles, such that they had the highest BMI z-scores at age 8 among the three adiponectin terciles (adiponectin-age interaction p-value < 0.001) (Figure 2).
Conclusion(s) In this cohort of children, neonatal leptin and adiponectin concentrations were predictive of adiposity and its course trajectory during childhood. These results suggest that adiponectin and leptin play a role in fetal programming, and are biomarkers of weight gain and adiposity in early childhood.

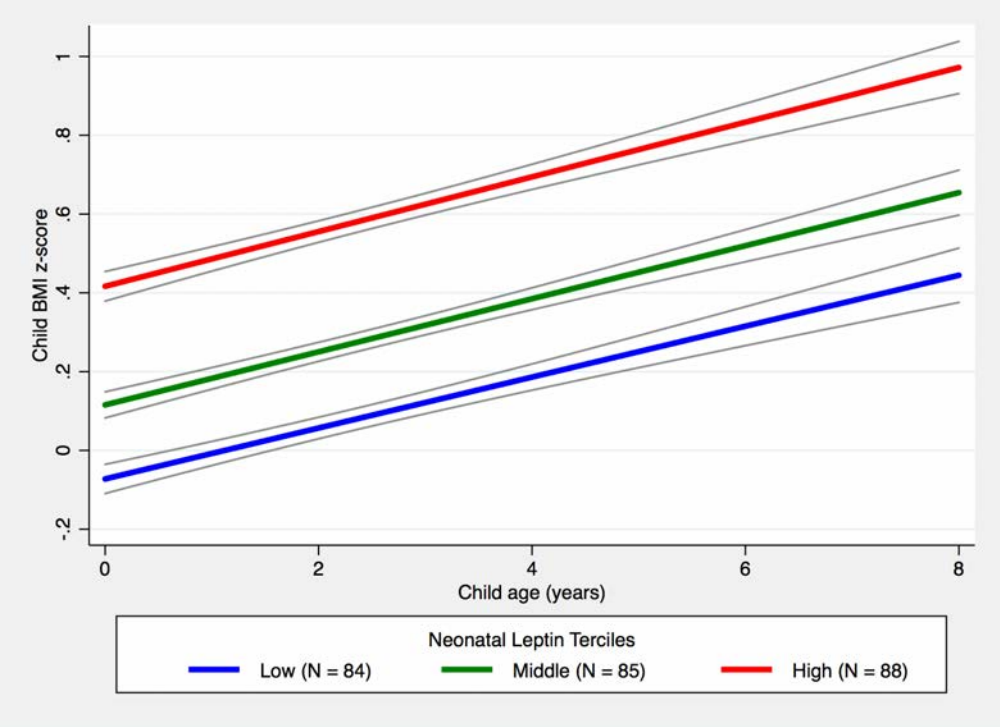

Figure 1. Changes in child body mass index z-scores with age by neonatal leptin terciles. Linear regression with generalized estimating equations of child body mass index (BMI) z-scores during the first 8 years of life per neonatal leptin concentrations (N = 257). Adjusted for child age, maternal race, maternal age, maternal income, parity, maternal BMI at 16 weeks gestation, maternal serum cotinine concentration, and child sex. Solid lines represent mean BMI z-scores from the adjusted linear regression model for children in each neonatal leptin tercile. The lighter lines represent the 95% confidence intervals.

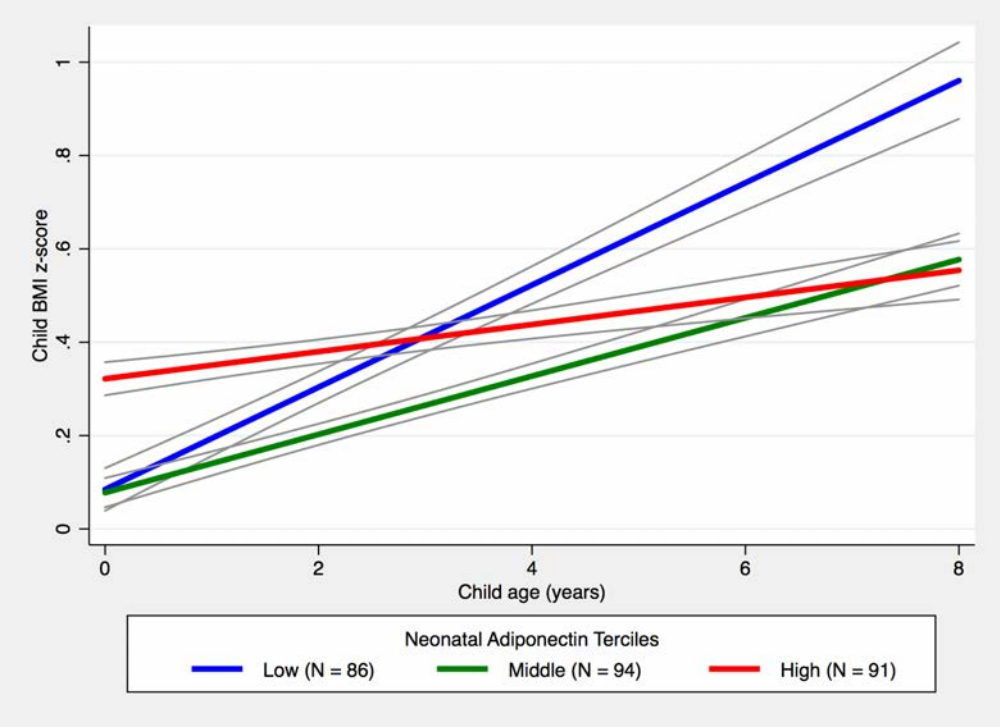

Figure 2. Changes in child body mass index z-scores with age by neonatal adiponectin terciles. Linear regression with generalized estimating equations of child body mass index (BMI) z-scores during the first 8 years of life per neonatal adiponectin concentrations (N = 271). Adjusted for child age, age - adiponectin interaction term, maternal race, maternal age, maternal income, parity, maternal BMI at 16 weeks gestation, maternal serum cotinine concentration, and child sex. Solid lines represent mean BMI z-scores from the adjusted linear regression model for children in each neonatal adiponectin tercile. The lighter lines represent the 95% confidence intervals.

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Abstract: 194

Not So Sure About Pediasure: Assessing the Relationship of BMI and the Incorporation of Nutritional Supplements in Ideal Meal Plans

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Background The American Academy of Pediatrics (AAP) recommends that nutritional supplements (NS), such as Pediasure (PS), only be used when children are unable to receive adequate nutrients from their diets. However, PS, a popular dietary supplement, is widely advertised as “clinically proven to help kids grow,” possibly convincing some parents that not consuming NS may put their child at a disadvantage. Excess calories from unneeded NS can lead to increased incidence of obesity. Nevertheless, the frequency with which parents use NS, when not medically necessary, is currently unclear.
Objective The present study seeks to assess the frequency with which parents, when given the option, choose to offer their children NS when planning ideal meals.
Design/Methods Parents of children aged 4-12 years were surveyed anonymously using Amazon Mechanical Turk. Parents who indicated that their child had medical conditions affecting food preferences were excluded. First, parents answered demographic questions, including age, height, and weight of their child. IOTF BMI was calculated using these measurements. Participants were then given a randomized picture list of 71 healthy and non-healthy foods, including PS, from which they were prompted to structure a 1-day ideal meal plan (IMP) for their child, even if their child would not actually eat these foods in reality.
Results A total of 630 effective parent responses were obtained. The mean age of the child sample was 7.25 years (SD= 2.69), with 82.5% of parents identifying as White, 11% identifying as Black, and 6.5% Other. Overall, 35.4% of parents included PS in at least one IMP for the day (breakfast, lunch, dinner, or snack). Parental PS choice was found to be associated with child’s BMI (Chi-square = 12.671, p<.001). Notably, the proportion of children whose parents chose PS was higher in the overweight and obese categories (44% and 43%, respectively), than in the thin and normal weight categories (31% and 29%, respectively).
Conclusion(s) Despite AAP recommendations, over a third of parents chose to include PS in an IMP for their child. This percentage grew dramatically with increasing BMI, showing that children who fell within the overweight and obese categories had parents who chose PS for an IMP at a significantly higher rate. As pediatric obesity rates continue to climb nationwide, it is essential that pediatricians discuss misleading advertising and caution against excess calories associated with the non-medically necessary use of NS.

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Abstract: 195

Hypothalamic and Reward Pathway Dysregulation Affecting Oral Feeding in Infants with Prenatal Drug Exposure

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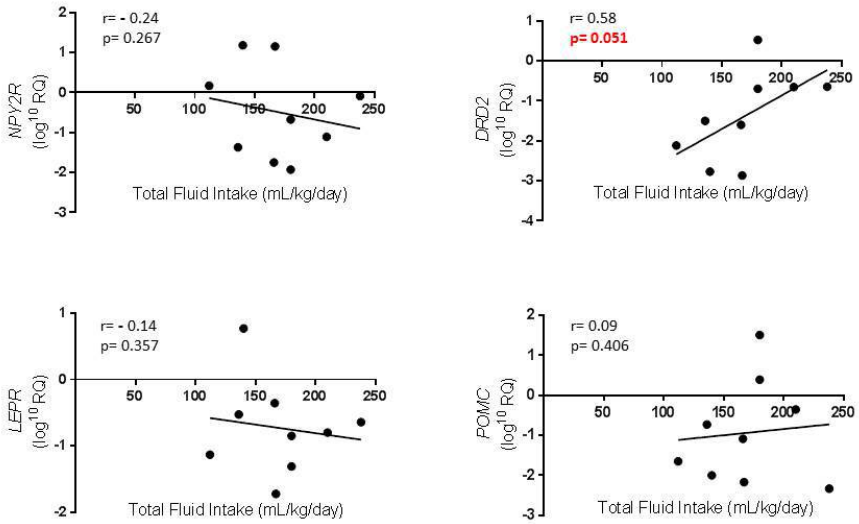
Background Infants with prenatal drug exposure are at risk for withdrawal symptoms called neonatal abstinence syndrome (NAS) and often exhibit a paradoxical feeding behavior by which they eat excessively, yet inefficiently. We hypothesize that this unique feeding phenotype is reflective of a hypothalamic imbalance between homeostatic (energy-driven) and hedonistic (reward-driven) pathways from chronic drug exposure in utero.
Objective 1) To use a non-invasive salivary method to evaluate genes involved in the hypothalamic and reward control of feeding behavior in case (NAS) and control cohorts; 2) To correlate these gene expressions with the feeding parameters (volume and calorie needs) in the case cohort.
Design/Methods Saliva was collected from all subjects within 48 hours of birth and prior to any pharmacotherapy (for the case cohort). Following RNA extraction, transcriptomic analysis was conducted using pre-designed RT-qPCR assays of the four designated genes: NPY2R—appetite regulator; POMC—mediator of satiety; LEPR—energy-based appetite modulator; and DRD2—regulator of central hedonic/reward pathways. Reference genes (GAPDH, YWHAZ, and HPRT1) were used for normalization and quality assessment. Log of relative quantification values between cases and controls, as well as across sex, were compared. Clinical data (feeding type, volume and caloric intake, weight loss) were compared between cohorts. Gene expression differences were correlated to the volume intake in infants with NAS.
Results Saliva of cases (n=31), along with sex- and age-matched controls (n=30) were analyzed. In the case cohort, LEPR was shown to be significantly upregulated (p=0.04) compared to the controls. Male infants, specifically, had significant upregulation in both DRD2 and LEPR expressions (p=0.02 and 0.05 respectively) (Table 1a,b). Infants in the case cohort lost more weight than those in the control

cohort (p=0.047). Correlation between gene expression and total intake on day of life (DOL) 7 showed that DRD2 was significantly associated with increased feeding volume (p=0.05) (Fig. 1).
Conclusion(s) Our study suggest that prental drug exposure alters the balance between hypothalamic and reward genes that regulate feeding behavior. Selective hypothalamic gene expression differs across sex, which may provide a basis for sex predisposition to future addictive behaviors. Positive correlation between DRD2 expression and intake on DOL 7 may indicate the utility of this gene expression in predicting feeding aberrance in infants with NAS.

Figure 1. Correlation of Total Intake with Gene Expressions



Correlation between NPY2R (neuropeptide Y2 receptor), DRD2 (dopamine type 2 receptor), LEPR (leptin receptor), and POMC (pro-opiomelanocortin) gene expressions with total intake in infants in the case cohort who required pharmacotherapy.

Table 1a. Gene Expression Levels in Case and Control Cohorts

Genes	Control (n=30) (mean log10 RQ +/- SD)	Case (n=31) (mean log10 RQ +/- SD)	p values
NPY2R	0.0 +/- 0.9	-0.2 +/- 1.0	0.41
DRD2	-1.7 +/- 1.4	-1.3 +/- 1.3	0.22
LEPR	-1.3 +/- 1.0	-0.8 +/- 0.8	0.04
POMC	-1.3 +/- 1.2	-0.8 +/- 1.3	0.12

Compared to the control cohort, infants in the case cohort had lower NPY2R (neuropeptide Y2 receptor), higher DRD2 (dopamine receptor type 2), higher LEPR (leptin receptor), and higher POMC (pro-opiomelanocortin) expressions, with significance found for LEPR.

Table 1b. Gene Expression Levels in Males Based on Cohorts

Genes	Control (n=16) (mean log10 RQ +/- SD)	Case (n=17) (mean log10 +/- SD)	p values
NPY2R	0.2 +/- 0.8	-0.4 +/- 1.0	0.06
DRD2	-1.8 +/- 1.3	-0.7 +/- 1.1	0.02
LEPR	-1.4 +/- 1.1	-0.8 +/- 0.8	0.05
POMC	-1.3 +/- 1.1	-0.6 +/- 1.4	0.11

Compared to the control cohort, males in the case cohort had lower NPY2R (neuropeptide Y2 receptor), higher DRD2 (dopamine receptor type 2), higher LEPR (leptin receptor), and higher POMC (pro-opiomelanocortin) expressions, with significance found for DRD2 and LEPR.

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Abstract: 196

How Much Is Too Much: Are Parents Aware of the Appropriate Serving Sizes for Children?

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Background Research has shown that larger portion sizes tend to correlate with larger food intake amounts and resultant overeating. While parents are expected to aid their children in portion selection regarding meals and mid-meal treats, it is unclear whether parents are aware of the appropriate portion sizes for children.
Objective This study aims to look at the parental awareness of serving sizes for children by assessing the snack portion sizes parents find to be appropriate.
Design/Methods Parents of grade school children (GSC) were surveyed with Amazon MTurk (n= 598). For each of seven popular snack items, parents were provided with pictures of various serving sizes and were asked to indicate which of the servings would be most appropriate for a child of a particular age and gender. Appropriate snack portion sizes were calculated based on the 200-Calorie snack-serving limit recommended by the USDA. We compared parents' responses to: (1) the serving size indicated on the nutritional label of each snack and (2) the appropriate serving size according to USDA's guidelines.
Results The majority of parents serve similar snacks to their children on a regular basis: 39.3% of the parents serve similar snacks to their children at least once a day, and 45.5% serve similar snacks at least once a week (Table 1). Based on USDA recommendations of a 200-Calorie snack, a single serving of a snack should not contain more than 6.5 g total fat, 2 g saturated fat, 30 mg cholesterol, 240 mg sodium, and 5 g sugars. Based on these recommended nutritional levels, we calculated the recommended serving sizes for each of the seven snacks (Table 2). For 5 out of the 7 snack items, parents significantly overestimated the snack portion size appropriate for GSC based on the USDA guidelines. A comparison of each snack's serving size indicated on the nutritional label, the calculated maximum suggested serving size according to the USDA, and parents' responses can be seen in Table 2.
Conclusion(s) Parents consistently overestimate the appropriate snack portion sizes for children. Since the majority of parents serve similar snacks to children very frequently, the overlarge portion sizes could result in multiple overeating incidences every week. With the rising prevalence of pediatric obesity, parents must be aware of the appropriate serving sizes for children in order to aid them in weight control. Since lifelong eating habits are established early in life, pediatricians must counsel and educate parents about proper food portions and the USDA guidelines.

	Many times daily	*Daily*	*Many times a week*	*Weekly*	*Many times a month*	*Once a month*	*Almost never*
How often do you typically give snacks similar to the ones in this survey to your grade school child(ren)?	*4.7%*	*34.6%*	*28.9%*	*16.6%*	*6.4%*	*4.2%*	*4.7%*

Table 1: Parents' responses to how often they serve snacks similar to the ones in the survey to their grade school child(ren).

Snack	Company-Suggested Serving Size Based on 2000-Calorie Diet	Recommended Serving Size Based on USDA 200-Calorie Snack Recommendation	Average Parents' Chosen Serving Size	Recommended Serving Size vs. Parents' Chosen Serving Size, p-value
Doritos	11 chips	8.9 chips	14.9 chips	p<0.001***
Cheetos Cheese Puffs	13 pieces	8.45 pieces	12.2 pieces	p<0.001***
Goldfish	55 pieces	52.8 pieces	54.6 pieces	p= 0.18
Pringles	16 chips	11.6 chips	11 chips	p<0.01**
Munchkins	1 munchkin	1 munchkin	3.16 munchkins	p<0.001***
Oreos	3 cookies	1.07 cookies	3.04 cookies	p<0.001***
Pretzels	17 pieces	9.1 pieces	16.6 pieces	p<0.001***

Table 2: Comparison of parents' recommended serving sizes of various popular snacks for their grade-school children and USDA recommended serving sizes.

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Abstract: 197

Association of Genetic Ancestry Admixture and Very Early Childhood Obesity

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Background Genetic ancestry and race may have controversial influence in research or clinical practice. Race and ethnicity do not capture all the heterogeneity; therefore, ancestral genetic background may help to better understand the prevalence and disparity of childhood obesity.

Objective To investigate relationship between children's genetic admixture proportions and obesity at age 12 months.

Design/Methods Children age 12 months were included in this retrospective cross-sectional study. Whole genome sequencing was performed and the ancestry of children was estimated by the ancestry and kinship toolkit by projecting the samples into the 1000 genomes principal components. Weight for Length Percentile (WFLP) at 12 months of age were categorized as $<95^{th}$ and $\geq 95^{th}$. Multiple logistic regression analysis was performed to calculate odds ratios (ORs) with 95% confidence intervals (CIs) for association of admixture proportion including European (EUR), American (AMR), African (AFR), East Asian (EAS) and South Asian (SAS) with WFLP categories. Association of admixture proportions and WFLP categories were investigated adjusting for maternal education, birth weight, frequency of breast feeding at 6 months and juice consumption at 12 months.

Results 821 children from 83 parental countries of birth were included; WFLP were 671 (81.7%) $<95^{th}$ and 150 (18.3%) $\geq 95^{th}$. WFLP$\geq 95^{th}$ was associated with higher birth weight (p=0.004), lower maternal education (p<0.001), lower breast milk consumption (p=0.0002) and higher juice consumption (p=0.001). Characteristics of outcome and predictive variables were described (Table 1). Crude odds ratios showed EUR admixture was protective (OR 0.45 (95% CI 0.27–0.74)) whereas AMR (OR 3.85 (95% CI 1.92 – 7.70)) and AFR (OR 5.70 (95% CI 2.19 –14.85)) were positively associated with obesity. After adjusting for confounding variables, only AFR was associated with WFLP$\geq 95^{th}$ (OR 7.38 (95% CI 2.31 – 23.59)), while AMR was no longer associated with WFLP$\geq 95^{th}$ and EUR was no longer protective. No association was observed between EAS or SAS with obesity (Table 2).

Conclusion(s) AMR and AFR admixture were associated with WFLP $\geq 95^{th}$ at 12 months, while EUR was protective. After adjusting for known obesogenic risk factors, the relationship between EUR and AMR and WFLP were no longer significant emphasizing the role of social and clinical factors. AFR remained significantly associated with obesity suggesting this genetic background may contribute to the observed differences in obesity.

Table 1: Distribution of admixture proportions and frequency of WFLP categories in the study population

Predictive and Outcome Variables (N=821)	Mean (SD) or Frequency (%)
Admixture Proportion	
EUR	0.66 (0.34)
AMR	0.03 (0.23)
AFR	0.06 (0.15)
EAS	0.08 (0.22)
SAS	0.07 (0.19)
Weight for Length Percentile (WFLP) Categories	
<95th	81.7
≥95th	18.3

Table 2. Crude and adjusted odds ratios for WFL percentiles ≥95th and <95th by genetic ancestry admixture proportions

Admixture proportion	Crude OR (95% CI)	Adjusted OR (95% CI)
EUR	0.45 (0.27-0.74)	0.60 (0.30-1.19)
AMR	3.85 (1.92-7.70)	1.06 (0.28-3.97)
AFR	5.70 (2.19-14.85)	7.38 (2.31-23.59)
SAS	0.55 (0.17-1.68)	0.21 (0.03-1.67)
EAS	0.69 (0.29-1.66)	1.33 (0.51-3.53)

*Adjusted for maternal education, breast feeding at 6M, juice consumption at 12M and birth weight

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Abstract: 198

Effects of Stimulant Medication on BMI in Normal Weight and Overweight Children with ADHD

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Background Methylphenidate (MPH), a stimulant, is a first-line drug used to treat Attention-deficit hyperactivity disorder (ADHD). One of the side effects of stimulant medication is loss of appetite, with studies showing slower BMI growth rates. It is not known whether BMI change in ADHD children on stimulant medication differs between normal weight and overweight children as a function of premedication BMI.

Objective To compare the change in BMI in normal weight and overweight children 6 months after starting stimulant medications on ADHD patients, as a function of premedication BMI.

Design/Methods A case control study was conducted in children ages 3- 18 years diagnosed with ADHD between Jan 2014 to Feb 2017 and followed at the developmental or psychiatry clinics for at least for 6 months. We included patients with ADHD diagnosis based on DSM-V criteria. BMI was retrieved from the electronic medical record at baseline (time of starting stimulant medications) and at 6 month-follow up. Patients were categorized as overweight (BMI >85 percentile) or normal weight (BMI = 5-85 percentile). Statistical analysis was done using SPSS software. The median (and interquartile ratio IQR) or mean ±SD were calculated. Changes in BMI centiles were analyzed using Wilcoxon Signed Ranks Test, or paired T-test, as appropriate. Comparison between weight categories was done using independent T test. Categorical variables were compared using Chi–squared ($\chi 2$) test.

Results Of 139 patients who started stimulant medication, 36 patients were excluded due to lack of follow up data. Of the remaining 103 children, 66% were male, with age range 5-17 years (median 8 years, IQR 7-11). Both overweight and normal weight groups had similar age and same proportion of males. Overall, there was a significant drop in BMI centiles from baseline [median (IQR) = 74 (39-94)] to 6 months [median (IQR) = 68 (30-88), $p<0.001$]. The median drop in BMI centiles for all patients was 2 (IQR -1 to 11). There was also a significant BMI centile drop from baseline to 6 months for both overweight ($p=0.002$) and normal weight ($p=0.014$) as shown in table 1. However, the degree of drop in BMI centiles between the two groups was not significant ($p=0.785$) (Figure 1).

Conclusion(s) Our study showed that ADHD children started on stimulant medication had a significant drop in BMI centile from baseline to 6 months; however, there was no significant difference in degree of BMI drop between overweight and normal weight children

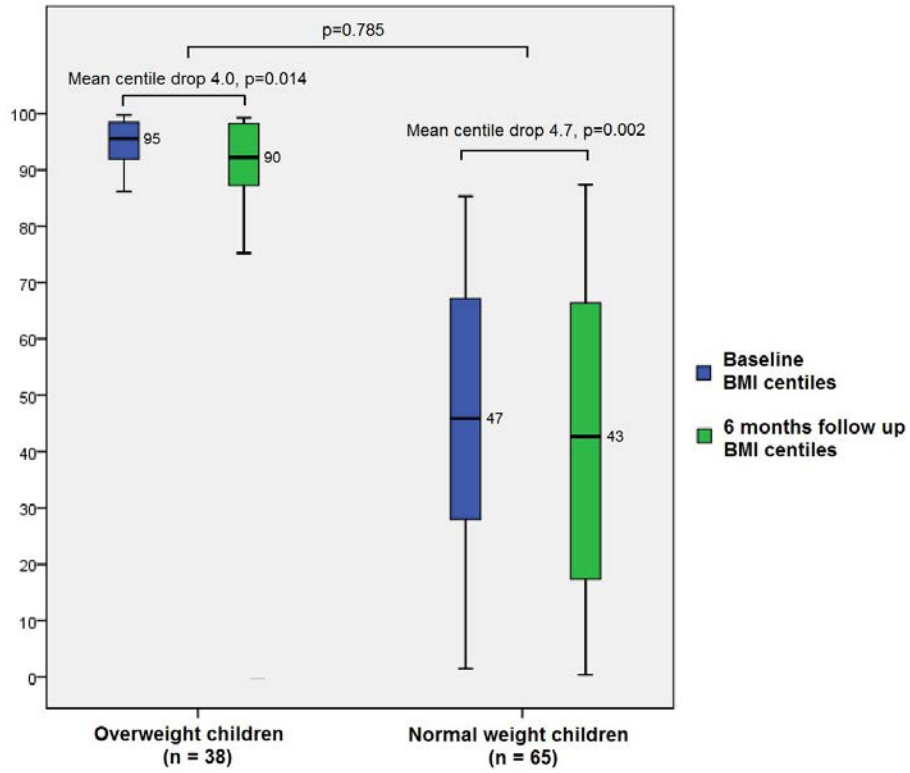

Figure 1: Box plots of BMI centiles for ADHD children started on stimulant medications, at baseline and 6 months follow up, stratified by overweight or normal weight (n=103)

Table 1

	Overweight group (n=38)	Normal weight group (n=65)	P value [1] (between the 2 groups)
Age at start, mean±SD	9.2±2.8	9.0 2.9	0.790
Male gender, n (%) Female gender, n(%)	23 (61%) 15 (39%)	45 (69%) 20 (31%)	0.368
BMI centiles at baseline, mean±SD	95±4	47±25	<0.001
BMI centiles at 6 months, mean±SD	90±9	43±27	<0.001
Drop in BMI centiles from baseline to 6 months, mean±SD	4.7±8.9 [2]	4.0±12.8[3]	0.785

1) using independent samples T test. 2) P value=0.002, comparing BMI centiles from baseline to 6 months in overweight group, using paired T test. 3) P value=0.014, comparing BMI centiles from baseline to 6 months in normal weight group, using paired T test.

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Abstract: 199

Improving Time to Administration of Systemic Corticosteroids to Patients with Moderate to Severe Asthma Exacerbations in the Pediatric Emergency Department

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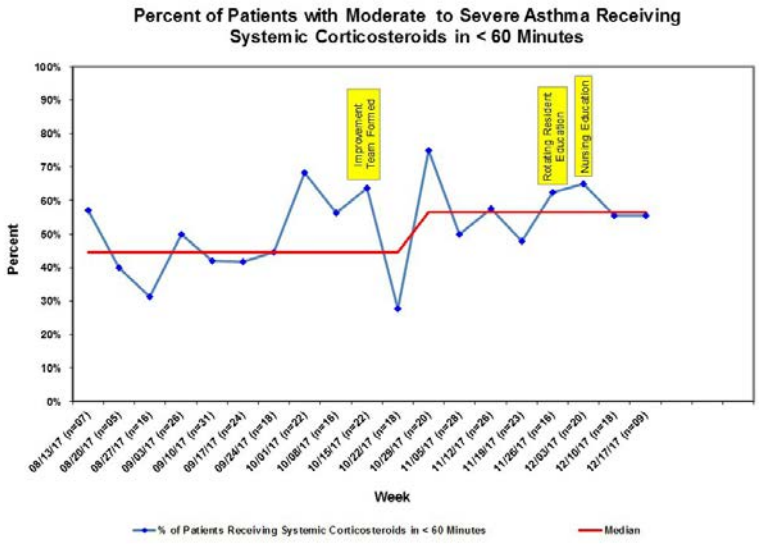
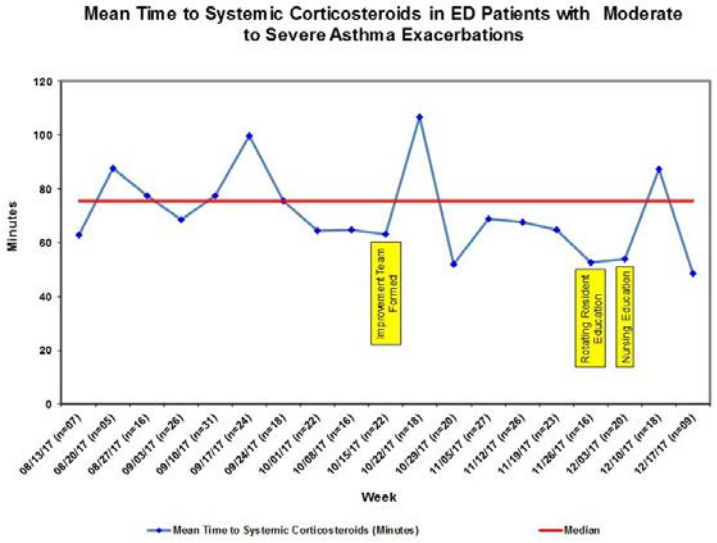
Background Systemic corticosteroids are a cornerstone of management of acute asthma exacerbations. Prior studies have demonstrated that early delivery of steroids in this patient population decreases the pediatric emergency department (ED) length of stay (LOS) and hospital admission rate. In our institution past research has shown that the administration of steroids to pediatric asthma patients in the ED within an hour of triage is associated with a 25-minute mean decrease in LOS. In a busy ED setting this can have a significant impact on patient throughput. Nurse initiated steroids in triage have been shown to decrease rate of return to the ED as well as decrease ED LOS.
Objective Improve time to delivery of systemic corticosteroids in patients presenting to the ED with moderate to severe asthma exacerbations through a targeted quality improvement (QI) project.
Design/Methods This is a single center prospective multi-disciplinary QI project targeting patients 1-18 years of age with an acute moderate to severe asthma exacerbation seen in the ED. Nine weeks of baseline data was collected for the time from patient arrival to ED until administration of steroids. A quality improvement project was launched in October 2017 involving multiple PDSA ramps aimed at improving time to administration of steroids. To this point re-education of residents on the use of our ED asthma pathway and electronic medical record (EMR) order set and nursing education about our nursing treatment protocol for asthma have been completed. Future PDSA ramps will continue with education as well as improvement of EMR support for the early delivery of steroids.
Results Baseline weekly median of patient's receiving steroids in under 60 minutes from ED arrival was 44% with a mean time to steroid administration of 76.2 minutes. With initiation of our QI project the weekly median of patient's receiving steroids in under 60 minutes improved to 57%. During our intervention period the mean time to steroid administration decreased to 64.8 minutes. Rate of ED return visits resulting in inpatient admission for patients initially discharged from the ED did not change with initiation of our project.
Conclusion(s) Our QI project improved the percentage of patients with moderate to severe asthma exacerbations receiving steroids in under 60 minutes from ED arrival and mean time to administration of steroids. Future work on EMR support of early steroid administration should lead to further improvement.





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Abstract: 200

Impact of NICU Design and Environmental Factors on Sound Exposure

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Background The AAP recommends that NICU sound levels should not exceed a continuous level of 45 decibels (dBA) or maximum sound level of 65 dBA, but these goals are difficult to achieve.

Objective To determine the impact of different NICU designs (single room, hybrid pod/single room, open room) and other environmental factors on sound levels experienced by NICU infants. We hypothesized that 1) sound exposures would be less in a single room NICU compared to pod or open room formats and 2) other modifiable environmental factors contributing to excessive sound levels may be identified by monitoring with the free smartphone application Decibel X (version 6.1, SkyPaw Co. Ltd).

Design/Methods Minimum (Min), maximum (Max), and peak dBA were measured using the Decibel X app at the level of infant's ear for 2 minute periods inside an incubator or open crib at different times of the day in each of the 52 rooms of the U. Maryland Medical Center (UMMC) single room level IV NICU and 4-6 bed pods/single rooms at St. Agnes Hospital (SAH) level III NICU, Baltimore, MD and in a 15 bed, open format Level III NICU at Prince George's Hospital Center (PGHC), Cheverly, MD and presence of sources of noise such as ventilators, alarms, conversations, TV/music, etc. were noted. Data were analyzed by Student t test and ANOVA with Bonferroni correction.

Results Although the min dBA was lowest in the open format NICU, the max and peak dBA were lowest in the single bed NICU (Table 1). Exposure to vent/CPAP sounds increased the min dBA, while conversations, alarms, and multiple factors significantly increased the max dBA and peak dBA (Table 2). The min dBA, max dBA, and peak dBA were higher in night shift than day shift recordings at UMMC [(min dBA 57.2±3.7 vs 55±2, p=0.0001); (max dBA 73.7±7.6 vs 68.7±7.7, p=0.0001); (peak dBA 81.2±8.5 vs 77.4±9.7, p=0.0073)]. The reverse was observed at SAH with higher min dBA during day shifts than night shifts (59.9±3.7 vs 51.9±2.5, p<0.0001). Max, and peak dBA were higher in isolettes than open cribs [(max dBA 76.2±6.8 vs 69.6±7.5, p<0.0001); (peak dBA 85±7.3 vs 76.6±8.3, p<0.0001)].

Conclusion(s) Maximum dBA was lower in a single bed NICU compared to open format and hybrid pod/single room NICUs, but all recordings exceeded the AAP recommended sound levels. Potentially modifiable environmental factors include conversations, equipment, and audible alarms. Isolettes did not reduce sound exposure. A smartphone app may be useful for auditing sound exposure in NICUs in quality improvements efforts to achieve the AAP recommended sound levels.

Table 1. Impact of NICU Design on Sound Levels

Variable	Single Bed NICU N=52 beds	Open Format NICU N=2 Rooms/6-9 beds each	Pod/single Room N=2 pods(6 beds each)/5 single rooms	P value
Min dBA	56.6 ± 3.5	54.4 ± 1.5	58.5 ± 4.7	<0.0001
Max dBA	72.5 ± 7.9	77.8 ± 5.4	76.1 ± 8.5	0.0001
Peak dBA	80.3 ± 8.9	85.7 ± 6.2	84.2 ± 9.3	0.0002

Data are expressed as mean ± SD

Table 2. Effect of Environmental Factors on NICU Sound Levels

Environmental Factor	Min dBA	Max dBA	Peak dBA
None	56.9 ± 3.7	70.3 ± 7.2**	77.8 ± 7.8†
Conversation/Music	57.2 ± 3.6	73.7 ± 8.6	81.1 ± 9.2
Monitor/Equipment Alarms	56.1 ± 2	77 ± 7.1	85.5 ± 8.8
Vent/CPAP	59.8 ± 7.7*	74.7 ± 6.5	82.5 ± 7.2
Multiple Factors	56.3 ± 3.6	77.2 ± 7.7	86.5 ± 8.5

Data are expressed as mean ± SD. *P<0.04 vs. no factor, alarms and multiple factors; **P<0.03 vs. conversations, alarms, and multiple factors; †P<0.002 vs. alarms and multiple factors

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Abstract: 201

Chlorhexidine (CHG) Baths in the NICU: A Quality Improvement Initiative to Improve Central Line Associated Blood Stream Infection (CLABSI) Bundle Compliance and Streamline Workflow

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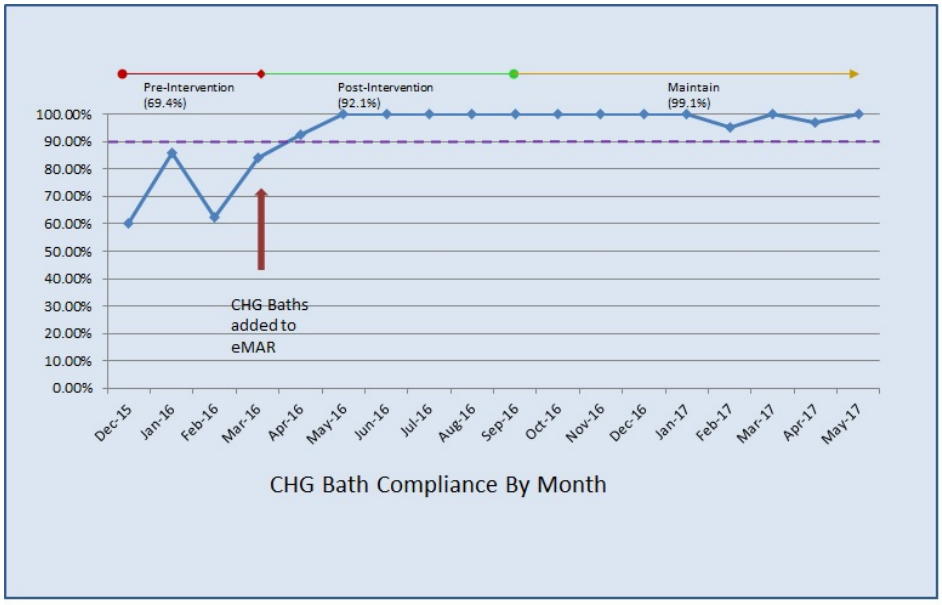
Background The use of CLABSI bundles have been shown to reduce the incidence of CLABSI, and CHG baths are a key component used to reduce surface colonization. In our NICU, CHG baths had been given by protocol; however, with unclear compliance. Based on the innovative suggestion of a bedside care provider, CHG baths were transitioned into the electronic medical record (EMR) by computer order entry (CPOE). This allowed for the inclusion of CHG bath wipes in the electronic medication administration record (eMAR), enabling barcode scanning upon administration.

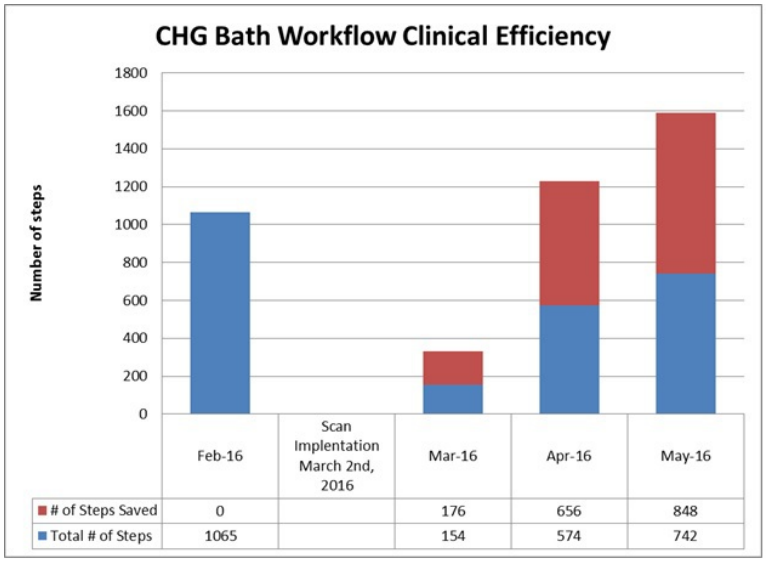
Objective To improve CLABSI bundle compliance to >90% by addressing one of the key 'fallouts', delivery of CHG baths, by implementing a process change to CPOE.

Design/Methods In an effort to improve CLABSI bundle compliance, a multidisciplinary team was created to review workflow and identify key steps for targeted interventions. CHG bath administration was a notable 'fallout' in bundle compliance and was identified as a target for intervention. The process was transitioned from protocol to CPOE, with eMAR documentation, and the team created an educational tool to train all providers. The number of steps involved were measured to track clinical efficiency. Bundle compliance and CLABSI rates continued to be monitored per standard NICU practice.

Results The goal of > 90% bundle compliance was reached one month post-intervention and has been sustained for the subsequent 14 months (image1). The intervention of CPOE reduced the total number of steps involved in the CHG bath administration process from 15 to 7, improving clinical efficiency by 53% (image 2).

Conclusion(s) The implementation of CPOE and barcode scanning for CHG bath administration in the NICU increased CLABSI bundle compliance, and has since become self-sustaining. The CLABSI rate decreased to 0.31 per 1,000 central line days, 80% lower than the year prior to the intervention (table). Although the CLABSI rate reduction is substantial, it is important to note that other process improvements were simultaneously implemented. The change in workflow reduced the number of steps required to document the administration of CHG baths in the EMR. We speculate that this initiative has been so successful because it is a unique example of process improvement that both streamlined efficiency of workflow at the bedside and also improved the overall quality of clinical care delivered, a shared goal.





CLABSI Rates in the NICU

Year	# of CLABSI	# of Central Line Days	CLABSI Rate (per 1000 line days)
2015	7	4511	1.55
2016	2	3071	0.65
2017	1	3226	0.31

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Abstract: 202

A Novel Surgical Procedure for Frenotomy using a New Slot Retractor

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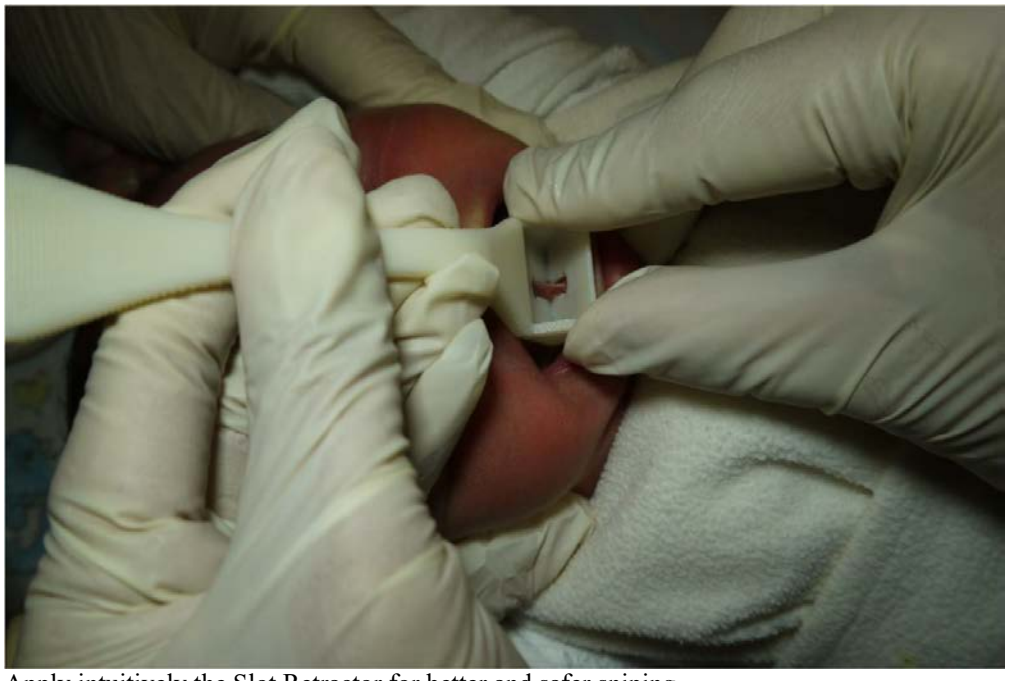
Background Tongue-tie (TT) is a common (3-10 % newborns) congenital condition affecting the neonatal breast feeding dyad. Simple release technique (frenotomy), if done early, provides immediate improvement in breast feeding efficacy and decreases discontinuance of breast feeding. Frenotomy, when properly completed using classical techniques, can be safe; however, several complications have been reported.

Objective To improve frenotomy procedures using a novel slot retractor (SR); offering the provider an easier cutting technique with few adverse events, less partial division, and shorter procedure times.

Design/Methods The SR was designed and 3D printed. The SR pyramidal shape acts as a bite block, immobilizes the TT & the curved handle was designed not obstruct the TT view. The SR sides (Figure 1) were designed to shield & protect vital tissues; the SR slots isolate the TT for precise sniping. The study was an IRB approved QI project; and consent was obtained. To date 200 infants have been studied. The protocol is as follows: 1) Under a nursery warmer, a newborn is wrapped in a blanket & analgesia given by oral sucrose. An assistant restrains the baby's head; 2) Insertion/Isolation Provider inserts the SR into the mouth, under the tongue & slides the TT into the SR slot; 3) Immobilization and visualization The SR handle (pointed towards the nose) exerts pressure against the tongue; immobilizes the TT for visualization & blocks mouth closure despite crying/head movement. 4) Division Hemostatic clamp pinches the TT a few seconds before sniping with blunt-end scissors. 5) Compression with sterile gauze swab to compress the mouth floor &

prevent bleeding; the patient is returned to the mother for immediate breast feed.
Results In all procedures performed to date, the success rate with complete division is >97%. Two cases reported to have repeated procedures due to reconnection secondary to incomplete division. Reconnection problems were much less then reported (30% with classical grove retractor). All successful infants were able to breast feed immediately after frenotomy and continued up to three months (rate comparable with breast feeding patients without TT
Conclusion(s) Using the newly designed SR & surgical procedure guidelines reported herein, we found that TT release was safe, fast and efficacious for better isolation, visualization and immobilization. We speculate that this novel surgical procedure guide for neonatal frenotomy can safely be done in the hospital nursery or doctor's office. (Supp. Nemours Fnd. & NIH COBRE P30GM114736).


Newly design Slot retractor for better visualization,immobilizatin and precised sniping


Apply intuitively the Slot Retractor for better and safer sniping

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Abstract: 203

Successful Long-term Breast Feeding Patterns with Early Frenotomy using a Novel Slot Retractor

Neil N. TRAN[2], Shehla s. SIDDIQUI[2], Anna Sosnovsky[2], Gita Jani[3], Leonard GOLUB[3], Chinendum N. Udenze-Utah[3], Adrianna Restrepo-Ormsby[3], Tariq Rahman[1], Thomas SHAFFER[1]

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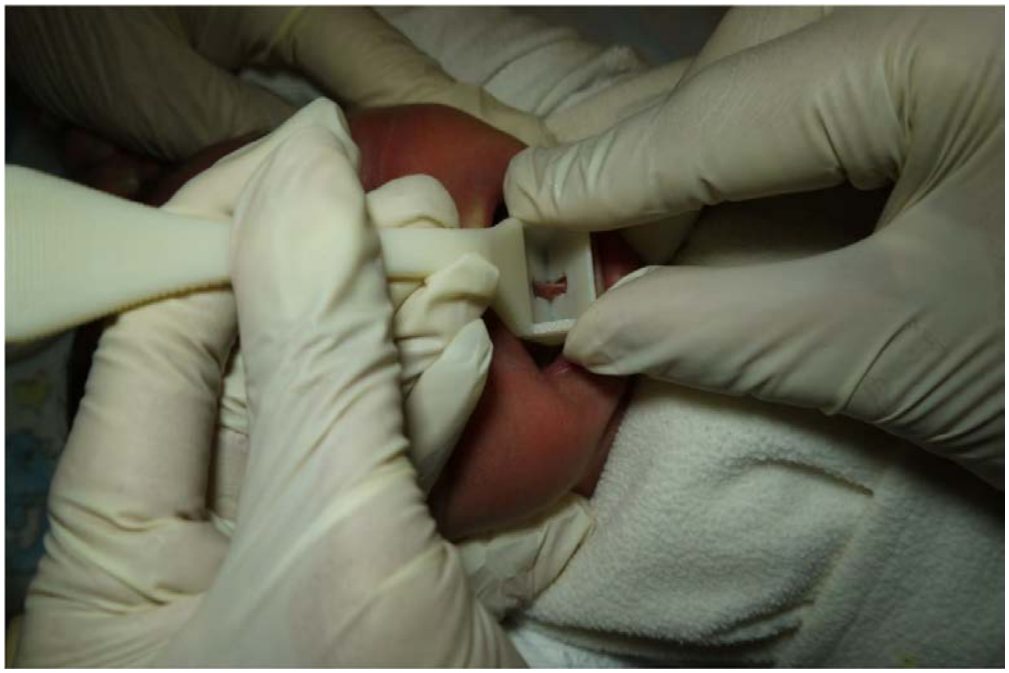
Background Frenotomy for (anklyoglossia; tongue-tie, TT) is a procedure in which the lingual frenulum is cut & is a common (3-10 % of newborns) congenital condition affecting the neonatal breast feeding dyad. This release technique, if done early, provides immediate improvement in breast feeding efficacy & decreases discontinuance of breast feeding. Frenotomy, when completed using classical techniques, can be safe; however, some complications have been reported.

Objective To reconfirm the safety and efficacy of a newly designed SR (Figure) for frenotomy in the neonatal period and evaluate any adverse events (AE), partial division frequency, length of procedure and long term breast feeding outcomes

Design/Methods The study was a QI project at Grand View Hospital following the Doylestown Hospital IRB Protocol; and consent was obtained. 79 infants (M/F=53/26) with clinical TT were studied (type II and III only). Using the SR with sucrose analgesia, all cases were performed in the nursery with a nurse and a neonatologist. Outcomes using the SR for TT release were evaluated as follows: AE, bleeding, partial division, length of procedure and breast feeding. Follow up long term breast feeding patterns, up to one year, which were then compared with a randomized group of 50 breast feeding full term neonates without TT

Results In 79 infants which completed TT release, there were no AE and minimal bleeding stopped within minutes, 2 cases moderate immediate bleeding (TT not clamped prior to sniping), & one case of partial sniping. Follow-up to one year, there were no other incomplete divisions (previous reported “reconnection” rate, 30% with other release methods.) Except for one bottle fed infant since birth, all studied infants were able to breast feed immediately after release & continued to breast feed until discharge. Long-term breast feeding patterns were followed for one year. There was a 98.7% success rate for TT complete release using the SR, and long term breast feeding patterns were successful.

Conclusion(s) After the TT procedure with the newly designed SR design, all except one infant was able to return to routine breast feeding. As noted, there was a 98.7% success rate for TT complete release using the SR & long term breast feeding patterns were successful due to complete sniping. We speculate that this novel surgical procedure for TT can safely and effectively be done in the nursery or doctor's office. (Supp: Nemours Fnd & NIH COBRE P30GM114736)



Apply intuitively the Slot Retractor for better Immobilization,visualization and isolation hence safer precised sniping

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Abstract: 204

Supporting MoMs: Quality Improvement to Increase Feeding of Mother's Own Milk in the NICU

Jillian Connors[1], Courtney Juliano[1], Monika Schule[2], Rosebel Aldana[2], Kathleen Gibbs[3]

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Background Mother's own milk (MoM) is the optimum nutrition for preterm and very low birthweight (VLBW; <1500g) infants. Mothers who produce >500ml of milk per day by postpartum day 14 are more likely to sustain MoM feeding through NICU discharge. There's a limited time period over which interventions to increase milk volume will be successful. In 2015, 55% of VLBW infants born at Mount Sinai received MoM at any time, and only 9% received exclusive MoM.
Objective Our aim is to increase MoM percent of total intake by discharge from 63.3 to 90% for fragile feeders (FF; VLBW and premature infants born <32 weeks) admitted to the NICU by May 2018. A secondary aim is to increase the percent of fragile feeders who receive exclusive MoM from 9% to 80%.
Design/Methods Key drivers involved in promoting/maintaining MoM supply were identified; parental knowledge of benefits of MoM, volume needed, pumping recommendations; medical team's awareness of MoM supply.
Tests of change have included a bedside milk log to communicate MoM volume; early lactation consult (LC); and weekly milk rounds to identify mothers with suboptimal milk production. Ongoing tests are focused on increasing parental milk log completion and weekly milk rounds.
Outcome measures include MoM% of total intake for hospitalization and % of FF who receive exclusive MoM. Process measures include compliance with early LC (within 2d of birth) and parental milk log completion. A balancing measure is the donor breast milk percent of total intake.
Statistical process control p charts were created using QI Macros for Excel.
Results Mean MoM% by discharge month has increased from historical baseline of 63.3 to 74.1%. The percentage of infants receiving >90% MoM by discharge month increased from 43.4 to 63% (Fig 1). Median percent FF receiving exclusive MoM is 16%. There is substantial common cause variability in FF MoM%. There was a centerline shift with increased early LC (76 to 89.3%, Fig 2). Median parental compliance with milk log completion was 6%. None of the milk logs had 100% completion.
Conclusion(s) Since the initiation of quality improvement initiatives, proportion of MoM fed to FF has increased. Substantial common cause variability of early MoM volume remains. Ongoing tests include parental use of milk logs, early LC within 1 day of birth and weekly milk rounds to allow for early identification of mothers with suboptimal milk volume and maintenance of adequate volume pumped over time.

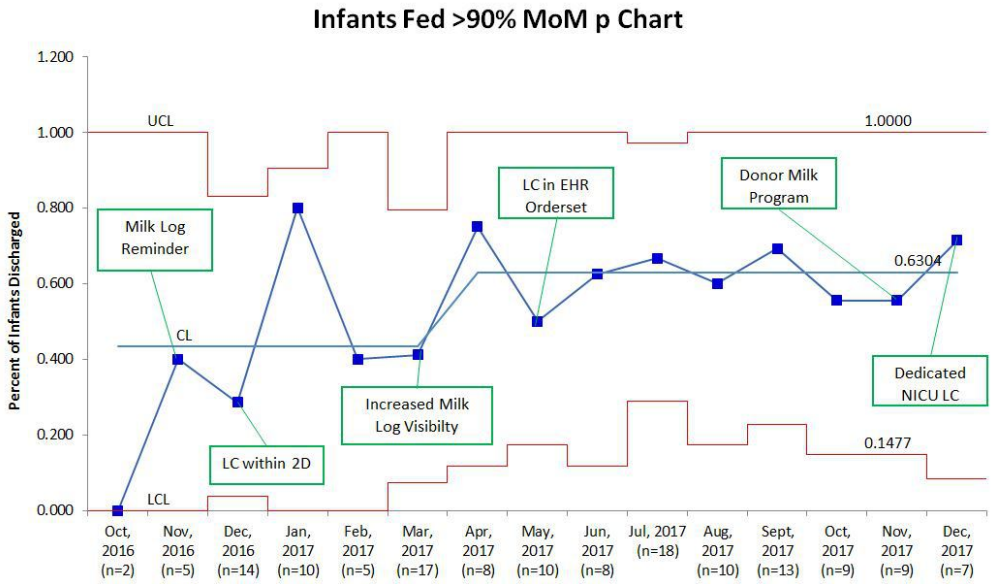

Figure 1. Percentage of FF receiving >90% MoM for entire hospitalization by discharge month. N equals the number of FF discharged.

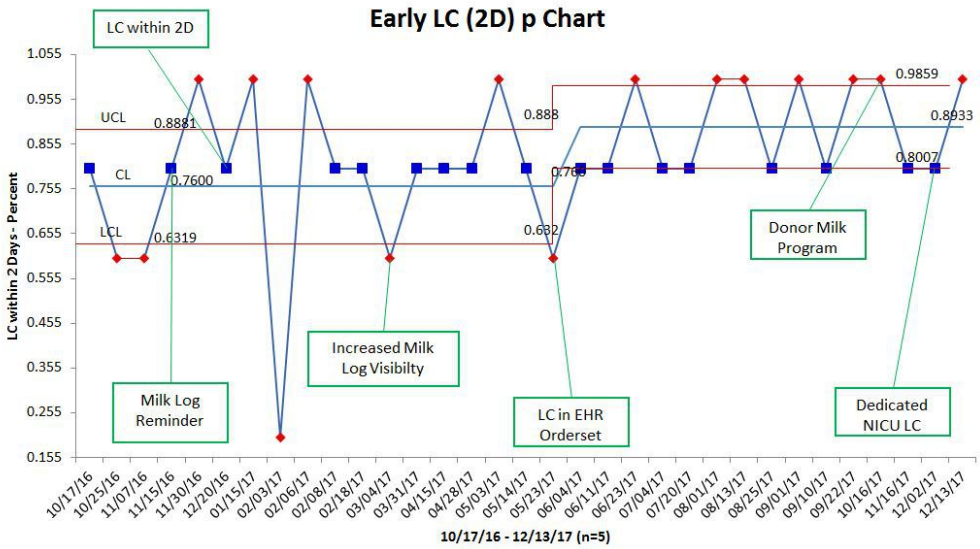

Figure 2. Percent of FF receiving early LC within 2 days of birth for every n=5 patients.

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Abstract: 205

Assessing the Relationship between General Self-Efficacy and Parental Guilt

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Background Self-efficacy (SE) describes an individual's beliefs about their ability to successfully achieve a goal. Parental SE specifically refers to a parent's confidence in their capacity to execute parenting tasks. Poor SE has been associated with passivity in the parenting role and is considered a risk factor for maternal depression. To the same end, parental guilt (PG) is the feeling of having failed in one's role as a parent, and is similarly predictive of poor maternal mental health. While existing literature has established that guilt is associated with poor maternal self-efficacy, the present study seeks to quantify various facets of PG, and their individual potential to predict SE in a large sample of mothers and fathers.

Objective

Design/Methods An anonymous online survey was distributed by Amazon M-Turk to parents of children aged 5 -12 years. Subjects completed demographic questions followed by a 2-part survey. In Part 1, participants were asked to rate the magnitude of parental guilt they experience regarding medical, educational and sociocultural factors. In Part 2, subjects completed The New General Self-Efficacy Scale, a validated measure of SE. A linear regression was performed to assess the relationship of PG to SE, and likelihood ratio tests were performed to determine if the relationship between PG and SE remained when accounting for demographic factors (Figure 1A-C).

Results A total of 1,128 parents completed the survey (51% mothers). 54% were between 26-35 years old. 57% of the participants identified as White, 7.9% identified as Black, and 27.2% identified as Asian. Self-assessed magnitudes of medical, educational and sociocultural guilt were all strongly associated with General Self-Efficacy (Figure 1A-C). Likelihood ratio tests indicated that the predictive power of guilt on SE remained when accounting for gender of the parent, race, ethnicity, number of children in the family, and income across medical, educational and sociocultural guilt domains ($p_{medical} < .001$, $p_{educational} < .001$, $p_{sociocultural} < .001$).

Conclusion(s) Considering the robust association between PG and SE, pediatricians should be aware of PG in both mothers and fathers, as lower SE can lead to poor parenting outcomes. Programs designed to help parents attain better parenting skills and coping mechanisms for PG are needed. Pediatricians should strive for quick identification of parents in need and make appropriate referrals to mitigate the impact of low self-efficacy.

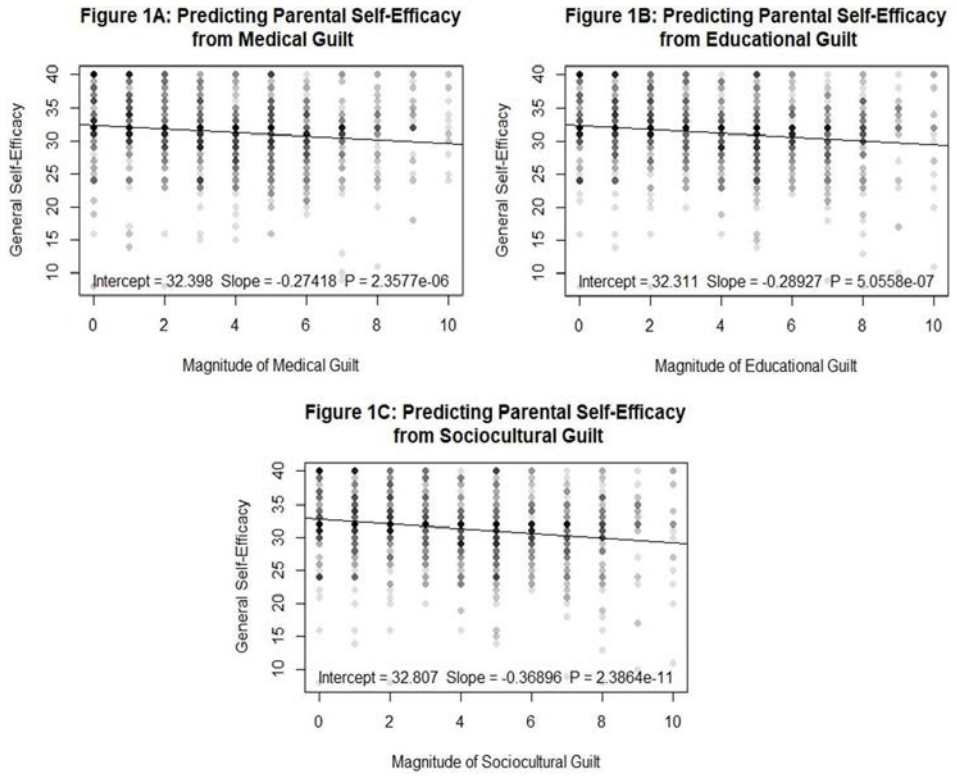

Figure 1: Predicting Parental Self-Efficacy from Medical, Educational and Sociocultural Guilt

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Abstract: 206

Informing Young People with Autism Spectrum Disorders about their Diagnosis: Beneficial Effects on Self-Advocacy and Awareness

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Background In a clinical report about healthcare transition planning, the American Academy of Pediatrics emphasized the need for children with special health care needs to develop self-advocacy skills and to assume "increasing responsibility for their health to the fullest extent possible."[1] Although small, interview-based qualitative studies have found evidence that being explicitly told about their autism spectrum disorder (ASD) diagnosis may help adolescents with ASDs to develop self-advocacy skills, larger systematic studies are needed to characterize the impact of explicitly telling young people with ASD about their diagnosis.

Objective To evaluate the perceived impact of being informed of their ASD diagnosis on the development of self-advocacy skills, personal awareness, self-esteem, and other outcomes among young people with ASDs.

Design/Methods Parents of young people with ASDs (ages 8-25) were recruited via outreach to ASD support and advocacy groups from across the US. Respondents completed an online questionnaire to characterize their experiences with disclosing the ASD diagnosis to their affected child. Those who indicated that they or others had explicitly informed the child of the diagnosis completed an additional set of questions about the perceived impact on the child of disclosing the ASD diagnosis.

Results Of the 117 respondents, 82% indicated that they or others had explicitly informed their child of the diagnosis. In most cases, the diagnosis was initially discussed when the child was 6-9 (44%) or 10-12 (28%) years old. When asked to rate, on a scale of 0-100, the extent to which their child currently accepts their ASD diagnosis, the median response was 95 (IQR: 65-100). Most parents reported that learning of the ASD diagnosis had improved their child's ability to self-advocate (70%) and self-awareness of personal strengths (70%) and weaknesses (68%). Self-esteem was reported as improved in 39% and decreased in 20% of youth. Peer relationships improved in 33%. Most youth who had been told about their diagnosis sought out information about ASDs from other sources (66%), independently brought up their diagnosis in conversation (77%), and shared their diagnosis with others (85%).

Conclusion(s) In this largest study to date of the impact of diagnostic disclosure on youth with ASDs, findings suggest an awareness of their ASD diagnosis leads to greater self-awareness and fosters crucially important self-advocacy skills in this population.

[1]Pediatrics, 128(1), 182-200

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Abstract: 207

Spread The Word! Examining the Spread of Misinformation Regarding Antibiotic Diversion on Parenting Blogs

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Background Antibiotic diversion is the unsafe practice of sharing prescription antibiotics among people for whom they are not prescribed, which contributes to the spread of antibiotic-resistant bacteria. While the American Academy of Pediatrics (AAP) strongly dissuades this practice, the misuse of antibiotics may continue to persist, in part, due to the dissemination of medically inaccurate information via the internet. To date, no study has investigated the extent to which posts on popular parenting websites and online blogs promote antibiotic diversion.
Objective To examine attitudes toward antibiotic diversion practices as discussed on publicly accessible online parenting blogs.
Design/Methods Parenting blogs, identified by a Google search of "parenting forum/blog," were reviewed for posts containing the keyword "antibiotics." Posts were included if the authors were parents and if they alluded to "reusing/sharing antibiotics." Posts were categorized as promoting or opposing antibiotic diversion and were assessed for whether anecdotal evidence or research evidence, if any, was provided as justification for advice shared. The number of blog followers and comments on original posts were used to quantify the influence of a post, with comments classified as encouraging or discouraging antibiotic diversion. Posts were also evaluated for anti-pharmaceutical and anti-physician sentiments.
Results Overall, 97% of blog posts (n=600, n_e=160) on publicly accessible parenting blogs promoted antibiotic diversion (Table 1). There were more comments encouraging antibiotic diversion than discouraging the practice on 33% of posts. While 7.5% cited anecdotal evidence and 0.5% cited medical research, the vast majority of posts (92%) provided no evidence for the advice imparted. Over 16% of original posts expressed mistrust of doctors and 5.6% stated an aversion to the pharmaceutical industry (Table 2).
Conclusion(s) Medical advice distributed online can be incorrect and potentially dangerous. A substantial number of posts advocated antibiotic diversion, with most providing no justification for the recommendation and many articulating suspicions regarding doctors and pharmaceutical companies. As the amount of health information that is circulated through the internet continues to rise, it is crucial that medical professionals and organizations such as the AAP, National Institutes of Health, and Centers for Disease Control have a stronger online presence to combat misinformation and direct parents to accurate medical advice.

Table 1. Characteristics of publicly accessible parenting blogs evaluated for content on antibiotic diversion.

Characteristics	
Number of Original Posts	160
Number of Blog Followers	$\bar{x}$ = 159,044 (2,362 – 449,755)
Number of Comments on Each Original Post	$\bar{x}$ = 6.4 (1 – 28)

Table 1: Characteristics of publicly available parenting blogs evaluated for content on antibiotic diversion.

Table 2. Characteristics of publicly accessible parenting blog posts discussing antibiotic diversion.

Characteristics of Original Parenting Blog Posts	% (n)
Posts promoting antibiotic diversion	97.5 (155)
Posts that include anecdotal evidence	7.5 (12)
Posts that include research evidence	0.6 (1)
Posts with no evidence included	91.9 (147)
Posts with comments encouraging antibiotic diversion	68.1 (109)
Posts with more comments encouraging antibiotic diversion than discouraging antibiotic diversion	33.1 (107)
Posts with anti-physician sentiments	16.3 (26)
Posts with anti-pharmaceutical sentiments	5.6 (9)

Table 2: Characteristics of publicly accessible parenting blog posts discussing antibiotic diversion.

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Abstract: 208

Correlation of clinical and/or histological chorioamnionitis with early onset neonatal sepsis (EOS) and other outcomes in neonates

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Background Chorioamnionitis, clinical or histological, is associated with adverse neonatal outcome including: EOS, bronchopulmonary dysplasia, retinopathy of prematurity, and intraventricular hemorrhage.
Objective To determine the maternal temperature, maternal heart rate and fetal heart rate that will best predict EOS and other neonatal outcomes.

Design/Methods This is a retrospective cohort study of neonates delivered to women with CCA and/or HCA from January 2010 to December 2015 in a tertiary hospital and admitted into the Level 3 NICU. Infants with no documented placental pathology/culture and neonates with major congenital/chromosomal abnormalities were excluded. Maternal and infant demographics, clinical data, and placental pathology/culture reports were extracted from the institution's electronic medical record.
Results Data for 332 mother-infant dyads were available for analysis. The mean ± SD gestational age and birth weight were 37.89 ± 3.85weeks and 3126.52 ± 760.97g, respectively. CCA was diagnosed in 310 of 332 mothers (93.4%), while HCA was diagnosed in 201 of 329 placentas (60.5%). Blood culture was positive in 3/332 infants (0.9%; one contaminant); 0/50 CSF studies were positive. Modified Rodwell criteria from the initial and 24 h CBC correctly identified the 2 infants with positive blood cultures. There was no significant association between positive blood culture and symptoms of CCA or presence of HCA. No "cut-off" values for the CCA symptoms could be determined with an ROC curve. Only fetal HR >160 (p=0.006) and presence of HCA (p=0.004) were significantly associated with clinical EOS. Fetal HR > 160 was associated with sepsis by modified Rodwell classification from the 24h CBC. There was no association between other CCA symptoms and parameters from initial and 12 h CBC. None of the CCA symptoms predicted positive blood culture in the infants.
Among infants ≤ 32 weeks, BPD was significantly predicted by FHR > 160 (p=0.001) and maternal Tmax > 100.4 (p=0.001). ROP, IVH, and NEC were not predictable by any CCA symptoms.
Conclusion(s) This study showed that symptoms of CCA are not reliable to predict true EOS. Fetal tachycardia was significantly associated with clinical sepsis and hematological parameters of 24h CBC

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Abstract: 209

Picking Processed Foods: Assessing Differences Between Picky and Non-Picky Eaters

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Background Guidelines published by the American Academy of Pediatrics (AAP) advise parents to provide their children with a balanced diet consisting of whole grains, proteins, and dairy while avoiding highly processed foods. For parents of "picky eaters," children who exhibit behaviors of specific food restriction and/or food neophobia, it can be challenging to find foods that are appetizing and conform to AAP recommendations. Though prior research has examined the dietary patterns of picky children, studies have not yet compared the consumption of processed food (PF) and unprocessed food (UPF) among picky and non-picky eaters.
Objective To assess PF and UPF intake among picky and non-picky children.
Design/Methods In an anonymous questionnaire distributed via Amazon Mechanical Turk, parents were asked to rate their child's eating habits on a six-point scale (1=Extremely Picky, 6=Not Picky at All) and to report the foods that their child eats, based on a list of 71 commonly-consumed foods (categorized as PF/UPF). Two-sample t-tests and Pearson Correlations were used to compare the preferences for PF and UPF between picky and non-picky eaters.
Results A total of 804 parents responded to the questionnaire, with 622 meeting inclusion criteria. Children of responding parents were 56% male; avg age=7.3 years; 12.7% Hispanic/Latino; 79.8% White, 8.3% Black, 11.9% Other. Children were classified as picky (68.5%) and non-picky (31.5%) based on parental evaluations of pickiness. According to parental reports, picky eaters consumed significantly fewer listed food items compared to non-picky eaters. PF comprised a significantly greater percentage of the food items picky eaters consume compared to non-picky eaters. Parents of both picky and non-picky eaters selected more PF items compared to UPF items, but the discrepancy was greater for picky eaters (Table 1). Parental reports of child pickiness (based on the six-point scale) were positively correlated with the total number of food items the child consumes and were negatively correlated with the percentage of the selected food items that were PF (Table 2).
Conclusion(s) Regardless of child pickiness, when parents were offered a variety of food options, the majority of items selected were PF. In addition, picky children consume significantly more PF items, compared to non-picky children. Considering the relationship between PF consumption and obesity, it is imperative that pediatricians advise parents to choose UPF that are consistent with AAP guidelines and children's individual food preferences.

Table 1. Results of two-sample t-tests comparing picky and non-picky eaters in terms of the total number of food items child actually eats, the percentage of processed foods out of the total, and the percentage of unprocessed foods out of the total.

	Non-picky eaters (n=196)	Picky eaters (n=426)	p-value	t-statistic
Total number of food items child actually eats	45.9	33.7	<.001	9.64
Percentage of processed foods out of total	57.4%	66.4%	<.001	-9.17
Percentage of unprocessed foods out of total	42.6%	33.6%	<.001	9.17

Table 1. Results of two-sample t-tests comparing picky and non-picky eaters in terms of the total number of food items child actually eats, the percentage of processed foods out of the total, and the percentage of unprocessed foods out of the total.

Table 2. Results of Pearson Correlations between parental reports of child pickiness (on a six-point scale where a lower score corresponds to greater pickiness) and the total number of food items the child actually eats, the percentage of processed foods out of the total, and the percentage of unprocessed foods out of the total.

	Correlation Coefficient	p-value
Total number of food items child actually eats	0.47	<.001
Percentage of processed foods out of total	-0.45	<.001
Percentage of unprocessed foods out of total	0.45	<.001

Table 2. Results of Pearson Correlations between parental reports of child pickiness (on a six-point scale where a lower score corresponds to greater pickiness) and the total number of food items the child actually eats, the percentage of processed foods out of the total, and the percentage of unprocessed foods out of the total.

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Abstract: 210

Feasibility of Optimal Blood Culture Technique for Neonatal Early-Onset Sepsis

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Background Blood culture (BC) remains the diagnostic standard for the identification of neonatal early-onset sepsis (EOS). Ideal blood culture technique requires a minimum of 1 mL blood per culture bottle, and the use of two culture bottles may help distinguish pathogenic and contaminant species. Clinicians often express concerns regarding the technical challenges in obtaining adequate specimen blood volumes from newborns, and therefore question the validity of blood culture results

Objective To determine the (1) proportion of BC obtained by optimal technique as defined by local policy and (2) the number of phlebotomy attempts required for BC, among both very-low birth weight (VLBW, < 1500 grams) and non-VLBW infants

Design/Methods Observational study of neonates admitted to a 45-bed level III unit from 11/01/2016-06/30/2017 for whom BC was obtained as part of EOS evaluation in ≤72 hours of age. We excluded BC obtained at referral centers and repeat cultures drawn <48 hours from a prior BC. We defined optimal BC technique as 2 ml of blood (a) obtained with sterile preparation by phlebotomy or by blood withdrawn from a central catheter, and (b) divided and inoculated in one aerobic and one anaerobic BC bottle. Providers drawing the BC specimen document volume, number of phlebotomy attempts and source (phlebotomy vs. catheter) at the time of testing. When provider-reported variables were missing, we assumed criteria were unmet. We abstracted antibiotic use and BC results from medical records.

Results Of 306 BC obtained during study period, 247 tests were obtained from 242 newborns at ≤72 hours after birth. Overall, 195/247 (78.9%) tests fulfilled criteria set for both blood volume and paired aerobic/anaerobic bottles; 219/247 (88.7%) tests met at least one criteria. Documented volume per bottle was ≥1 ml in 210/247 (85%) tests. Among the tests obtained by phlebotomy, 54/192 (28.1%) required >2 attempts. Table 1 provides test details by infant age and weight. The proportion of BC tests that failed to meet both criteria was similar (20.7% vs 23.5%, p = 0.6) for VLBW and non-VLBW infants.

Conclusion(s) The majority of EOS blood culture tests met our local criteria for 1 mL blood in each of two paired blood culture bottles. Multiple phlebotomy attempts were required in ~1/4 of tests obtained by peripheral phlebotomy. Few infants were administered prolonged antibiotics in the absence of documented bacteremia. BC technical documentation may increase confidence in BC results as well as identify opportunities for optimizing BC procedures.

Table 1: Patient characteristics and blood culture technique (total subjects =242)

	Non-VLBW 213 BC tests	VLBW 34 BC tests	Overall 247 BC tests
Mean birth weight†, mean (SD)	3009 (769)	1008 (309)	2734 (1000)

Gestation at birth†, mean (SD)	38.5 (3.2)	27.8 (2.6)	36.2 (4.6)
Age in hours at BC, median (IQR)	2.6 (1.9-4.7)	2.7 (1.9-3.8)	2.6 (1.9-4.5)
Source of specimen†: - Blood from central catheter - Blood from peripheral phlebotomy	-22 (10.3) -190 (89.2)	-32 (94.1) -2 (5.9)	-54 (21.9) -192 (77.7)
Attempts for peripheral phlebotomy BC - >2 attempts, n (% peripheral BC) - Undocumented, n (% peripheral BC)	-32 (16.8) -21 (11.1)	-1 (50) -0	-33 (17.2) -21 (10.9)
Specimen volume <1 ml/bottle Specimen volume undocumented	3 (1.4) 26 (12.2)	0 8 (23.5)	3 (1.20) 34 (13.8)
Aerobic/anaerobic pair sent	185 (86.9)	34 (100)	219 (88.7)
Met full criteria for culture volume and aerobic/anaerobic pair	169 (79.3)	26 (76.5)	195 (79.0)
Blood culture positive†‡	2 (0.9)	2 (5.9)	4 (1.6)
Antibiotics given for ≥ 5 days in absence of positive blood culture	2 (0.9)	0	2 (0.8)

†Significantly different ($p<0.05$) *Missing data: specimen source=1; ‡ Bacterial species identified were Propionibacterium acnes (considered a contaminant) and alpha-hemolytic Streptococcus among non-VLBW infants; E. coli was isolated in both VLBW cases.

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Abstract: 211

NICU Clinicians' Opinions and Concerns on the Efficacy of Cuddler Programs

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Background Many hospitals around the country have "Cuddler Programs" (CD) in their NICUs in which volunteers hold infants whose parents are unable to be at their bedside. While therapeutic touch has been shown to promote weight gain and decrease hospital length of stay, medical professionals may have concerns regarding adverse events when non-medical volunteers are directly handling NICU infants. However, there has been little research investigating the effects, professional opinions, or concerns of this program type.
Objective To assess the concerns and beliefs NICU team members have about their NICU CD.
Design/Methods An anonymous three-part survey was sent to National Association for Continuing Education NICU faculty across the United States. After indicating that their NICU had a CD, participants completed hospital demographic and CD history questions. In Part 2, subjects rated six statements regarding the outcomes/effects of their CD on a 7-point Likert scale. In Part 3, they specified whether they had any concerns regarding their CD and if any negative consequence(s) had occurred as a result. Participants were also given a comment box, and thematic content analysis was performed on the provided responses. Linear regressions were used to determine whether outcomes/concerns differed across NICU level and/or community type.
Results Of the 229 who responded, 104 indicated that their NICU had a CD. Of those, 67% indicated that their program was >3 years old, 78% had > 30 NICU beds, 98% were a L3/L4 NICU, 67% were set in an urban community, and 64% belonged to an academic hospital. Overall, the majority of programs indicated that their CD was beneficial to their unit (Table 1) and the results did not differ across NICU level or community type ($p>0.05$). Concern levels regarding CD are listed in Table 2. When asked for specific issues, participants reported no CD adverse events (0%), HIPPA violations (0%), or infections (0%). Subjects cited "lack of need for volunteers" (39%) as the most common concern followed by "parents not interested" (26%). There were no negative free text responses, with 56% reporting general positive comments, 18% supporting CD research, and 18% supporting the use of CD for NAS infants.
Conclusion(s) Overall, NICU staff agreed with the effectiveness and benefits of current CD programs, citing no negative consequences. The majority of NICU staff stated they had no concerns with infections, HIPPA violations, or adverse events. Research regarding CD is essential to promoting these beneficial programs for all NICUs.

Statements	Strongly Disagree	Disagree	Somewhat Disagree	Neither	Somewhat Agree	Agree	Strongly Agree
The CD has improved the care of our neonates	3%	0%	0%	3%	10%	37%	46%
The CD has reduced the stress of our neonates	3%	0%	0%	2%	9%	46%	39%
Families find the CD beneficial for their neonates	3%	0%	0%	13%	10%	45%	29%
Faculty and staff of the NICU find the CD beneficial for our neonates	3%	0%	0%	1%	7%	32%	55%
Cuddlers are able to soothe our neonates when they are irritable or in pain	2%	1%	0%	1%	6%	44%	46%
Benefits of the CD outweigh the risks	3%	0%	0%	1%	3%	38%	54%

Table 1. NICU Staff Agreement on Statements regarding Cuddler Programs

Concerns	Not at all Concerned	Slightly Concerned	Somewhat Concerned	Moderately Concerned	Very Concerned
Concerns - HIPAA	61%	26%	8%	2%	2%
Concerns- Infections	53%	31%	10%	5%	1%
Concerns- Severe Adverse Events	68%	26%	5%	0%	1%

Table 2: NICU Staff Concerns with CD HIPPA, Infections and Adverse Events

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Abstract: 212

Implementation of Umbilical Cord Blood Culture (UCBC) Sampling for Detection of Early Onset Sepsis in a Level III Neonatal Intensive Care Unit (NICU)

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Background Peripheral venous blood culture is the gold standard for detecting bacteremia in neonates. Although a minimum of 1mL of blood is necessary for appropriate sensitivity, the volume submitted for blood cultures is often less, leading to under-diagnosis of culture proven sepsis. Umbilical cord blood is an underutilized resource. UCBC may increase diagnosis of bacteremia etiology by higher blood volume inoculum.

Objective To obtain UCBC concurrent with peripheral blood culture (PBC) on at least 90% of all neonates ≥37 weeks' gestation at birth admitted to the NICU due to maternal chorioamnionitis in a 10 month period.

Design/Methods Observational time series conducted at a Level III NICU between 3/2017-12/2017. The number of UCBC samples, eligible admissions, neonatal and maternal characteristics and blood culture results were collected biweekly. The number of cases between missed UCBCs was displayed using a G-chart. Established rules for detecting special cause were applied. Figure 1 highlights aims, key drivers and interventions.

Results During the first 5 months a total of 77% (13/17) of UCBC samples were collected. After 2 PDSA cycles, this increased to 94% (16/17). Special cause improvement was noted in the mean number of cases between missed UCBC samples from 2 to 17 by exceeding the upper control limit (Figure 2). Missed samples were due to new work flow and late diagnosis of chorioamnionitis. There were 3 positive UCBCs (E. faecalis, E. Coli and S. mitus). Only one (E. Coli) correlated with neonatal clinical signs of sepsis for a presumed contamination rate of 6.8% (2/29). All PBCs were negative. The two additional cases of clinical sepsis had negative UCBCs and PBCs.

Conclusion(s) UCBC sample collection can be successfully incorporated into the NICU workflow with minimal contamination rate in infants at risk for sepsis. Keys to success included collaborations with obstetricians and inter- disciplinary involvement of NICU providers. Higher sample volume can lead to increased detection of culture-proven sepsis, as in the case of one of our patients. This technique may have increased sensitivity to detect transient bacteremia, that does not necessarily correlate to neonatal sepsis. Larger enrollment may demonstrate effectiveness of UCBC sampling to increase the yield of culture-proven sepsis. This project can help other NICUs implement UCBC sampling. We speculate this technique may become part of pain and blood sparing protocols in our high risk neonates.

Figure 1. Key Driver Diagram

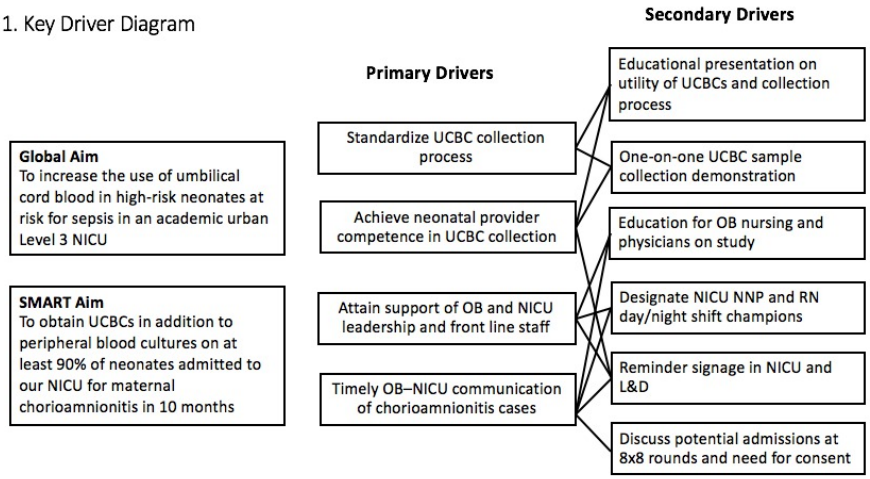
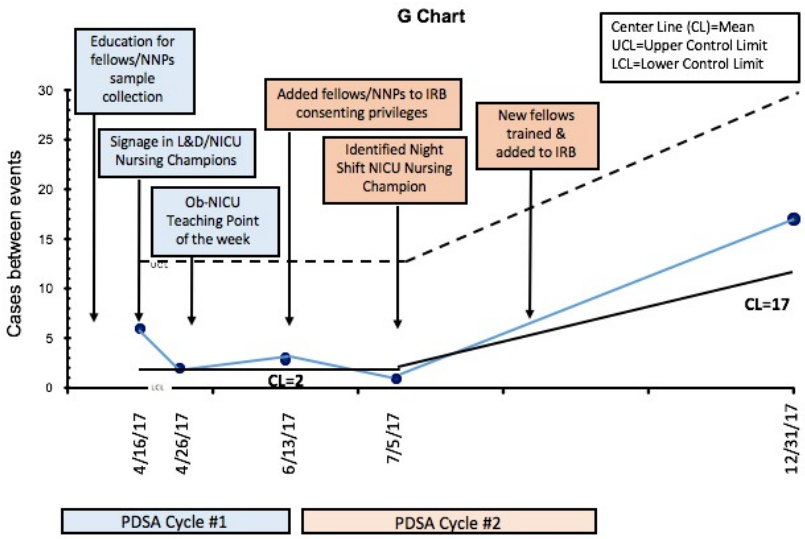


Figure 2. Cases between missed UCBC samples



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Abstract: 213

Quality Improvement to reduce NICU admissions from Mother baby unit (MBU) secondary to Hypothermia

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Background Newborns are susceptible to hypothermia because of multiple factors such as increased body surface area, immature thermoregulation and environmental factors. Hypothermia can be a sign of infectious, neurological or endocrine conditions and can lead to hypoglycemia, and respiratory distress. In our institution, newborns found to be hypothermic (temp<97F) in the MBU are sent to the NICU for evaluation and sepsis work up. There is no standardized protocol for managing hypothermia in the MBU, which may lead to unnecessary admissions

Objective Reduce NICU admissions secondary to hypothermia from the MBU by 20% post intervention in 2017.

Design/Methods Retrospective chart review of infants ≥35 weeks with an admission temperature of <97F from MBU (n=22). Baseline information was obtained on hypothermic infants admitted from January to August 2017. An interdisciplinary team of nurses, residents and Attendings evaluated the current MBU hypothermia management by constructing a process map to identify opportunities for improvement. In September 2017, we performed a PDSA cycle consisting of education on temperature assessment and rewarming interventions. Education focused on transitional period in the Recovery Room and MBU. Data was collected for hypothermic

admissions post intervention.
Results During this time period,there were 136 admissions from MBU to the NICU, of which 96 were pre intervention and 40 were post intervention. 22/136 (16%) patients had documented temperatures of < 97F in MBU that warranted admission to the NICU. Prior to intervention, 16/96 (17%) were hypothermic as compared to 6/40(15%) post intervention. Of the total admissions to the NICU secondary to hypothermia, 9/22 (41%) were < 37 weeks and 10/22 (46%) were < 2500g. All cultures were negative.
Conclusion(s) Based on negative cultures, isolated hypothermia admissions in our institution are likely secondary to risk factors such as late preterms, low birth weight and environmental causes. There was no significant change in the rate of admissions for hypothermia after nursing education intervention alone. Although awareness was increased and specific evidence based practices were discussed, failure to affect the hypothermia admission rate, points to the importance of a standardized protocol and need for a checklist to ensure consistency. PDSA cycle 2 will begin in January,2018. A protocol will be implemented with tasks to be completed in order to decrease NICU admissions due to non pathological causes of hypothermia.

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Caregiver Variation in Percieved Impact of Transition to a Single Family Room NICU

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Background Many institutions are transitioning to single family room (SFR) NICUs to provide more privacy, better control of environmental stimuli and possible reduction of infections. Studies have explored staff perception of job related stress, job satisfaction, workload and impact on patient care with SFRs, however the literature focuses on the nursing experience. Studies evaluting the experience of transition to SFR NICUs specific to the provider role do not exist.
Objective To compare perceived impact of transition to a SFR NICU on job satisfaction, workload, communication and patient care in NICU providers of variable roles.
Design/Methods A brief, 10 question anonymous survey was provided to caregivers present on the NICU one month following relocation to a 64 bed SFR Level 3 NICU within a newly built children's hospital. The survey included questions about staff's perception of changes in physical and emotional demands, workload, patient care, parent involvment, communication (with parents and between providers), job satisfaction, patient safety and interaction with other providers. 47 providers completed the survey including 21 nurses (RN), 5 attending/fellows, 6 housestaff, 8 NP/PAs, 4 RTs and 3 staff of "other" designation (nutrition and social work). Responses were compared by one way ANOVA with post-hoc Tukey. A follow up survey will be performed 3 months after the move to identify changes in perceptions and potential factors impacting staff adaption.
Results Caregiver role significantly influenced perceptions on the impact of transition to SFR in 7 of 10 components surveyed. While providers reported that their jobs were more physically and emotionally demanding, physicians and "other" staff were less likely to agree with these statements. Physicians were also more likely to perceive that parental involvement and communication had improved while other providers disagreed. RNs, RTs, NP/PAs and "other" staff reported they did not feel their job was more rewarding while physicians were neutral. All staff disagreed to some extent with the statements that patient safety, security and quality of interactions with other members of the NICU team improved, although physicians were not as strongly in disagreement. Provider type did not influence perceptions of a more manageable workload or improved patient care.
Conclusion(s) Perception of the impact of transition to a SFR NICU varies significantly by caregiver role. Understanding the impact on providers of variable roles facilitates preparation and transition.

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Abstract: 215

Comparison of Selective Head and Whole Body Cooling Therapy in Newborns with Encephalopathy: Short-Term Morbidities and Laboratory Biomarkers

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Background Selective head (SHC) or whole body (WBC) cooling are currently widely accepted methods for therapeutic hypothermia in newborns with hypoxic-ischemic encephalopathy (HIE). There is inconclusive evidence on which method of cooling leads to better neurological outcomes. Few small studies on physiologic effects of head versus body cooling and short-term outcomes have found no differences between both methods. Further exploration as to whether SHC or WBC leads to fewer side effects and neonatal morbidities is necessary.
Objective To investigate and compare short-term morbidities and laboratory biomarkers in newborns with HIE treated with either SHC or WBC.
Design/Methods Newborn infants with diagnosis of HIE born or transferred to NYU Langone Health and Bellevue Hospital Regional Perinatal Center’s from January 2016 to December 2017 were included in the study. Two groups were further identified based on method of cooling: selective head vs. body cooling, from Hypothermia Program Database. Demographic and laboratory characteristics as well as short-term outcome data were collected from retrospective chart reviews. Chi-square test was conducted using SPSS 23.0 software to compare categorical variables between the groups and independent sample t-test was used for continuous variables.
Results Forty patients who received therapeutic hypothermia were identified and included in the study. SHC was applied to twenty two patients and eighteen were treated with WBC. There was no difference in patient demographics or clinical characteristics between the

groups (Table 1). There was no significant difference in the diagnoses of PPHN, referral for ECMO or hemodynamic instability/pressors use. We found no difference in coagulation profile except statistically significant lower fibrinogen levels on day 2 and 3 of therapeutic hypothermia in WBC vs. SHC groups (Table 2). Despite these finding, there was no difference in the need for transfusion of fresh frozen plasma or platelets in either groups.

Conclusion(s) While both methods of cooling are safe and well tolerated, WBC was found to be associated with decreased fibrinogen levels on day 2 and 3 of hypothermia. However, these findings did not translate into differences in clinical management and therefore may need further validation.

Table 1: Demographics and Clinical Characteristics

	SHC (n=22)	WBC (n=18)	p- value
Gestation age (in weeks), mean (±SD)	38.1 (±1.4)	39.0 (±1.8)	NS
Birth weight (in grams), mean (±SD)	3297 (±686)	3280 (±602)	NS
Mode of delivery (%)			
- C-section	77%	83%	NS
- Vaginal	23%	17%	NS
Resuscitation required at delivery (%)			
- Intubation	87%	100%	NS
- Chest compressions	37%	39%	NS
- Epinephrine	32%	22%	NS
5 min APGAR median	3	4	NS
10 min APGAR median	4	5	NS
Sarnat Stage 2 (%)	72%	88%	NS
Sarnat Stage 3 (%)	28%	12%	NS
Mortality (%)	9%	17%	NS
FiO2 requirement on admission (1.0= 100%), mean (±SD)	0.6 (±0.36)	0.6 (±0.36)	NS
Initial PaO2, mean (±SD)	113 (±80)	108 (±56)	NS
Use of vasopressors (%)	45%	61%	NS
Clinical or subclinical seizures (%)	68%	47%	NS
PPHN (%)	36%	44%	NS
Need for ECMO (%)	6%	18%	NS
Abnormal function echocardiographic functions (%)	44%	53%	NS
Full PO feeds (days), mean (±SD)	17 (±19)	12 (±8)	NS
Length of stay (days), mean (±SD)	28 (±32)	27 (±26)	NS

Table 2: Laboratory Biomarkers

Cord pH, mean (±SD)	6.89 (±0.23)	6.99 (±0.16)	NS
Cord base deficit, mean (±SD)	17.5 (±7.8)	12.8 (±5.9)	NS
Initial postnatal pH, mean (±SD)	7.02 (±0.19)	7.05 (±0.18)	NS
Initial postnatal base deficit, mean (±SD)	18.1 (±5.9)	18.0 (±6.2)	NS

Fibrinogen- day 1, mean (±SD)	154 (±78)	149 (±46)	NS
Fibrinogen- day 2, mean (±SD)	244 (±131)	166 (±46)	0.03
Fibrinogen- day 3, mean (±SD)	323 (±124)	207 (±52)	0.005
D-dimer- day 1, mean (±SD)	8098 (±14695)	2292 (±1970)	NS
D-dimer- day 2, mean (±SD)	4521 (±9596)	1024 (±1479)	NS
D-dimer- day 3, mean (±SD)	2787 (±5832)	654 (±790)	NS
Platelets- day 1, mean (±SD)	158 (±71)	204 (±77)	NS
Platelets- day 2, mean (±SD)	149 (±52)	153 (±63)	NS
Platelets- day 3, mean (±SD)	155 (±62)	134 (±50)	NS
Initial Highest lactate, mean (±SD)	9.8 (±6.4)	10.8 (±4.9)	NS
Platelets transfusion (%)	33%	37%	NS
FFP transfusion (%)	33%	56%	NS

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Abstract: 216

Why parents say no to influenza vaccine in Ambulatory Clinic for their kids

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Background Millions of children get sick with the flu each year and thousands are hospitalized. Outpatient clinic visits are required to screen and administer influenza vaccine for every child unless contraindicated or refused by parents, however, the vaccination rate remains low in our ambulatory clinic, located in downtown Brooklyn. Therefore, we aimed to investigate the rational for parental to refuse the influenza vaccination in the outpatient clinic.

Objective

Design/Methods Parents with children between 6 months and 18 years old without flu vaccine contraindication who refuse/accept flu vaccine in our Ambulatory Clinic during October 2017 to March 2018 have been invited to participate for the study. After obtaining verbal consent, a de-identified survey was filled by the parents.

Results There were a total of 29 surveys filled out by parents who refused flu shot for their children in our clinic. Majority were mid-age group and low income families.The most commonly cited reason for flu shot refusal was “worry about side effect” (55.2%), followed by “flu vaccine can cause flu symptoms” (31.0%), simply “not wanting vaccine” (20.7%), and a belief that flu vaccine “is not needed” (17.2%). A small minority (6.9%) of parents thought that “flu vaccine doesn’t work”, and another group of parents (6.9%) refused due to egg allergy of their child.

Factors that might affect parents’ decision about flu vaccine were also studied, but due to the small number, it’s difficult to determine. However, parents with single child seem to be more likely to refuse flu vaccine, just as single parents making independent decisions for their children. However, 13.7% of parents did opine that health providers never or poorly discussed flu vaccine with them.

Conclusion(s) Parents’ lack of knowledge about influenza vaccine, concern about side effects, education level and possible socio-cultural factors are playing a role in their hesitation and/ or refusal of influenza vaccine in mid-low socioeconomic outpatient population. Therefore, an engaging discussion with the parents regarding the importance of protection against the flu and addressing the side effects of the vaccine is immensely necessary during each encounter. Our next phase would involve comparing the mindsets of the parents who consent to vaccinate their children against influenza with those who refuse the same.

Baseline characteristics of respondents to the influenza questionnaires

	Number	Percentage %
Relationship with the child		
Mother	26	89.7
Father	3	10.3
Age of parent		
< 18	3	10.3
18-24	3	10.3
25-34	18	62.1
35-44	5	17.2

45-54	0	0.0
> 55	0	0.0
Ethnicity		
Asian	2	6.5
Black/African American	21	67.7
Hispanic/Latino	3	9.7
White	2	6.5
Other	3	9.7
Education level		
Less than a high school diploma	1	3.6
High school degree or equivalent	7	25.0
Some college	11	39.3
Associate degree	4	14.3
Bachelor's degree	5	17.9
Master's degree	0	0.0
Marital status		
Single	18	66.7
Married	8	29.6
Divorced	1	3.7
Annual household income		
Less than $20,000	8	33.3
$20,000-$34,999	7	29.2
$35,000-$49,999	5	20.8
$50,000-$74,999	2	8.3
$75,000-$99,999	1	4.2
Above 100,000	1	4.2
Religious preference		
Catholic	2	6.9
Christian	12	41.4
No religion	10	34.5
No response	5	17.2
Other	0	0.0
Child received flu shot in the past		
Yes	9	31.0
Never	19	65.5
Not sure	1	3.4
Has your doctor or nurse discussed flu shot with you		
Yes and very helpful	25	25
Yes but poor	1	1
No	3	3
Have you refused other vaccines		
Yes	7	25.0
No	21	75.0
Did the information in this survey change your opinion of Flu vaccine for today's visit		
Yes	4	14.3
No	23	82.1
Not sure	1	3.6
How many children do you have		
1	19	65.5
2-3	8	27.6
more than 3	2	6.9

Insurance type		
No insurance	1	3.4
Medicaid	23	79.3
Private insurance	5	17.2

Reasons that parents refused for influenza vaccination

	Number	Frequency %
worry about side effect	16	55.2
Flu vaccine can cause flu symptoms	9	31.0
Not wanting vaccine	6	20.7
It's not needed	5	17.2
Flu vaccine doesn't work	2	6.9
Other	2 (allergy to egg)	6.9

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Abstract: 217

Patent Ductus Arteriosus, A Physiological Threat?

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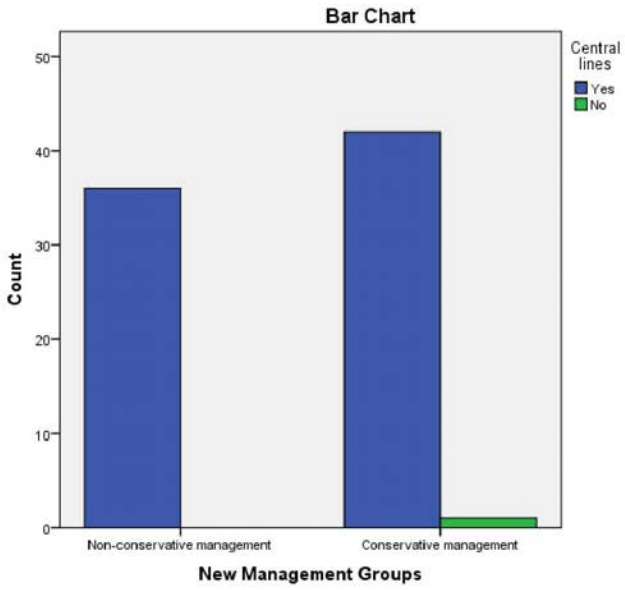
Background In 1959, Burnard described an association between patent ductus arteriosus (PDA) murmurs and premature infants. Several studies categorized PDA as a clinical problem incriminating its presence with increased morbidity and the need to facilitate closure. We hypothesize that PDA is merely a physiological sign of prematurity and not a pathologic process that necessitates therapy. Non-inferior outcomes among the conservatively managed infants with PDA would support our hypothesis.

Objective Our objective is to evaluate treatment outcomes among premature infants with PDA that are managed conservatively and compare with those that required therapeutic intervention. Secondary objective is to determine the association of risk factors and treatment modalities with outcomes between groups.

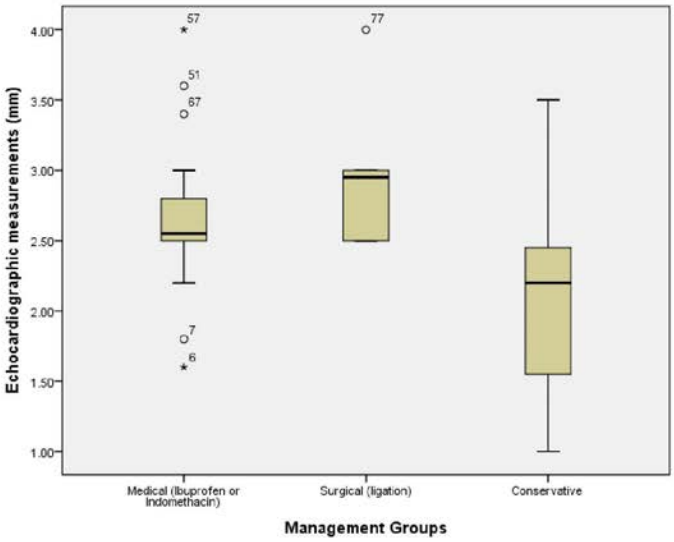
Design/Methods Cross-sectional, descriptive, retrospective study. Subjects were all preterm newborns with birth weight <1500 grams and echocardiographic confirmed diagnosis of PDA, admitted to the NICU at The Brooklyn Hospital Center from 10/1/2011 to 4/30/2017. Infants with identifiable syndromes and those that died before 36 weeks of corrected gestational age were excluded. Demographic data, hemodynamic findings on echocardiogram, type of therapeutic modalities and associated morbidity/mortality were recorded. Statistical analysis was done using SPSS.

Results There were 242 preterm infants with birth weight <1500 grams of which 79 infants had a documented PDA on echocardiogram. Conservative management occurred in 54.4% infants and the remaining 55.6% received some form of therapeutic intervention (32.9% were managed medically while 12.7% managed surgically). The logistic regression model was statistically significant $\chi 2=8.308$, p-value=0.016 with 13.3% variance in management of PDA. There was association between late diagnosis of PDA with non-conservative management (OR=1.147, 95% CI= 1.015-1.297, p-value=0.028); association with the size of PDA and treatment modality, a larger PDA was more likely to be treated non-conservatively $\chi 2=21.03$, $p<0.001$; and the non-conservative group had longer duration with a central line $\chi 2=5.67$, p=0.017. No difference was found between groups with length of hospital stay, mean duration 77.14 days, $\chi 2=1.754$, p=0.185.

Conclusion(s) Infants with late diagnosis of a PDA were more likely to be managed non-conservatively. A larger PDA was found to need non-conservative treatment more often and patients treated non-conservatively had longer duration with central lines with no difference found in neonatal morbidities or long term outcomes between groups.



Central Line Duration: Conservative vs Non-conservative management



Echocardiographic measurements (mm) between different management groups

Test Statistics a, b

	Duration in days of mechanical ventilation	Duration in days of noninvasive ventilation	Duration in days of chest tube	Duration in days of umbilical lines	Duration in days of central lines	Length of Hospital stay in days	Echocardiographic measurements (mm)
Chi-Square	.700	.644	1.167	.108	5.674	1.754	21.033
df	1	1	1	1	1	1	1
Asymp. Sig. (p value)	.403	.422	.280	.742	.017	.185	.0001

a. Kruskal Wallis Test b.Grouping Variable: New Management Groups

Anova

		Sum of Squares	df	Mean Square	F	Sig.
Time of Diagnosis (Day of Life)	Between Groups	85.629	1	85.629	4.036	.048
	Within Groups	1633.587	77	21.215		
	Total	1719.215	78			

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Abstract: 218

Assessment of Pediatric Cardiologist Adherence to the 2012 American Heart Association Recommendations on Neurodevelopmental Evaluation and Management of Children with Congenital Heart Disease

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Background The 2012 American Heart Association (AHA) statement “Neurodevelopmental Outcomes in Children with Congenital Heart Disease (CHD): Evaluation and Management” concluded that children with CHD are at increased risk for neurodevelopmental (ND) disorders and delays. Routine developmental surveillance and evaluation throughout childhood are recommended. It is unknown to what extent pediatric cardiologists (PC) adhere to these recommendations.

Objective To assess PC familiarity and compliance with the 2012 AHA ND statement.

Design/Methods An anonymous online survey was distributed to PC nationwide. Surveyed data included: non-identifiable demographics, familiarity with the AHA statement and presence of ND cardiology program (NDP) in their affiliated institution. If no NDP was present, PC were asked to what extent and to whom CHD patients were referred for ND evaluation, or why they did not refer. All PC indicated who they believe is responsible for surveillance and referral of CHD patients.

Results PC (N=129) responded from 37 states. The majority of PC (54%) stated they were only “somewhat familiar” and 18% were “not familiar” with the AHA statement. Forty PC (31%) stated their institution did not have a NDP. Of these, 25% indicated they generally did not refer CHD patients for ND follow-up; 45% performed ND surveillance and referred to a specialist/early intervention (EI) if warranted; and 30% generally referred all CHD patients. Of PC without affiliated NDP who referred, 48% referred to a “primary care physician” (PCP), 28% to a “developmental pediatrician/neurologist”, and 17% to “EI.” Table 1 presents frequencies PC without NDP refer different CHD patients. Lastly, 43% of PC do not feel responsible for ND surveillance, and 11% do not feel responsible for ND referrals. Table 2 indicates PC beliefs about responsibility for ND surveillance and referral.

Conclusion(s) It is widely accepted that CHD, particularly those requiring operative repairs, is associated with increased ND risk. However, in this survey, most PC stated that they were not familiar or only somewhat familiar with AHA ND guidelines. This suggests that a substantial proportion of PC is not referring high-risk children for adequate ND care. It is essential that the ND risks associated with CHD be widely disseminated amongst PCP and PC, and that current guidelines are reinforced to ensure all patients are appropriately screened and referred for services.

	NA/I do not see these kinds of patients n (%)	Never n (%)	Rarely n (%)	Sometimes n (%)	Often or Very Often n (%)	Always or Almost Always n (%)
Infants (less than 12 months) requiring open heart surgery (cyanotic and acyanotic types).For example, HLHS, IAA, PA/IVS, TA, TAPVC, TGA, TOF, tricuspid atresia.	2 (2%)	0 (0%)	11 (9%)	25 (21%)	14 (12%)	70 (57%)
Children (over 12 months) with other cyanotic heart lesions NOT requiring open heart surgery as a neonate/infant. For example, TOF with PA and MAPCA(s), TOF with shunt without use of CPB, Ebstein anomaly.	4 (3%)	1 (1%)	32 (26%)	33 (27%)	25 (21%)	27 (22%)

Table 1. PC without NDP Referral Practices for CHD patients

	n (%)
Pediatric Cardiologist	11 (10%)
Cardiac ND Follow-up Clinics	27 (24%)
Primary Care Physician	67 (59%)
Pediatric Neurologist/Developmental Pediatrician	8 (7%)

Table 2. PC Beliefs about who is Responsible for ND Surveillance and Referral

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Abstract: 219

Nephrology Consultation Contributing to Improved AKI Outcomes

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Background Severe acute kidney injury (AKI) increases risk of mortality, fluid overload, hypertension, need for renal replacement therapy, longer hospital stays, and impaired kidney function at time of discharge. Early recognition of AKI and subsequent nephrology consultation may improve these outcomes.

Objective To determine whether AKI outcomes were affected by nephrology consultation.

Design/Methods Using a clinical database (Clinical Looking Glass), we performed a single-center, retrospective data analysis of subjects 0-21 years of age admitted with AKI to the Children's Hospital at Montefiore between 2014 and 2016. AKI was defined based on ICD 10 codes. For all patients, we assessed the presence or absence of renal consultation, length of stay (LOS), mortality, and the need for renal replacement therapy (RRT).

Results 326 subjects were analyzed (33% African-American, 16% Caucasian, 2% Asian, 1% American Indian and 48% Other) with a median age of 11 years. Of these, 141 (43%) received a nephrology consult. The average LOS in patients who received consults was shorter as compared to those who did not (21 days vs. 32 days, $p = 0.007$). Mortality, although not statistically significant, was higher in those who did receive consultation (13% vs. 9%, $p=0.3$). In patients without a coexisting renal condition (69%), the most common diagnoses associated with AKI were cardiac pathologies (16%), sepsis (15%), dehydration (8%), respiratory failure (5%), and bone marrow transplant (4%). Of all patients who received a nephrology consult, 28% received RRT and were required to receive a nephrology consult.

Conclusion(s) Patients with AKI who received nephrology consults had a shorter LOS as compared to those who did not receive consults. Risk of mortality showed a trend toward significance in patients who received a nephrology consultation. This may be a reflection of the severity of illness and the need for RRT. Further analysis of factors associated with outcomes may include: lapse in time from identification of AKI to renal consultation, electrolyte disturbances, hypertension, and creatinine at time of discharge. Our findings support the need to implement innovative alerts in the Electronic Health Record in order to facilitate earlier recognition of AKI and appropriate nephrology consultation.

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Abstract: 220

DRESS Syndrome Associated with Severe Autoimmune Hypothyroidism: A Case Report

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Background Drug Reaction with Eosinophilia and Systemic Symptoms (DRESS) syndrome is a rare, potentially life-threatening, adverse drug hypersensitivity reaction characterized by fever, rash, facial edema, hepatitis, and eosinophilia within 6 weeks of initiation of the inciting medication. The pathogenesis is incompletely understood but involves a drug-specific T cell-mediated immune response. Anticonvulsants, sulfonamides, and several other drugs have been implicated. Late complications include autoimmune sequelae such as thyroid disease and type I diabetes mellitus. We present a case of severe autoimmune hypothyroidism diagnosed 7 months following onset of DRESS syndrome.

Objective

Design/Methods Clinical data were abstracted from the electronic medical record.

Results A 12-year-old female with juvenile myoclonic epilepsy was prescribed lamotrigine; she developed fever and adenopathy 2 weeks later and was treated with amoxicillin-clavulanate. Both medications were discontinued 2 days later due to onset of a pruritic rash. Symptoms progressed with fever, malaise, cervical adenopathy, and generalized morbilliform eruption of the trunk, extremities, palms and soles. Laboratory evaluation revealed eosinophilia and transaminitis: eosinophils 858/uL (5.8%), AST 299 U/L, and ALT 473 U/L, consistent with DRESS syndrome. Around this time, she had euthyroid sick syndrome with TSH 0.12 (0.5-3.8 uIU/ml) and free T_4 1.3 (1-1.8 ng/dl); levels normalized 5 weeks later. Transaminitis and other symptoms slowly improved with high-dose prednisone followed by cyclosporine. Approximately 7 months after the onset of DRESS, she developed fatigue, fine-motor bradykinesia, cold intolerance, bradycardia, and anorexia. Thyroid testing showed TSH 174 uIU/ml, free T_4 <0.25 ng/dl, positive thyroid peroxidase and thyroglobulin antibodies. Levothyroxine (LT4) was started with concomitant stress dose steroids due to iatrogenic adrenal insufficiency. The patient is euthyroid on continued LT4 and is being monitored for potential development of type 1

diabetes.
Conclusion(s) DRESS syndrome is associated with both disease-specific and iatrogenic endocrine complications. Patients treated with high-dose steroids are at increased risk of iatrogenic adrenal insufficiency. Late complications, including autoimmune thyroid disease, type 1 diabetes, systemic lupus, myocarditis, and others, may occur months to years after presentation. Patient education and periodic monitoring are important to allow early recognition, avoid complications, and ensure optimal growth and development.
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Abstract: 221
Side Effects of Seasonal Influenza Vaccine in Egg Allergic Children 6 to 36 Months in an Urban Multiethnic Community Hospital
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Background Influenza infection in children 6-36 months is associated with high morbidity and mortality. American Academy of Pediatrics Influenza Vaccine Policy Statement 2017 stated that influenza vaccine should be administered to all children over 6 months. Children with known egg allergy were often not vaccinated for risk of possible anaphylaxis due to residual egg protein in influenza vaccine. Common side effects of influenza vaccine include soreness, local swelling, fever and muscle aches. Allergic side effects include local swelling, urticarial rash, angioedema and anaphylaxis. There is little data on allergic side effects in children between 6-36 months with egg allergy after influenza vaccination.
Objective To estimate the risk of allergic side effects in children with egg allergy after seasonal influenza vaccine.
Design/Methods Retrospective chart review of egg allergic children aged 6 months to 36 months who received influenza vaccine followed in Flushing Hospital Medical Center Ambulatory Care Center from January 2014 to December 2016. Patients were diagnosed either by clinical history or by positive Immunocap testing for egg white, ovomucoid or ovalbumin. All patients were vaccinated with inactivated quadrivalent influenza virus vaccine (Fluzone, Sanofi-Pasteur). Two doses of influenza vaccine were administered at least four weeks apart if never vaccinated or with unknown history. All patients were observed for 60 minutes after vaccination for respiratory distress, urticarial rash and anaphylaxis.
Results Of 124 known egg allergic children, 61 (49%) were between 6-36 months, mean age 20.61 months (SD:10.3 months), 34 (56%) male, 67.2% Hispanic and 19.7% Asian. Egg white allergy by Immunocap was in 63.9% and egg yolk in 50.8%. Presence of eczema was in 49.2%, asthma in 34.4% and allergic rhinitis 26.2%. No common or allergic side effects were observed.
Conclusion(s) No side effects from influenza vaccine in egg allergic children between 6 and 36 months were observed in our small sample. Our findings confirmed the safety of administering influenza vaccine to egg allergic children in primary care setting.
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Abstract: 222
Frequency of Shin Guard Use in Youth Soccer: Recommendations Vs. Reality
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Background There are over 4.2 million registered youth soccer players (YSP) in the United States, with over 100,000 YSP reporting lower extremity injuries. The United States Youth Soccer Association (USYSA) has taken steps to reduce injuries, including requiring the use of shin guards (SG), which significantly reduce the force of a direct blow to the tibia. Unfortunately, although SG are required for official gameplay, standard safety suggestions are difficult to enforce during practice. As practice accounts for the majority of YSP's schedules, they may be playing unprotected more often than not.
Objective To examine the frequency of SG use among YSP during practice with the intent to investigate to what extent YSP are using proper safety equipment.
Design/Methods Researchers visited YSP fields in urban, suburban, and rural NY areas. The fields were identified using online schedule postings. Gender, age, and the use of SG were recorded. A chi-square test and Pearson product-moment correlation were used to analyze the variance of SG use among different age groups and genders.
Results 394 YSP were observed across 9 age groups, 10-18 years old, 30.71% male. Overall, 58.37% of the YSP observed were wearing SG in practice situations. A significant difference was observed between female and male YSP where females were significantly more likely to wear SG during practice (88.14% vs.43.2% , χ=83.684, p<.001). Pearson correlations between age and the propensity to wear SG, separated by gender showed a significant correlation between age and proportion of players wearing shin guards among male teams (r= -0.775, p<.001), but no significant correlation between age and proportion of players wearing shin guards among female teams (r=-.615, p=.105) demonstrating that older male players were significantly less likely to wear protective gear during practice.
Conclusion(s) Our results clearly showed that a large portion of YSP observed were not wearing SG. Additionally, there was a strong inverse relationship between age and SG usage, with older males less likely to wear SG during practice. As YSP age, the need for protective gear becomes even more pressing as the physicality of the gameplay increases, thereby raising the risk of injury. In order to reduce youth sports-related injury, additional sports with similar propensities for injury should be examined for the proper use of protective equipment during practice situations. Clinicians, parents, and coaches must reinforce the importance of safety gear.
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Abstract: 223

Effect of sustained inflation on placental transfusion and hemodynamics in asphyxia

Jayasree Nair[1], Sylvia Gugino[1], Carmon Koenigsknecht[1], Justin Helman[1], Lauren Davidson[1], Susheel Muralidharan[1], Praveen Chandrasekharan[1], Satyan Lakshminrusimha[2]

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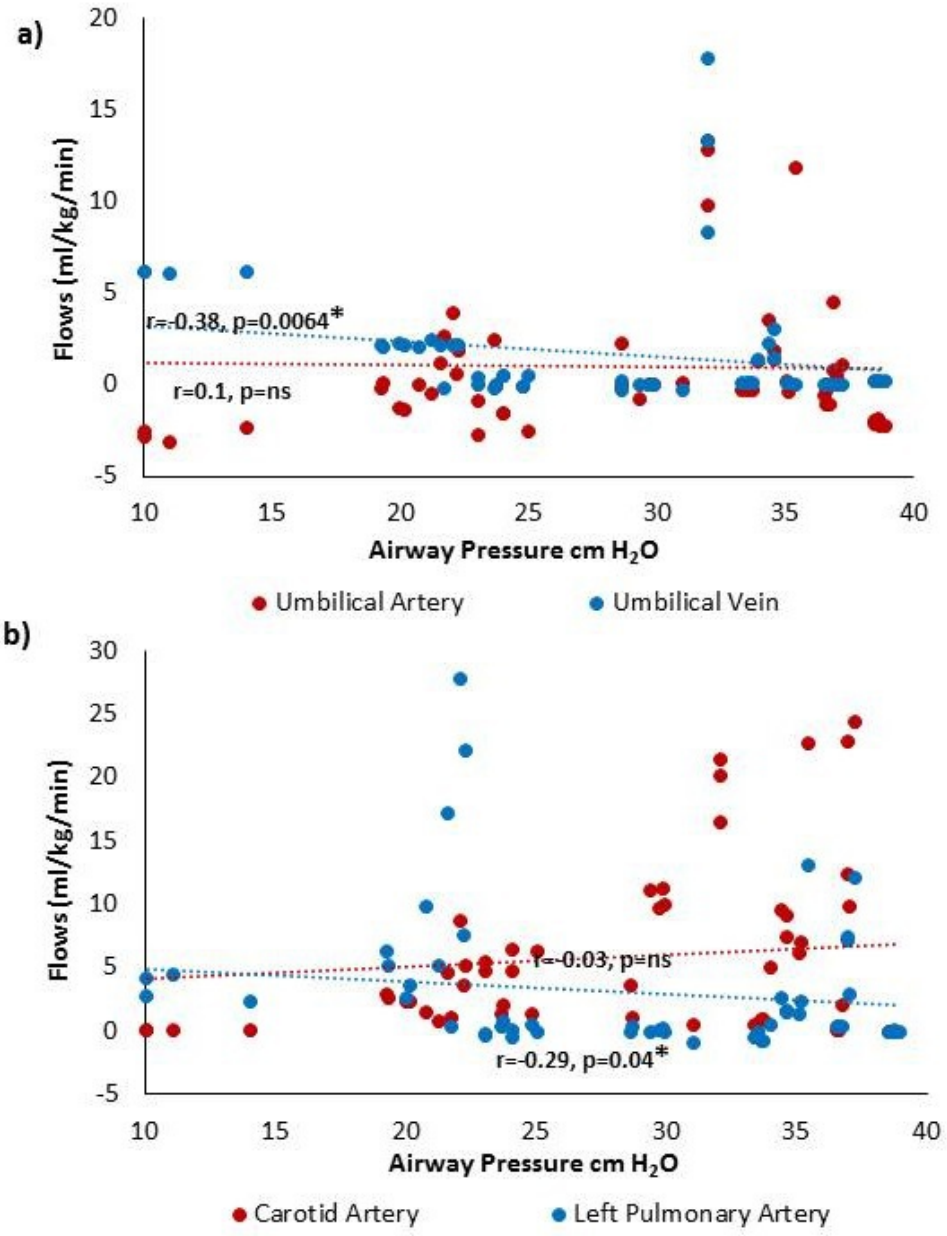
Background A sustained inflation (SI) breath is recommended by the European Resuscitation Council for apneic term and preterm infants at birth. However, duration and pressure of SI to optimize transition at birth is yet to be determined. A single SI of 35 cm H_2O for 30s improved speed of circulatory recovery in near term asphyxiated lambs (Klingenberg, 2013). NRP recommends delayed cord clamping (DCC) for infants who do not require resuscitation but there is limited information on DCC in asphyxia. DCC stabilized cardiac output and reduced cerebrovascular injury in asphyxiated near-term lambs (Polgase, 2017). Effect of SI on placental transfusion with DCC is not known.

Objective To determine the effect of airway pressure with SI and positive pressure ventilation (PPV) on placental transfusion and hemodynamics during resuscitation of near term asphyxiated lambs. We hypothesized that increased airway pressure would reduce umbilical venous (UV) and pulmonary arterial (PA) flows without altering carotid (CA) and umbilical arterial (UA) flows.

Design/Methods Near term (141d gestation) lambs were partially exteriorized and instrumented with flow probes placed around left CA, left PA, one UA and UV. Asphyxia was induced by cord occlusion until mean blood pressure was ≤22 mmHg. 10 lambs were delivered and received DCC for 60 sec. They were randomized to receive PPV (DCC-V) (n=4) or a 30 sec SI breath prior to clamping the cord (DCC-SI) (n=6). An $ETCO_2$ adapter was attached to the endotracheal tube and lambs were resuscitated with a T-piece (PIP of 35 cmH_2O, PEEP of 5 cmH_2O and FiO_2 0.21). Physiological measurements were recorded using Biopac software during 30 sec SI or PPV. A Philips NM3 monitor recorded airway pressures. Groups were compared using Mann whitney U test and correlation was calculated using Graphpad Prism.

Results Airway pressure was significantly higher in DCC-SI group (34.57 cmH_2O vs 20.16 cm H_2O in DCC-V). Increased airway pressure decreased UV as well as PA flows (Table 1, Fig 1). Increased CA flow was noted in the SI group but was not statistically significant.

Conclusion(s) Increasing pressures delivered by an SI breath in near term asphyxiated lambs with DCC reduced UV and PA flows without affecting UA or CA flows. Our data suggest that high intrathoracic pressure generated by SI decreases both sources of LV preload – pulmonary blood flow and umbilical venous return. As ongoing clinical trials evaluate benefits of DCC in infants who need resuscitation, the optimal initial ventilation strategy needs to be studied further.



Correlation between airway pressure and a) umbilical flows b) carotid and pulmonary arterial flows

Comparison of flows between SI and ventilation with an intact cord in asphyxia

	DCC-V (n=4)	DCC-SI (n=6)	p value
Weight (kg)	3.45±0.27	3.66±0.4	ns
Airway pressure (cm H2O)	20.16±5.8	34.57± 3	p<0.0001*
UA flow (mean±SD) ml/kg/min	-0.39±2.1	1.45±4.59	ns
UV flow (mean±SD) ml/kg/min	2.2±2.46	1.51±4.33	p=0.03*
CA flow (mean±SD) ml/kg/min	2.78±2.62	7.46±8.73	p=0.67
PA flow (mean±SD) ml/kg/min	5.05±7.87	1.67±3.91	p=0.01*

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Abstract: 224

Change in Blood Volume with Delayed Cord Clamping in Asphyxia with Asystolic Cardiac Arrest

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Background The role of Delayed cord clamping (DCC) in asphyxia is currently being evaluated. Diastolic and mean blood pressures at 30min post ROSC are higher with DCC in asphyxiated lambs with cardiac arrest (Davidson, PAS 2017). DCC is also shown to stabilize cardiac output in asphyxiated near-term lambs without asystole (Polgase, 2017). The effect of resuscitation with an intact cord during asystole on placental transfusion and neonatal RBC volume is not known. Biotin labeled RBCs can be used to accurately measure RBC volume (Strauss 2003).

Objective To evaluate the effect of resuscitation of asystolic lambs with an intact cord on RBC volume.

Design/Methods Near term lambs at 142d gestation were partially exteriorized and instrumented in utero. Low density biotinylated RBC's were administered while still in-utero to calculate fetoplacental volume. Blood samples were collected before and after injection of low density biotin. Asphyxial arrest was induced by compressing the umbilical cord. After 5 min of asystole, lambs were resuscitated as per NRP guidelines and randomized into DCC (cord clamped at 120 sec) and ECC (cord clamped within 30 sec). High density biotin labeled RBCs were injected 30 min post-delivery to measure neonatal RBC volume. Blood volume was calculated using RBC volume, hematocrit and body weight.

Results The fetoplacental blood volume was similar at baseline in both groups (table). There was no statistically significant difference in measured newborn RCV or blood volume between the DCC and ECC groups. There was no difference in residual placental volume between the two groups.

Conclusion(s) Our study did not detect any significant increase in RBC or blood volume with DCC during resuscitation for asystole. The beneficial hemodynamic effects of DCC that are noted may be due to mechanisms other than volume transfer. The long period of cord occlusion to achieve 5 min of asystole may have impaired return of spontaneous umbilical flows, thereby yielding negative results. Further translational and clinical studies are needed, potentially with shorter periods of asystole and longer duration of DCC.

	DCC n=4	ECC n=4	t Test
Weight (kg)	4.2 +/- 0.8	3.4 +/- 1.3	p=ns
BLOOD VOLUME			
Feto-Placental Blood Volume (ml/kg)	63.1 +/- 7.8	58.1 +/- 12	p=ns
Newborn Blood Volume (ml/kg)	56.1 +/- 5.5	49.3 +/- 14.7	p=ns
Residual Placental Blood Volume (ml/kg)	7.0 +/- 5.2	8.9 +/- 3.7	p=ns
RED CELL VOLUME (RCV)			
Feto-Placental RCV (ml/kg)	26.8 +/- 4.5	25.5 +/- 6.6	p=ns
Newborn RCV (ml/kg)	23.0 +/- 3.0	19.9 +/- 6.4	p=ns
Residual Placental RCV (ml/kg)	4.9 +/- 2.1	5.6 +/- 2.2	p=ns
Fraction of Feto-Placental Volume in Newborn	0.9 +/- 0.1	0.77 +/- 0.09	p=ns

Values above are represented as mean +/- standard deviation.

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Abstract: 225

Patterns of Pre-Discharge Blood Gas Utilization and Clinical Course of Hypercarbia in Preterm Infants

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Background Infants with lung disease of prematurity (bronchopulmonary dysplasia or BPD) have abnormalities of both oxygenation and ventilation that may persist even after discharge from the neonatal intensive care unit (NICU). There is limited and conflicting data regarding safety of specific levels of hypercarbia and potential effect on outcomes. Blood gas (BG) measurement patterns and values from infants who are pre-discharge or on minimal to no respiratory support are not well defined.

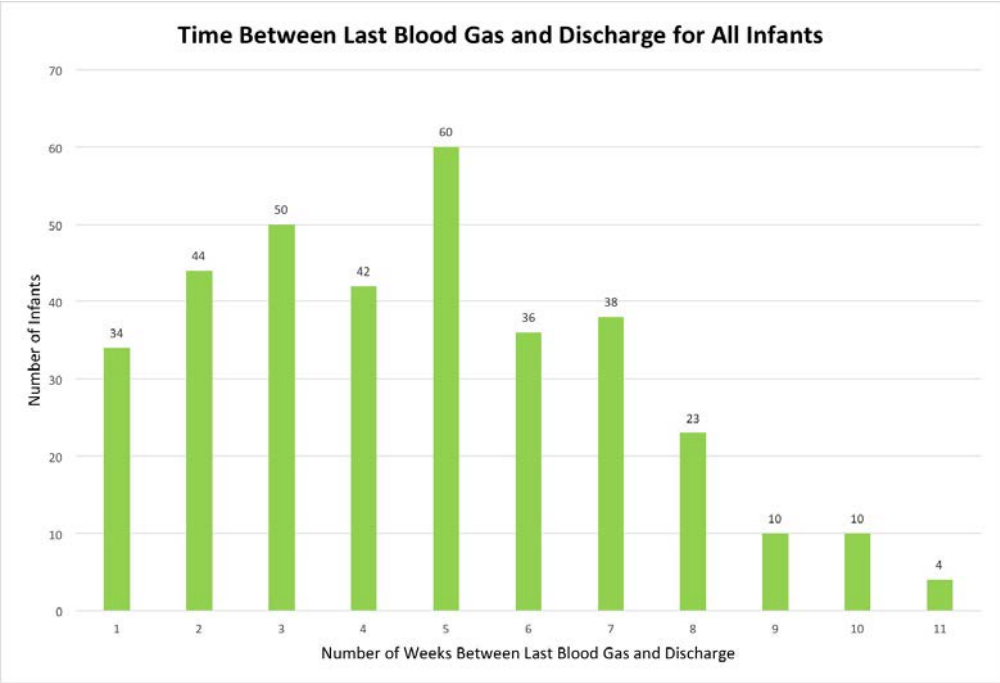
Objective 1. Describe the patterns of utilization of BG assessment prior to NICU discharge.

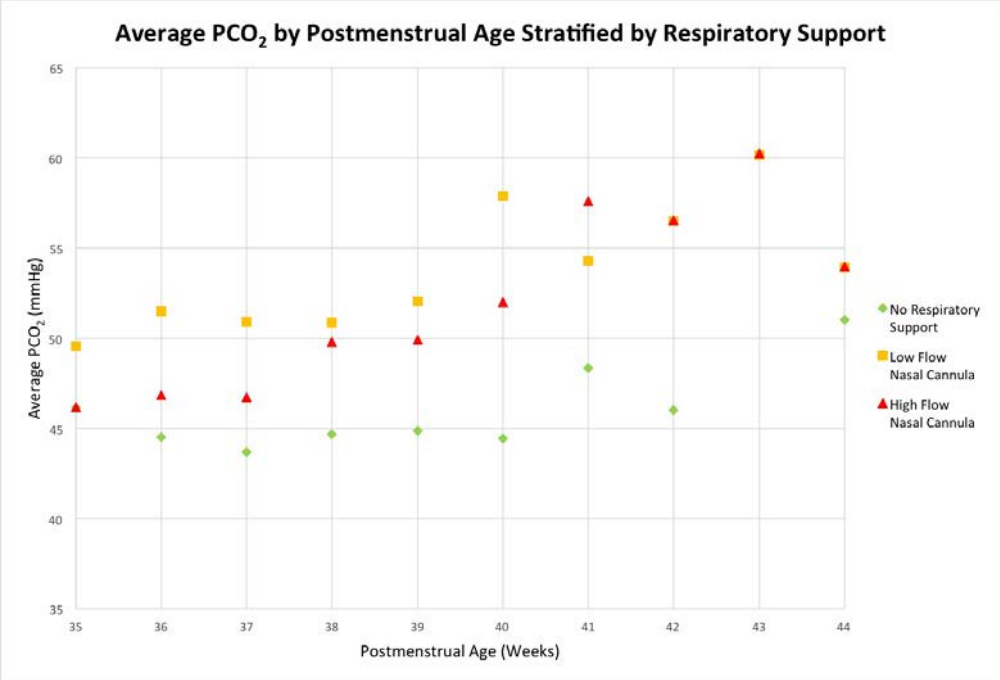
2. Determine time to resolution of hypercarbia in infants with BPD weaned to supplemental nasal cannula oxygen or to no respiratory support.

Design/Methods We identified 692 infants born < 32 0/7 weeks gestation between January 2012 and December 2015 at either University of Massachusetts Memorial Medical Center or Beth Israel Deaconess Medical Center. We extracted clinical/demographic information, all BG values, and level of respiratory support at time of blood gas. We performed descriptive analyses.

Results Infant demographics are presented in Table 1. Less than 25% of patients had BG assessments within 2 weeks of discharge (Figure 1). Hypercarbia tended to worsen over the course of NICU hospitalization. At every postmenstrual age (PMA), infants with no respiratory support had lower PCO_2 values compared to infants requiring low-flow (LFNC) or high-flow nasal cannula (HFNC). At early PMAs, PCO_2 values of infants on LFNC were higher than those of infants on HFNC at the same PMA. At corrected term and older, this trend reversed (Figure 2).

Conclusion(s) Few infants had a BG drawn within 2 weeks of NICU discharge, suggesting that neonatologists do not think this is important baseline information to provide to outpatient providers. In fact, baseline hypercarbia status may predict risk of subsequent respiratory morbidity. PCO_2 was lowest, on average, at each PMA for infants not requiring respiratory support. This likely reflects the concept that in healthier infants, normocarbia is associated with normoxia. We also found that hypercarbia worsened rather than improved throughout the NICU course, suggesting that ventilation is not managed as aggressively as oxygenation when infants are weaned off higher levels of respiratory support. More research investigating ventilation status pre-discharge, and the relationship between hypercarbia and long-term respiratory outcomes in preterm infants is warrented.





Characteristics of Study Cohort

Total N	692
	Mean, SD
Gestational Age (weeks)	28.9, 2.19
Birth Weight (g)	1194, 377.4
NICU Length of Stay (Weeks)	68.6, 33.1
PMA at Discharge (weeks)	38.6, 3.24
	N, %
Male	371, 53.6%
Race	
White	375, 54.2%
Black	96, 14%
Asian	42, 6.0%
Hispanic	35, 5.0%
Other	83, 12%
Unknown	61, 8.8%

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Abstract: 226

Surviving Sepsis in the NICU: Delayed Antimicrobial Therapy Worsens Outcomes

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Background The timely administration of antimicrobial therapy forms the cornerstone of current sepsis management. Since the implementation of guidelines from the Surviving Sepsis Campaign, the overall severity of illness and mortality have decreased significantly in adults. However, there is little evidence regarding optimal timing and consequences of delayed antibiotic administration in infants with sepsis.

Objective To evaluate the association between time to first antibiotic administration (TTA) and in-hospital morbidity and mortality in

infants with sepsis at a quaternary NICU.
Design/Methods We have established a registry for automatic identification and data abstraction of infants 0-1 year with suspected sepsis, including patient demographics, comorbid conditions, laboratory/vital signs, medication records, and clinical care data. Ventilator and inotrope-free days were determined from day of sepsis evaluation through 28 days post event. We used multivariate regression models with generalized estimating equations to examine associations between TTA and outcomes including mortality, ventilator-free days, inotrope-free days and days of persistent positive blood cultures.
Results From September 2014-June 2017, 1629 sepsis evaluations were performed in 839 patients, with 108 episodes of culture proven sepsis (Table 1).The median time to antibiotic administration in patients with sepsis was 70 min (IQR 49-106). Lower gestational age, presence of a central line, necrotizing enterocolitis, chronic lung disease, prolonged length of stay, and death were more common in the group with sepsis ($p<0.001$,$p<0.001$,$p<0.001$,$p=0.003$,$p<0.001$,$p<0.001$) (Table 1). Mortality within 7 days of sepsis occurred in 10%, with gram-negative organisms the most common pathogens. 44% of patients required mechanical ventilation throughout the entire 28-day period. 45% of episodes had >1 day of persistent positive blood cultures, not including those who died on day 1 of sepsis. After adjusting for potential confounding variables including gestational age, sex, and comorbid conditions, prolonged time to antibiotic initiation was associated with decreased inotrope-free days ($p=0.034$) and increased days of positive blood cultures ($p=0.016$). Despite small numbers, mortality was significantly increased with prolonged TTA ($p=0.013$) in our cohort (Table 2).
Conclusion(s) Prolonged time to antibiotic initiation is associated with increased morbidity and mortality in infants with sepsis. Our results highlight the importance of prioritizing rapid antibiotic initiation in the NICU.

Cohort Demographics

Variable	Total Cohort	Culture Positive	Culture Negative	P-value
Patient Demographics (n=839)				
Birth Weight (kg)	2.3 (1.0,3.0)	1.6 (0.4, 5.2)	2.3 (0.4, 5.9)	0.004
Gestational Age (weeks)	34.5 (29.0, 37.0)	32.0 (26.0, 37.0)	35.0 (23.0, 40.0)	<0.001
Sex (female)	351 (41.8)	43 (44.8)	308 (41.5)	0.533
Race (Caucasian)	361(60.1)	33 (55.0)	328 (60.6)	0.483
Congenital Surgical Disease	256 (30.5)	29 (30.2)	227 (30.6)	0.945
Chronic Lung Disease	180 (21.5)	32 (33.3)	148 (19.9)	0.003
Necrotizing Enterocolitis	109 (13.0)	26 (27.1)	83 (11.2)	<0.001
Congenital Cardiac Disease	98 (11.7)	14 (14.6)	84 (11.3)	0.347
Intraventricular Hemorrhage	89 (10.6)	15 (15.6)	74 (10.0)	0.09
Length of Stay (days)	52 (23.0, 116.6)	94.7 (50.8, 197.8)	47.9 (20.2, 103.8)	<0.001
Episode Demographics (n=1629)				
Corrected Gestational Age at time of sepsis evaluation (weeks)	39.6 (35.6, 46.1)	40.3 (35.5, 46.5)	39.5 (35.6, 46.3)	0.78
Presence of Central Venous Line	1095 (67.2)	97 (89.8)	998 (65.6)	<0.001
ECMO at time of sepsis evaluation	66 (4.1)	3 (2.8)	63 (4.1)	0.487
Intubated at time of sepsis evaluation	1056 (64.8)	68 (63.0)	988 (65.0)	0.675
Death within 7 days of sepsis evaluation	63 (3.9)	11 (10.2)	53 (3.4)	<0.001

Table 1: Demographics of cohort, separated by patient specific variables and episode specific variables (839 patients in 1629 episodes, 95 patients with sepsis in 108 episodes). Data presented as median (interquartile range) or frequency (percentage). P-value represents difference in demographics between the blood culture positive and negative groups, reported from Chi-square test for categorical variables and from Wilcoxon rank-sum for continuous variables.

Association Between Time to Antimicrobial Administration and Death

Variable	Univariate Analysis		Multivariate Analysis	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Time to Antimicrobial Administration (TTA)	1.48 (1.14, 1.92)	0.003	1.51 (1.09, 2.10)	0.013
Gestational Age	0.84 (0.71, 0.98)	0.029	0.84 (0.71, 0.99)	0.038
Sex	2.33 (0.63, 8.56)	0.204	2.41 (0.54, 10.78)	0.251
Corrected Gestational Age	0.95 (0.86, 1.04)	0.235	-	-
Birth Weight	0.59 (0.24, 1.50)	0.269	-	-

Table 2: Association between time to antimicrobial administration and death in univariate and multivariate analyses, using logistic regression models with generalized estimating equations. Demographic variables and those with p-value ≤0.2 in univariate analysis depicted above. None of the comorbid conditions (congenital surgical disease, chronic lung disease, necrotizing enterocolitis, congenital cardiac disease and intraventricular hemorrhage) were significantly associated with death and thus were not included in multivariate model. OR, Odds ratio; CI, Confidence Interval

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Abstract: 227

Correlation of clinical signs of chorioamnionitis with histological chorioamnionitis

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Background Clinical chorioamnionitis (CCA) is defined by the presence of fever plus one or more of the following: maternal tachycardia, fetal tachycardia, maternal leukocytosis, uterine tenderness and/or foul-smelling or purulent amniotic fluid. However, some of these symptoms can results from etiologies other than CCA, while others can be subjective. In addition, these symptoms of CCA correlate poorly with histological chorioamnionitis (HCA); and placental pathology reports are not available immediately after delivery for medical decision making. Therefore, predicting the factors of CCA that best correlate to the presence of HCA would be useful.

Objective To determine if any of the clinical parameters, singly and/or in combination, of CCA would accurately predict HCA in neonates

Design/Methods This is a retrospective cohort study from January 2010 to December 2015 in a tertiary hospital with a level 3 NICU of all neonates delivered to women with fever of at least 100.4^{o}F within 24h of delivery, and/or the presence of HCA. Deliveries with no placental pathology/culture, and neonates with major congenital/chromosomal abnormality were excluded.

Maternal and infant demographics and clinical data including: maternal Tmax within 24h of delivery, maternal and fetal heart rate at time of Tmax, maternal WBC at time of Tmax or within 24h of delivery, any documented uterine tenderness and foul-smelling/purulent amniotic fluid within 24h of delivery, neonatal complete blood count (CBC) within 24h of delivery, and placental pathology/culture report were extracted from the institution's electronic medical record

Results Data for 332 mother-infant dyads have been completed for analysis. The mean maternal age was 24.63 ± 5.61 years, and the mean gestational age of the infants was 37.89 ± 3.85 weeks. The mean birth weight was 3126.52 ± 760.97g. CCA was diagnosed in 310/332 mothers (93.4%), while HCA was diagnosed in 201/329 placentas (60.5%) with available histology reports. None of the symptoms of CCA were significantly associated with the presence of HCA. However, HCA was found to correlate with maternal WBC (p=0.034), elevated FHR (p=0.01) and maternal Tmax (p=0.015). Multiple linear regression showed that only maternal WBC (p=0.03) and Tmax (p=0.049) predicted the presence of HCA. ROC analysis showed that there were no acceptable "cut off" values of maternal WBC, maternal Tmax, maternal HR and fetal HR for accurately diagnosing HCA.

Conclusion(s) This study showed that there are no reliable clinical symptoms of CCA to correctly predict HCA

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Abstract: 228

Perception of Seasonal Influenza Vaccine Among Parents of Children Between 6 and 24 Months in an Urban Multi-Ethnic Community

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Background Seasonal influenza (FLU) is a common vaccine-preventable illness that is associated with substantial morbidity and mortality. Children <2 years of age have a much higher rate of FLU-related hospitalization and death. Surveys conducted among

parents in large urban communities found that perceptions of susceptibility to FLU illness, severity and potential vaccine (Vc) benefits are significant predictors of parental consent for FLU Vc. The Advisory Committee on Immunization Practices encourages FLU Vc for children aged 6-23 months. There are no studies of knowledge, attitude and perception of seasonal FLU Vc of parents of children between 6-24 months in an urban multiethnic community.
Objective To explore parental misperception and understanding of seasonal FLU, common cold and their effect on vaccination rate (VR).
Design/Methods Descriptive cross sectional study of parents of children aged between 6-24 months, visiting Flushing Hospital Medical Center Ambulatory Care Clinic (G1) or two private pediatric offices (G2) from Aug-Oct 2017. A questionnaire in English or Spanish consisting of demographics and questions on knowledge, attitude and perception of FLU Vc was given to parents of children between 6-24 months. Data were compared using percentages.
Results Of 179 completed surveys, 31 (17.3%) in G1, 148 (82.7%) in G2. Of all the responders, 88.5% were not US born, 60.2% between 21-30 years of age and 26.8% first time parents. Highest level of education in G1 and G2 was elementary school 29.5% vs 36.1% and high school 34.5% vs 43%. Average annual family income below $40,000 was 80% in G1 and 87.2% in G2. Most parents were aware that FLU infection was different from common cold (G1 56.2%, G2 54.7%). Most mothers in G1 (75.9%) and G2 (81.6%) received FLU Vc during pregnancy, 90.3% in G1 vs 90.3% in G2 were planning to give FLU Vc to their children. The primary source of information for FLU Vc was the pediatrician (74.2% in G1, 87.8% in G2). Of the participants with misperception that FLU was same as cold, VR was 71.6% compared to those aware that FLU was different from cold, VR of 58.2%, p=0.06.
Conclusion(s) Difference in VR between groups with and without misperception was not statistically significant. Pediatricians and healthcare providers need to impart knowledge of FLU Vc to improve VR.

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Abstract: 229

Impact of State-By-State Adoption of Key Patient Protection and Affordable Care Act Provisions on PED Patients

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Background The Patient Protection and Affordable Care Act (ACA) was enacted on January 1, 2014. The PPACA was designed to improve access to primary and preventative care by offering a variety of public and privately subsidized health insurance plans.
Objective Evaluate the effects of marketplace format and Medicaid programs through the PPACA on overall PED insurance composition and visit rates. As a proxy for preventable PED visits, we performed an analysis of asthma-related visit rates by insurance type.
Design/Methods Data was abstracted from the Pediatric Health Information System (PHIS) database. Pre-PPACA era data was collected 1/1/2010-12/31/2011, Post-PPACA era data was collected from 1/1/2015-12/31/2016. Hospitals in the PHIS database were grouped into 3 categories for analysis based on Medicaid expansion and the presence of a state/federal marketplace (Table 1).
Results 11 million PED visits were analyzed in the pre and post periods from 47 PED's in 28 states. In the post-PPACA period, states that expanded Medicaid saw a significantly greater increase in the number of PED visits compared to states that did not expand Medicaid ($p<0.001$). By insurance type, all 3 groups showed a significant decrease in patients presenting to PEDs with private insurance (4%), an increase in public insurance (4%), and a slight decrease in self-pay (1%). States that enacted Medicaid expansion and used the federal marketplace (Group 2), showed the greatest overall change for all insurance type, with private, public and self-pay methods decreased from 35.1% to 30.2%, increased from 61.1% to 66.3%, and decreased from 3.9% to 3.5%, respectively.

The rate of asthma visits across all PEDs decreased from 1.7% to 1.4% from pre to post-PPACA time period ($P<0.0001$). However, hospitals with a state marketplace saw a modest increase from 1.5% to 1.6% ($p<0.001$).
Conclusion(s) Hospitals in states that expanded Medicaid showed significantly greater increases in overall PED visits and public insurance PED visits compared to those that did not. State marketplace hospitals show significant increase for asthma related PED visits post-PPACA, with an increase in public insurance composition post-PPACA. These results suggest that PPACA provisions are critical for expanding healthcare access to everyone, but most notably those who qualify for public insurance. This also suggests that those with public health insurance utilize the PED for common health concerns such as asthma despite the expansion of primary care services under the PPACA.

Group #	Medicaid Expansion?	State Marketplace?	Federal Marketplace?
1	No	No	Yes
2	Yes	No	Yes
3	Yes	Yes	No

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Abstract: 230

Impact of Two Different Liquid Human Milk Fortifiers on the Neonatal Intestinal Microbiome

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Background Abnormal microbial colonization (dysbiosis) of the neonatal intestine may impact the digestion of nutrients, alter intestinal peristalsis, and has been associated with necrotizing enterocolitis. As the role of the microbiome in health and disease becomes more apparent, it is important to evaluate associations between early dietary exposures and microbial colonization patterns in preterm infants (PI).

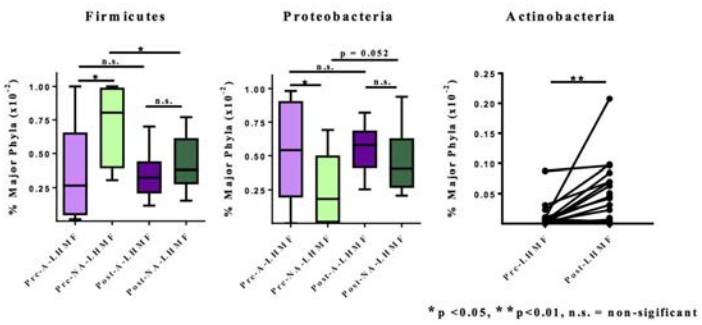
Objective Compare the intestinal microbiome of PI fed breast milk (BM) supplemented with acidified vs. non-acidified liquid human milk fortifiers (A- vs. NA-LHMF).

Design/Methods Stool samples were collected at one-week intervals from 29 age/gender/weight-matched PI < 30 weeks gestational age (A-LHMF n =16, NA-LHMF n =13), prior to (Pre) and after (Post) the introduction of LHMF. Clinical data included day of life (DOL) of sample acquisition, total days of LHMF, antibiotic (abx), and antacid exposure. Bacterial DNA was extracted and the 16S rRNA gene was sequenced using an Illumina MiSeq. Mann-Whitney U tests assessed differences between groups and paired t-tests assessed differences within groups. Hierarchical linear regression analysis (HLR) identified clinical factors associated with operational taxonomic units (OTUs) and Simpson's diversity indices (SDIs).

Results Total days of LHMF, abx, and antacid exposure were similar between the A-LHMF and NA-LHMF groups. Microbiome data from 136 stool samples were compared. Prior to supplementation, there were no significant differences in alpha diversity between groups, represented by the total number of OTUs and SDIs. However, the abundance of Proteobacteria (PB) was significantly higher ($p = 0.044$) and the abundance of Firmicutes (FM) was significantly lower ($p = 0.046$) in Pre-NA- vs. Pre-A-LHMF (Figure). Post supplementation, the abundance of PB and FM was no longer significantly different between groups; corresponding with a significant reduction in FM ($p = 0.044$) following the addition of NA-LHMF as determined by paired analysis. Introduction of any LHMF corresponded with enrichment for Actinobacteria (AB, $p = 0.007$). In HLR, the addition of NA-LHMF was associated with higher SDIs after adjusting for DOL and abx exposure (Table, $p = 0.014$).

Conclusion(s) In this cohort of PI, the addition of NA-LHMF to BM feeds corresponded with reduced intestinal FM and higher SDIs. An increase in intestinal AB was seen with the addition of either A- or NA-LHMF. Additional studies are needed to further evaluate these associative findings and determine potential clinical significance.

Figure. Relative abundance of Major Phyla prior to and after the introduction of LHMFs



*p <0.05, **p<0.01, n.s. = non-significant

Table: Hierarchical Linear Regression Analysis

OTUs[1]	β	95% CI	P value
Mean OTU	36.22	26.66, 49.2	<0.001
Age, per day	1.01	1, 1.02	0.036
Antibiotic exposure when sampled, per day	-1.04	-1.06, -1.02	<0.001
Antacid exposure when sampled, per day	1.02	1, 1.03	0.011
SDIs[2]	**β**	**95% CI**	**P value**
Mean SDI	1.78	1.45, 2.18	<0.001
Age, per day	1.01	1, 1.02	0.005
Fortified – nonacidic*	1.25	1.05, 1.48	0.014
Antibiotic exposure when sampled, per day	-1.02	-1.03, -1.01	<0.001

1 - Not significant: On antibiotic on day of sample; On antacid on day of sample; Fortified – acidic (reference: non-fortified); Fortified – non-acidic (reference: non-fortified)
2 - Not significant: On antibiotic on day of sample; On antacid on day of sample; Cumulative days antacid exposure on day of sample; Fortified – acidic (reference: non-fortified)
*Reference group: Fortified-acidic or Non-fortified

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Abstract: 231

Management Considerations in Pediatric Giant Prolactioma: A Case Series

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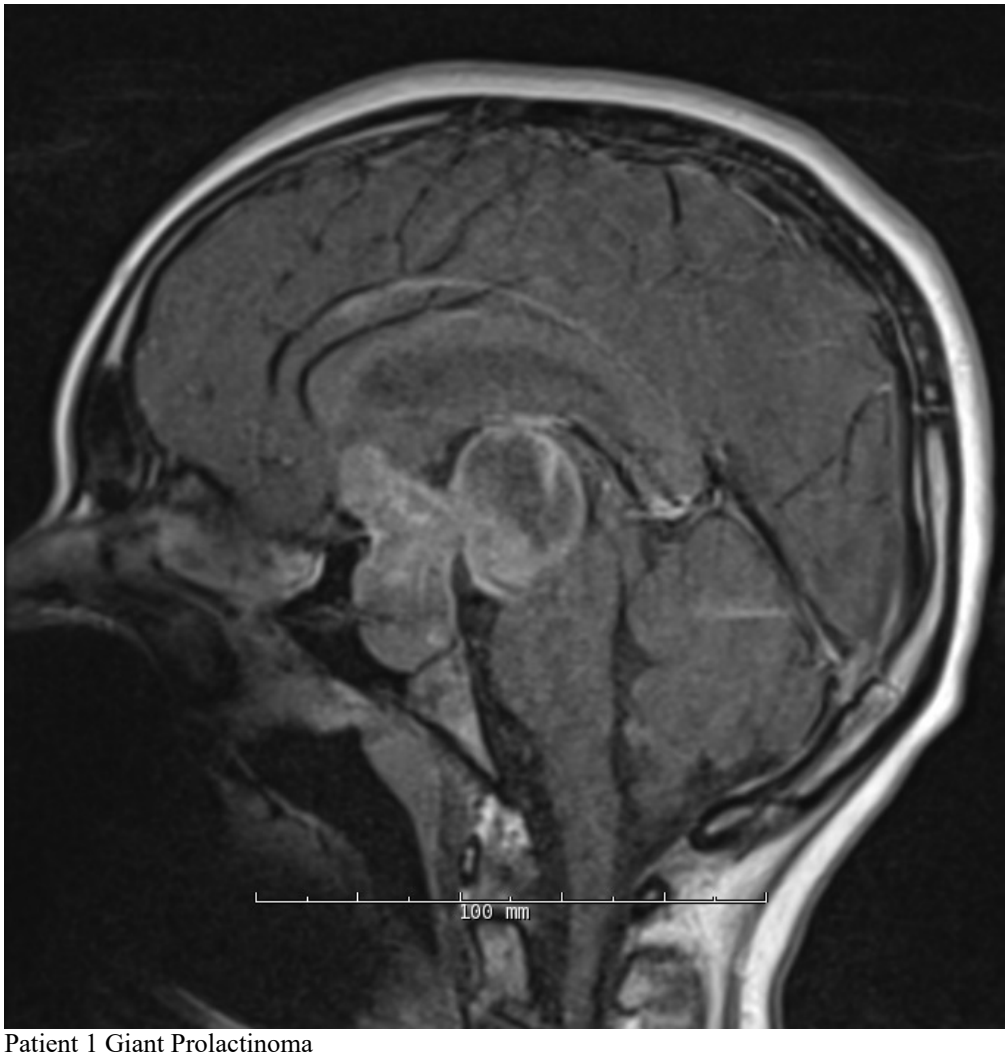
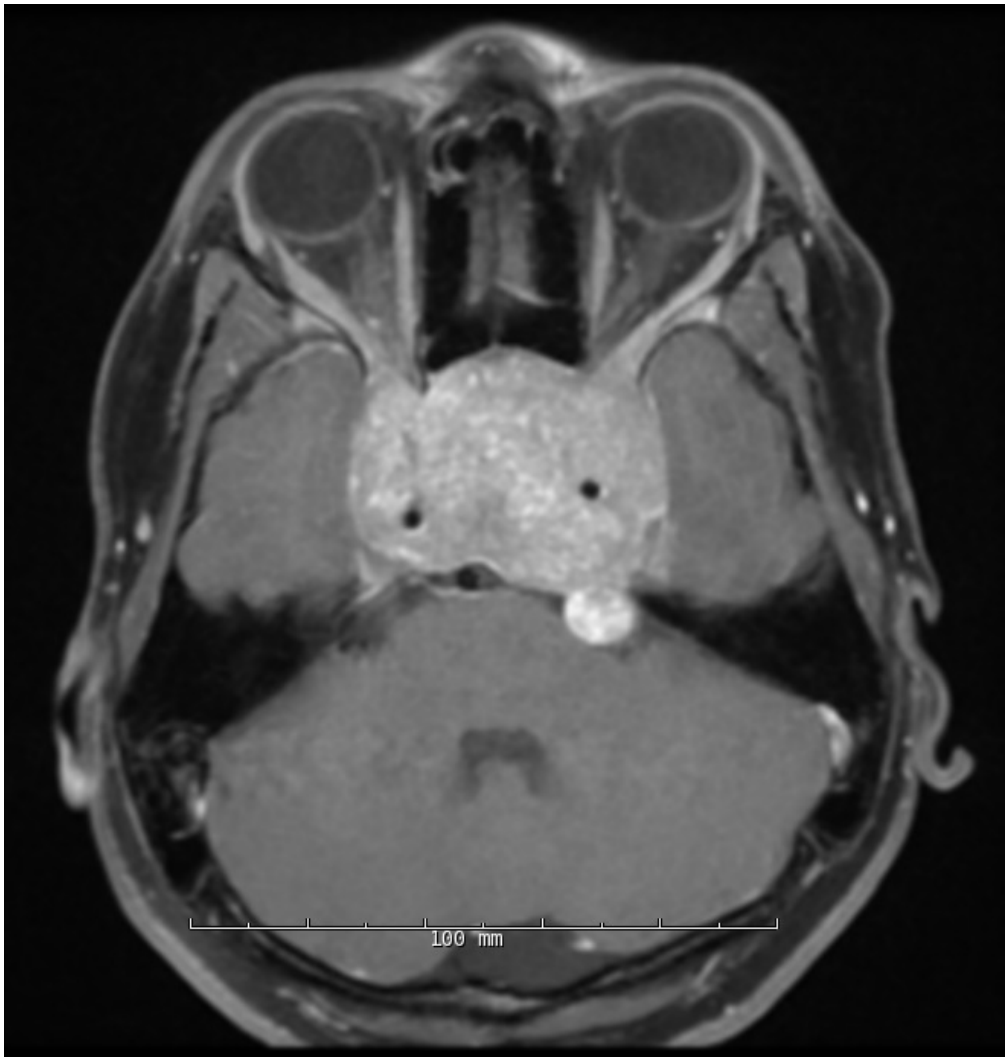
Background Less than 3% of intracranial tumors in children are pituitary adenomas; of these, the most common type is prolactinoma. Giant prolactinomas are a rare subset of macroprolactinomas, characterized by size greater than 4cm and prolactin concentrations above 1000ng/mL. Given the paucity of giant prolactinomas in children, available evidence to guide management is limited.
Objective To describe two cases of giant prolactinoma, and to review management considerations in the pediatric population.
Design/Methods Clinical data were abstracted from the electronic medical record for two children receiving care at the Children's Hospital of Philadelphia.
Results Patient 1 is a 15 year-old female who presented with symptoms of increased intracranial pressure, which prompted CNS imaging. She had associated decreased visual acuity, bitemporal hemianopia, primary amenorrhea, galactorrhea, hypothyroidism and adrenal insufficiency. Her tumor measured 4.6cm in diameter, and initial prolactin of 11,265 ng/mL confirmed a diagnosis of giant prolactinoma. She was started on cabergoline 0.25mg twice weekly, which was increased to 0.5mg twice weekly. Her visual acuity and field defects improved with dopamine agonist therapy. Her course was complicated by intratumoral hemorrhage causing obstructive hydrocephalus, necessitating ventriculoperitoneal shunt placement.

Patient 2 is a 14 year-old male who presented with progressive headache, aniscoria, decreased visual acuity and bilateral visual field defects, which prompted CNS imaging. He had associated adrenal insufficiency and hypogonadism. His tumor measured 5.6cm in diameter, and initial prolactin of 3,250 ng/mL confirmed a diagnosis of giant prolactinoma. He was started on cabergoline 0.25mg twice weekly, which was increased to 0.5mg twice weekly. His anioscoria, visual acuity and field defects improved with dopamine agonist therapy.

Genetic testing was negative for mutations in FIPA, MEN1, and CDKN1B in both patients.
Conclusion(s) In general, dopamine agonists are first-line therapy for all prolactinomas, including giant prolactinomas. Cabergoline has been shown to have superior efficacy and reduced side effects compared to bromocriptine, and is the preferred treatment modality. Beginning with 0.25 mg cabergoline twice weekly is a reasonable general approach, with titration to therapeutic response; over-rapid treatment risks precipitating CSF leak or pituitary apoplexy. Surgery may be indicated for resistance to dopamine agonists and/or severe associated clinical symptoms, but also has associated risks.



Patient 1 Giant Prolactinoma



Patient 2 Giant Prolactinoma

Patient 1 Prolactin Levels

Time Elapsed From Presentation	Prolactin Level (ng/mL)	Cabergoline Dose (mg)	Changes Made
98 days	6,747.3	0.5 twice weekly	
64 days	6,867.6	0.5 twice weekly	
28 days	6,948	0.25 twice weekly	Increased Cabergoline to 0.5mg twice weekly
14 days	10,411.3	0.25 twice weekly	
5 days	9,836.8	0.25 twice weekly	
At Presentation (0 days)	11,264.5		Started Cabergoline 0.25mg twice weekly

Patient 2 Prolactin Levels

Time Elapsed from Presentation	Prolactin Level (ng/mL)	Cabergoline Dose (mg)	Changes Made
215 days	293.9	0.5 twice weekly	

167 days	647	0.5 twice weekly	
54 days	729	0.5 twice weekly	
18 days	1,377	0.5 twice weekly	Increased Cabergoline to 0.5mg twice weekly
5 days	2,771	0.25 twice weekly	
3 days	2,194	0.25 twice weekly	
At Presentation (0 days)	>3,259		Started Cabergoline 0.25mg twice weekly

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Abstract: 232

Neonatal Intensive Care Unit admissions from the newborn nursery before and after the adoption of the Baby Friendly Hospital Initiative

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Background The Baby Friendly Hospital Initiative (BFHI) is a global initiative of the World Health Organization developed in 1991 to promote and support successful breastfeeding. It has led to increased rates of exclusive breastfeeding and decreased rates of infectious diarrhea worldwide. Exclusive breast feeding in the US may increase risk for hypoglycemia, hyperbilirubinemia and dehydration requiring higher level of neonatal care.

Objective To determine if there was a change in admissions to the neonatal intensive care unit (NICU) from the newborn nursery after the adoption of BFHI in a large urban hospital.

Design/Methods This is a retrospective analysis of all neonates admitted to the NICU from the newborn nursery between 01/2007 to 12/2016. Demographics, clinical characteristics and primary diagnosis for admission were compared between those admitted before (01/07 to 12/11) and after (01/12 to 12/16) the initiation of BFHI.

Results A total of 20,124 infants were born and 3684 infants (18.3%) were admitted to NICU. There was no significant difference in the number of infants admitted from the newborn nursery as a % of total deliveries or % of total NICU admissions before and after the BFHI. There was no difference in number of infants admitted with a diagnosis of possible sepsis, hypoglycemia, neonatal abstinence syndrome (NAS) and hyperbilirubinemia between the two groups. However, significantly more infants required IV fluids for hypoglycemia after the initiation of BFHI. The age of admission was higher and the duration on NICU stay was shorter in infants admitted after the initiation of the BFHI.

Conclusion(s) The BFHI has not led to a significant change in the number of infants admitted to NICU from the newborn nursery or reasons for their admissions. However, since its adoption, there has been an increase in the use of IVF for treatment of hypoglycemia. We speculate that an increase in the use of IVF for hypoglycemia after introduction of BFHI is likely to be due to maternal preference of IVF over formula feeding. Change in the NICU guidelines for the management of possible sepsis and NAS may have impacted on the duration of hospitalization in infants born after BFHI.

NICU admissions from the newborn nursery.

	Before (n = 282)	After (n = 288)	p
Number of deliveries	10186	9938	
Number of NICU admissions	1822	1862	
% of deliveries	2.8	2.9	0.6
% of NICU admission	15.5	15.5	1.0

Comparison of neonates admitted to the ICN from newborn nursery before and after the BFHI.

	Before (n= 282)	After (n= 288)	p

Birth Weight in kg (mean±SD)	3.13 ± 0.49	3.15 ± 0.55	0.8
Gestational Age in weeks (mean±SD)	38.79 ± 1.49	38.68 ±1.67	0.4
Age of Admission in days (med, IQR)	1 (1-2)	2 (1-4)	<0.001
Possible sepsis (%)	76 (27)	87 (30)	0.4
Hypoglycemia (%) Required IVF	27 (10) 7	28 (10) 21	0.9 <0.001
NAS (%)	95 (33)	105 (36)	0.5
Respiratory Distress (%)	64 (23)	53 (18)	0.2
Hyperbillirubinemia (%)	4 (1.4)	4 (1.4)	1.0
Others (%)	16 (6)	11 (4)	0.3
Duration of NICU Stay in days (med, IQR)	8 (4-29)	6 (3-22)	0.006

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Abstract: 233

A study of the workplace environment for expressing breastmilk

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Background Maternal employment and insufficient maternity leave are major barriers to breastfeeding in the US.More than 1/2 of mothers in the US with infants are employed with 1/3 employed full-time.Currently, among 173 countries,the US is among the 4 with no national policy on paid maternity leave making workplace lactation support programs vital to successful breastfeeding
Objective To assess the workplace environment for expressing breast milk among mothers employed in a large urban hospital
Design/Methods Anonymous,self-administered,online questionnaires were employed.An email containing a brief description along with a link directing recipients to the survey was sent to all members of staff of the hospital.The inclusion criteria were women who had delivered a healthy baby in the 5 years preceding the survey
Results A total of 84 respondents had delivered a healthy baby in the 5 years preceding the survey period of February 2017 thus meeting the inclusion criteria.60 of these 84 respondents(71%) completed the survey and were included in the analysis.
97%(58/60) of respondents had ever expressed breast milk.78%(45/58) had ever expressed breast milk at work.Among those who did not express breast milk at work,92%(12/13) gave unavailability of a suitable space in the workplace as a reason.57% of respondents(32/58) said they had no lactation room available in the workplace.
Nearly 1/3 of respondents had used a patient care area(30.91%; 17/55) and a restroom(34.55%; 19/55) to express breast milk during lactation.91%(41/45) of respondents did not have a dedicated sink for cleaning breast pumps and 92%(42/45) did not have an appropriate refrigerator to store expressed breast milk in the workplace.
66%(38/58) of respondents were not provided any adjustment to their work schedule to make allowance for their need to express breast milk
Conclusion(s) This study demonstrated that there are still significant barriers for women who desire to pump breast milk in the hospital workplace with almost all of the women who did not express breast milk at the work place saying they were not able to do this because of a lack of a suitable space in which they could express milk.Even with a dedicated space,most women were not able to store breast milk in a refrigerator.
Hospitals could stand as models and pioneers of “the breastfeeding friendly”work environment but without significant policy changes this is unlikely to occur.Additionally,hospital staff who are able to pump breast milk in this environment could serve as a model for parents in the promotion of breast feeding.

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Abstract: 234

Improving Nutritional Support of Very Low Birth Weight Infants

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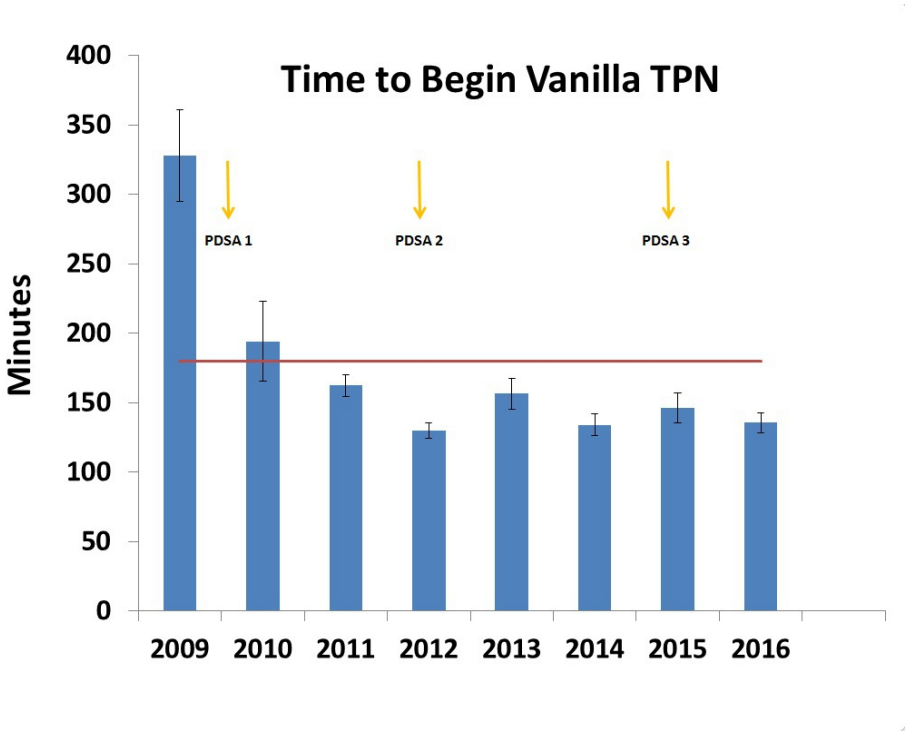
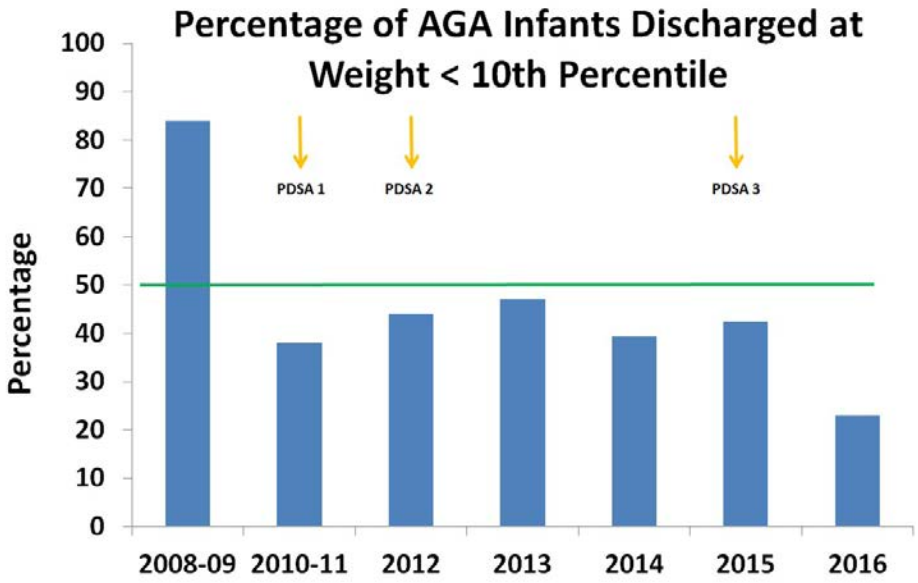
Background Extrauterine growth failure (EUGF) in VLBW infants is a result of factors such as prematurity, acute illness and sub-optimal nutritional support. Poor growth in the NICU is predictive of suboptimal growth and neuro-developmental outcomes following discharge. We found that 84% of appropriately grown VLBW infants at birth were discharged home at weights that were < 10^{th} percentile.
Objective This quality improvement project aimed to reduce the percentage of infants discharged with EUGF to less than 50% within 2 years and to maintain a low incidence of EUGF.

Design/Methods Setting: The Penn State Health Children's Hospital has a level IV NICU with 35% of annual admissions born at referring hospitals.

Methods: All inborn infants were eligible for the study. Infants with congenital anomalies were excluded. We determined key drivers for optimal nutrition and identified potentially better practices (process measures) based on a review of the literature, which included more rapid initiation of starter TPN, aggressive use and advancement of regular TPN, initiation of enteral milk feedings within 2 days of birth, and fortification of milk when the volume of intake reached 80 mL/kg/day. Three PDSA cycles of change were achieved. Results Time to initiation of starter TPN was significantly reduced from 5.5 hours to under 3 2.5 hours. Regular TPN provided the goals for amino acids and lipids at increased frequency as well as advancement of these macronutrients to the maximums of 4 g/kg/day of amino acids and 3 g/kg/day of lipids after the first 2 PDSA cycles. The proportion of infants whose milk was fortified at 80 mL/kg day increased after the 3rd PDSA cycle. We found a sustained decrease in the percentage of infants discharged with EUGF from 84% at baseline to fewer than 50% beginning in 2010-11 through 2016, with 23.1% of infants experiencing EUGF in 2016. Conclusion(s) We have achieved improved nutritional support of VLBW infants using the model for improvement with changes in practice based on evidence-based medicine.



TIME TO BEGIN VANILLA TPN



Percentage of AGA Infants Discharged at Weight < 10th Percentile

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Abstract: 235

Reducing Non-Infectious Central Line Complications in a Neonatal Intensive Care Unit (NICU)

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Background Non-infectious central line (CL) complications remain of concern with CL use increasing. Line malpositioning may occur in 13-30% of cases and higher rates are seen with umbilical catheters (UC). Our unit had 22 total non-infectious complications in 2015 and 21 in 2016, mostly due to malpositioning. In December 2016, the NICU CL Surveillance Team began standardized CL documentation to accurately determine our complication rate due to concern for underreporting. In January 2017, there were 6 non-infectious complications (49.6 line complication rate per 1000 line days) so additional areas for improvement were identified.
Objective We aimed to reduce non-infectious CL complications, defined as CL malpositioning, thrombosis, phlebitis, and other cause, to less than 2 complications per month (16.5 line complication rate/1000 line days) by December 2017.
Design/Methods The key drivers of change were reduction of CL days, compliance with optimal CL use guidelines, and promotion of staff awareness. CL use guidelines were implemented to minimize unnecessary CL use (PDSA 1) and documentation was standardized to accurately identify our complication rate (PDSA 2). UC malpositioning was our most common complication, so daily surveillance x-rays were performed to verify UC position (PDSA 3). CL securement with dressing change simulation was performed with staff (PDSA 4). Our primary outcome was number of non-infectious CL complications per month and per 1000 CL days. Compliance of daily surveillance x-rays for UC and staff attendance at dressing simulation were tracked as process measures.
Results CL malpositioning is the most common complication (76.5%) (Table 1). An increase in CL complications was noted following PDSA 2 likely from improved reporting. Figure 1 shows the non-infectious complication rate per 1000 CL days from January 2016 to November 2017 with the highest rates in March 2016 (36.6) and January 2017 (49.6). Compliance for daily surveillance imaging for UC.
Conclusion(s) There was a reduction in CL complication rates despite an increase in total CL days. While surveillance imaging compliance was mostly at goal, UC malposition continues to be a problem. A new UC securing device is currently being trialed. A real-time analysis form is now completed immediately following a complication to identify other areas of improvement.

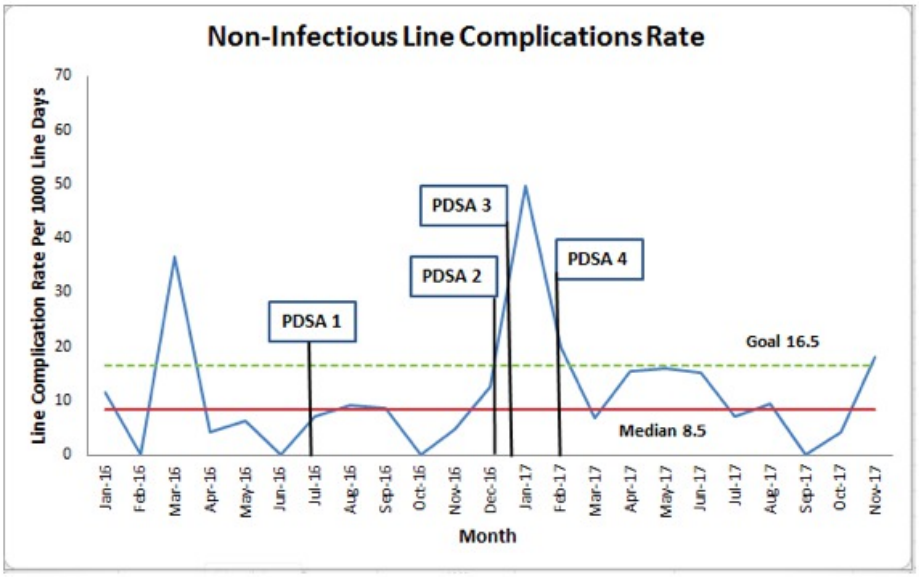

Figure 1

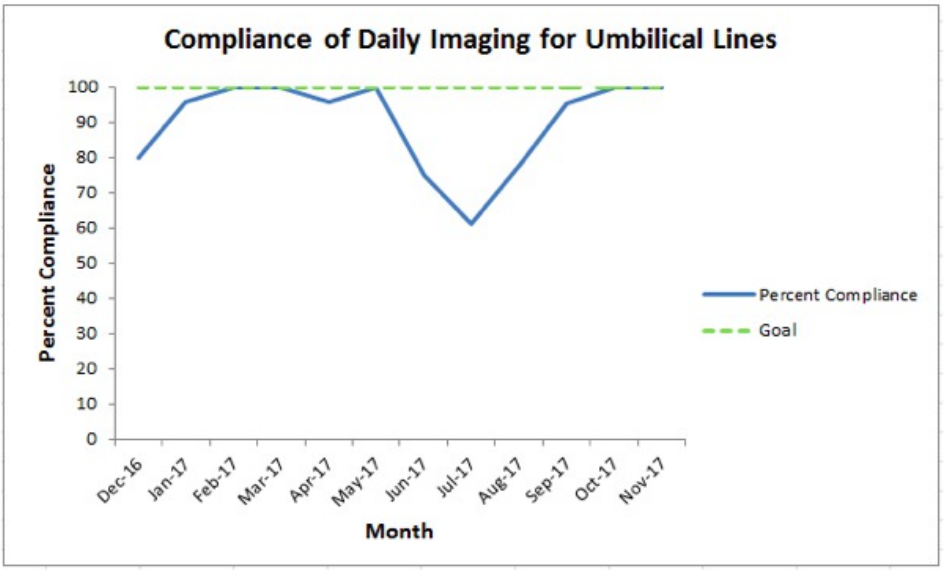

Figure 2

Table 1. Monthly Non-Infectious Line Complications

Month	Central Line Days	Total Number of Non-infectious Complications	Line Malpositioning	Thr ombosis	Phlebitis	Other Causes
January 2016	175	2	2	0	0	0
February 2016	159	0	0	0	0	0
March 2016	164	6	6	0	0	0
April 2016	243	1	1	0	0	0
May 2016	322	2	2	0	0	0

June 2016	232	0	0	0	0	0
July 2016	140	1	0	1	0	0
August 2016	220	2	1	0	0	1
September 2016	234	2	2	0	0	0
October 2016	252	0	0	0	0	0
November 2016	213	1	1	0	0	0
December 2016	238	3	3	0	0	0
January 2017	121	6	3	2	1	0
February 2017	250	5	4	0	0	1
March 2017	145	1	0	1	0	0
April 2017	258	4	3	1	0	0
May 2017	249	4	3	0	1	0
June 2017	132	2	2	0	0	0
July 2017	140	1	1	0	0	0
August 2017	212	2	1	0	1	0
September 2017	306	0	0	0	0	0
October 2017	242	1	1	0	0	0
November 2017	221	4	3	0	0	1
Total		51	39	5	3	3

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Abstract: 236

Futility & Neonates: How does one define when too much is too much?

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Background While there is agreement that physicians are not obligated to provide futile care, there is a vigorous debate and little agreement on the definition of futile care, especially as applied to the neonatal population. Studies in adult medicine demonstrate different opinions of the definition of futility between providers at different levels of training, but to our knowledge, no such study exists for the neonatal population.

Objective 1. To assess if differences exist amongst neonatal healthcare professionals regarding their definition of futility in the neonatal intensive care unit (NICU). 2. To assess providers' reasons for defining an infant as receiving futile care and if differences between providers at differing levels of training exist.

Design/Methods This is a 2-phase study. 1. NICU healthcare professionals (attendings, fellows, residents, neonatal nurse practioners [NNP], nurses) completed a questionnaire to assess their definition of futility. Participants were asked: "in your own words, how do

you define futility in the NICU?" 2. Focused discussions were conducted with the provider groups to further expand on the definitions of futility. Responses were qualitatively analyzed by two independent members of the research team and grouped into similar themes. Qualitative thematic analysis assessed similarities and differences between provider groups.
Results 165 participants completed questionnaires: 89 (53.9%) NICU nurses, 18 (10.9%) NNPs, 34 (20.6%) pediatric residents, 8 (4.8%) neonatal fellows, and 16 (9.7%) attending neonatologists. The majority of participants self-identified as female (91.5%), Caucasian (86.1 %), and were 20-40 years old (55.8%).

Responses were grouped into 13 independent categories (table 1). Attending neonatologists (50%), fellows (63%) and residents (38%) most frequently provided definitions that included the terms "meaningful life" or "quality of life". In contrast, the neonatal nurses most often provided definitions pertaining to the inability of treatment to prolong life (31%). Unlike members with "decision making" roles (attendings, NNPs, fellows, and residents), nurses also provided definitions related to unnecessary testing, cost of treatment, or conflicts between family or team members.
Conclusion(s) Neonatal providers have significant variability in their definitions of futility and reasons for identifying a treatment as futile. Further research is needed to assess these differences amongst neonatal providers and to evaluate ways to promote unity of the team caring for neonates.

Futility and Neonates
Results – Phase 1

Categories of Definitions	Total Number of Responses
Treatment will not prevent death/prolong life	57 (34.5%)
Treatment does not lead to meaningful life / QOL	50 (30.3%)
Treatment will not change pt's "outcome"	43 (26.1%)
Treatment leads to pain / suffering	21 (12.7%)
Provides specific examples of pts/circumstances	15 (9.1%)
Treatment provides no benefit	14 (8.5%)
Treatment is not working / ineffective	10 (6.1%)
Unnecessary testing	6 (3.6%)
Cost / resources	6 (3.6%)
Not sure	5 (3.0)
Involves parents decision or wish	3 (1.8%)
Conflict b/w medical team and family	2 (1.2%)
Other – does not fit into any other category	14 (8.5%)

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Abstract: 237
Awareness of Type 2 Diabetes Mellitus Among Youth in an Urban Multiethnic Community
Marcela Astudillo[1], Patricia Burris-Warmoth[1], Leah I. Akinseye[1], Freddy Solano[1], Adriana Perez[1], Susana Rapaport[1], Dakshayani Guttal[2], Lily Lew[1]
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Background Prevalence of diabetes mellitus (DM), both type 1 (T1DM) and type 2 (T2DM), is increasing. Based on a 2012 analysis T1DM will triple and T2DM will quadruple by 2050. T2DM occurs in youth most often during the second decade of life. Being overweight (BMI 85–94%ile) or obese (BMI ≥95%ile) and having a positive family history are risk factors for T2DM. Educating, screening and identifying overweight and obese youths at risk can delay or prevent development of T2DM. There are no studies of awareness of DM in youth in an urban multiethnic community.
Objective To assess knowledge about T2DM in youth in an urban multiethnic community.
Design/Methods A descriptive, cross sectional study was conducted among non-diabetic youth aged 12-21 years visiting Flushing Hospital Medical Center between August and November 2017. Participants were asked to complete a questionnaire in English or Spanish with demographic data, knowledge of T2DM, its symptoms, risk factors and method of diagnosis. Youths with known DM or not literate in English or Spanish were excluded. Data were analyzed using percentages.
Results Of 86 completed surveys, 92% were in English, 8% in Spanish, 54.7% female, median age 16 years [14.0; 17.7], 69.8%

Hispanic and 18.6% Asians. Median BMI was 83.7%ile [65.5; 96.9], 52.3% had healthy weight, 16.2% overweight and 31.3% obese. Reponses to questions of knowledge, symptoms, risk factors and method of diagnosis were tabulated as yes, no and unsure (Table 1). Participants were informed of DM through their doctor 54 (63.5%), school 43 (50.6%), family member 40 (47.1%) and social media 30 (35.5%). Only 14.2% overweight and 40.7% obese participants were referred to a nutritionist. Most obese (74%) and overweight (57.1%) were told about their risk of DM. More than half (58.1%) wanted additional information about DM and from their doctor (81.6%).
Conclusion(s) Majority of youth had adequate knowledge about DM being a condition of high blood sugar and its risk factors. Half knew most of the common symptoms and majority had misperception about the cause. Few overweight and obese youths had knowledge about hemoglobin A1c as a screening test. More obese than overweight youths were referred to a nutritionist. Healthcare providers need to continue educating youths on DM and make early referral to nutritionist especially for those at risk.

Table 1

Responses		Questions	
Yes (%)	No (%)	Unsure (%)	
84.8	15.2	none	DM is a condition of high blood sugar
85.9	3.5	10.6	DM is a serious condition
24.4	18.1	57	Dark skin on back of neck associated with DM
65.4	34.5	none	Increased thirst as a symptom
68.6	11.1	19.8	Parent(s) with DM as a risk factor
70.9	8.1	20.9	Being overweight or obese as a risk factor
75.6	15.1	9.3	Eating candy causes DM
52.3	15.1	32.6	Exercise decreases risk of DM
5.8	61.6	32.6	Knowledge about hemoglobin A1c

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Abstract: 238
Accuracy of the Finnegan Scoring Based on Nursing Experience
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Background Neonatal Abstinence Syndrome (NAS) often follows the abrupt discontinuation of drugs at time of delivery. The Modified Finnegan Scoring System (MFSS), commonly used to assess infants with NAS, quantifies the severity of the symptoms and guides treatment. Previous studies showed that the FSS has a high inter-observer reliability of 0.996 and has convergent validity.
Objective To determine MFSS inter-rater reliability among NICU nurses and examine the impact of nursing experience.
Design/Methods A standardized video of infant exhibiting withdrawal symptoms (MFSS score=13) was shown to NICU nurses who were then surveyed anonymously to provide a MFSS score. Information on nursing experience obtained by collecting data on years of nursing experience, education level, and experience with infants being monitored for and treated for NAS. The questionnaire also addressed experience with MFSS, training in the use of MFSS, and time since last training. We defined less-experienced as $\leq$ 5-year experience as a nurse and more experienced as experience of > 5 years. The differences in the MFSS and the impact of experience were analyzed using one-way ANOVA.
Results The study group comprised of 56 nurses, 17 (30%) primarily on day shift, 47 (84%) working both weekend and weekday, and 1(1%) working weekend only. There were 48 (86%) experienced and 8 (14%) less experienced nurses. MFSS scores ranged from 4 to 19, with no differences between the two groups (10.8+/- 2.1 vs 9.6+/-3.6, p = 0.33). However, there was a trend with the less experienced nurses scoring closer to the score in the video (21 vs 30 % discrepancy, p = 0.18). There was no difference in inter-observer reliability among pediatric nurses (p =0.127) and NICU nurses (p =0.201) based on years of experience. There was also no difference in the scoring accuracy based on the primary shift worked (p = 0.878) or working weekday vs weekend (p = 0.359). There was no statistical difference in the MFSS based on age of the nurses (p = 0.801), education level (p = 0.687), or recent MFSS training (n = 37; 95% CI: 8.721, 10.738) versus no training (n = 19; 95% CI: 8.434, 11.250, p = 0.897).
Conclusion(s) Years of nursing experience did not alter the accuracy and reliability of MFSS. However, there was a trend for less experienced nurses to be more accurate with the scoring, possibly reflecting more recent training experience.
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Abstract: 239
Use of a Novel Protein Multiplex Assay to Analyze Cytokine Concentrations in Tracheal Aspirates from BPD Patients

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Background Bronchopulmonary dysplasia (BPD) is a leading cause of morbidity and mortality for preterm infants worldwide and is characterized by blunted alveolarization and dysmorphic pulmonary vasculature. Unfortunately, physicians cannot predict which premature infants will develop BPD, nor disease severity. Interestingly, mice that over-express GM-CSF, a cytokine with lung-specific importance, are resistant to hyperoxia-induced BPD. We hypothesized that a relative deficiency of GM-CSF may contribute to BPD, and that a novel multiplex immunoassay, ELLA, would be capable of measuring the low concentrations of cytokines found in tracheal aspirates (TA).
Objective To determine: 1) whether the ELLA microfluidic multiplex immunoassay system is capable of measuring the low concentrations of cytokines in TA; 2) whether an intrinsic property of TA, the TNFα:GM-CSF ratio, would be elevated in neonates with known severe BPD.
Design/Methods Tracheal aspirates (TA) were collected from intubated patients during their hospitalization in the Neonatal Intensive Care Unit (NICU) of Penn State Hershey Medical Center. Experimental subjects were classified as either severe BPD (based on the NIH consensus definition) or as controls (patients without BPD who were intubated for other reasons). TA samples were processed and total protein content was measured by BCA assay, and cytokines were measured using the ELLA immunoassay.
Results The protein concentrations of the 16 TA samples ranged from 0.7mg/L to 4.8mg/L (0.78 to 3.19 in BPD patients, 0.7 to 4.8 in control patients). ELLA was able to detect cytokines in all of the samples. Macrophage colony-stimulating factor (M-CSF) was the most abundant cytokine in all the samples, ranging from 98.0-18900pg/mL. The concentration coefficient of variance (CV) within each sample was very low, ranging from a low of 1.19% (IL-6) to a high of 7.83% (IL-10) (excluding IFNγ). The severe BPD group did not differ from control group with regard to each analyte, nor was there a difference in the TNFα:GM-CSF ratio.
Conclusion(s) The ELLA multiplex immunoassay system provided a fast, easy and reliable method for the analysis of tracheal aspirates. While we did not find any differences in the analytes of BPD and control patients, the ELLA system may provide an ideal means of clinical validation and translation into clinical use once better biomarker targets for BPD are established.

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Abstract: 240

Bottles at Bedtime: Prevalence of the Use of Milk/ Formula in the Bottle as a Sleep Aid in Toddlers Aged 13-35 months

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Background Baby bottle tooth decay, commonly known as “bottle rot”, has been estimated to affect nearly a quarter of all socioeconomically disadvantaged children. It most commonly occurs in the upper front teeth and is usually associated with frequent exposure to sugary drinks and bottle use at bedtime. However, many parents continue to use bottles past AAP recommended guidelines of 1 year of age and, even more damaging, many report using milk/formula in bottles (MIB) to help get their child to sleep. Therefore, it is imperative for pediatricians to be aware of the prevalence of MIB as a natural sleep aid as this can have a direct effect on oral health.
Objective
Design/Methods An anonymous online survey was distributed via Amazon MTurk to parents of children aged 13 to 35 months (n=239). Parents were asked demographic questions, the frequency with which they use MIB to put their child to sleep (Never, Seldom, Sometimes, Most Times), effectiveness of use (No, Moderately, Extremely) and whether side effects were observed (Yes/ No). Parents were then asked if they discussed the use of food/ drink as sleep aids with their child’s pediatrician (Yes/No).
Results Of 239 survey participants, 236 responded to all questions. The mean age of our sample was 23.1 months (SD= 6.7), with 80% of the participants identifying as White and 7.6% identifying as Black. Overall, 55% of all parent respondents stated that they had used MIB at some point as a sleep aid for their infant (8.5% Seldom, 23.3% Sometimes, 23.3% Most Times). Of these respondents, 90.4% stated that this intervention was effective, while only 8.9% indicated that their child experienced a side effect after using MIB. Of all parents who administer MIB, 54.6% reported that they did not discuss food/drink as sleep aids with their pediatrician.
Conclusion(s) Despite warnings issued by the AAP, the majority of parents report using MIB to help infants sleep after 1 year of age. Early childhood caries do not only affect baby teeth, but are also associated with loss of teeth needed to establish appropriate feeding habits, misaligned permanent teeth, and increased risk to adult dental caries. It is important for pediatricians to inform parents of the inherent health risks of using MIB as a sleep aid.

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Abstract: 241

Lack of Correlation of Human Contact With Improved Withdrawal Scores in Infants with Neonatal Abstinence Syndrome

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Background There has been a dramatic rise in incidence of admissions of infants with neonatal abstinence syndrome (NAS) nationally over the last decade. Volunteer cuddlers provide direct human contact to comfort infants, theoretically reducing need for

pharmacological treatment to reduce symptoms of NAS. The direct effects of cuddling on such symptoms have not been well-described.

Objective To determine the effectiveness of volunteer cuddling and human contact in reducing NAS symptoms, determined by decrease in Finnegan scores during cuddling.

Design/Methods We expanded use of volunteer cuddlers through implementation of a nocturnal cuddling program, increasing the total number of hours of cuddling substantially. Comparative data 3 months pre-and 8 months post- program implementation was collected from all infants discharged from the NICU. Inclusion criteria for patients included admission to the NICU to receive morphine treatment. Data collection included composition of daily feeds that received breastmilk, morphine dosing and timing, total hours of volunteer cuddling per 8 hours, determination of parental presence per 8 hours, and all Finnegan Scores through the course of patients' NICU LOS. Data collection was organized in 8-hour block shifts of 00:01-08:00, 08:01-16:00, and 16:01-00:00. We performed descriptive analyses and logistic regression analyses.

Results After initiating our nocturnal cuddling program, infants with NAS admitted to the NICU for morphine treatment had a statisitically significant increase in hours of exposure to cuddlers during their NICU admissions. They also had an increase in total human contact, increase in percent of feeds of breastmilk rather than formula, and an average shorter length of stay of more than 3 days, but none of these findings were statistically significant. (Table 1) Human contact did not result in a statistically significant temporal decrease in Finnegan scores. (Figure 1).

Conclusion(s) In our study, human contact did not result in a temporal decrease in Finnegan scores. It is possible that human contact does have an effect on infant comfort that is not reflected in the Finnegan scoring tool, or that effects are delayed. Further analysis of our data with a larger data set may allow further insight into the relationship between effect of human contact on infants with NAS. Further analysis of our data will look at types of human contact (i.e. holding versus sitting at the bedside without holding) to determine if these variables influence outcomes.

Figure 1. Lack of Correlation of Human Contact with Decrease in Finnegan Scores

	OR	95 % Confidence Interval	
Human Contact vs. no human contact	1.032	1.046	1.468
Breastmilk vs. no breastmilk	1.135	0.852	1.153
No morphine vs. maintaining dose	1.135	0.797	1.616
Increasing morphine vs. maintaining dose	0.343	0.193	0.611
Decreasing morphine vs. maintaining dose	1.53	1.146	2.044

Table 1. Characteristics of Study Cohort

	Baseline (N=21)	Post Implementation (N=26)	P
Girl, N. (%)	12 (57.1)	17 (65.4)	0.5732
Race, N. (%)			
White	18 (85.7)	23 (88.5)	NS
African American	1 (4.8)	0 (0)	NS
Hispanic	1 (4.8)	2 (7.7)	NS
Other	1 (4.8)	1 (3.8)	NS
Birth weight, g[a]	38.1 ± 509.3	3101 ± 662.5	0.2604
Gestational Age, week[a]	38.1 ± 2.1	38.4 ± 2.0	0.6353
Eligible to receive breast milk, N. (%)	12 (57.1)	12 (46.2)	NS
Outcomes			

NICU Length of Stay, days[a]	25.6 ± 13.5	22.1 ± 8.9	0.2852
Parent presence %	38.16 ± 24.76	43.25 ± 24.17	0.2816
Volunteer cuddle presence, % time during NICU hospitalization	22.25 ± 11.78	34.6 ± 13.38	0.0021
Non-clinical human contact, % time during NICU hospitalization	51.77 ± 21.22	62.40 ± 17.48	0.0660
NICU feeds receiving breastmilk, %[b]	22.71 ± 37.88	31.99 ± 42.66	0.4400
Days receiving morphine, d[a]	20.43 ± 14.22	16.77 ± 8.1	0.3017

a. Mean ± SD, b. Eligible to receive maternal breastmilk * NS is not significant due to low total N

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Abstract: 242

Neurodevelopmental Outcomes in Preterm Infants

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Background The incidence of preterm birth ranges from 5% to 18% worldwide, and complications from prematurity are the leading cause of death in children less than five. The death rate for neonates has declined over time, and now that survival has improved it is crucial to examine long-term outcomes, especially neurodevelopmental impairments in this population.

Objective To examine the neurodevelopmental outcomes of preterm infants born at ≤ 32 weeks gestation, and to look for associations with other risk factors such as chronic lung disease, retinopathy of prematurity (ROP), sepsis, or intraventricular hemorrhage (IVH).

Design/Methods We performed a retrospective chart review of preterm infants ≤ 32 weeks who were admitted to NYU Langone Medical Center or Bellevue Hospital NICU from January 2013 to December 2016. After discharge, infants were followed up in the NYU neurodevelopmental follow up clinic at 6 and 12 months corrected age. Data collected included maternal demographics, infant hospital course, and results from developmental assessments performed using Bayley Scales of Infant and Toddler Development III. Patients were grouped based on gestational age (extremely preterm (EPT) <28 weeks and very preterm (VPT) 28 weeks to 32 6/7 weeks). Chi-square and t-tests were used to compare the groups.

Results 104 (EPT = 33 and VPT = 71) infants who were born at ≤ 32 weeks were included in the study, with 18% of infants being lost to follow up. No differences were seen in maternal demographics between the EPT and VPT groups. When examining cognitive, language, and motor development scores for all patients they fell within normal range, within 1 SD of the mean, and no significant trend was seen by gestational age. However, half of the 23-week patients did not have quantitative Bayley data due to inability to complete the assessment, but had qualitative data instead. In the EPT group, gross motor scores were significantly lower in patients with ROP requiring intervention (p=0.01), those requiring sepsis treatment (p= 0.02), and those with grade 3 to 4 IVH (p= 0.02). Expressive language scores were also significantly lower in patients treated for sepsis (p <0.01) in the EPT group. The VPT group showed no associations in developmental scores with other comorbidities.

Conclusion(s) No correlation was seen between gestational age and developmental outcomes at 12 months corrected age, most likely due to small sample size and early timing of follow up. More delays may be apparent at 24 months corrected age. Factors associated with worse outcomes include ROP, sepsis, and IVH.

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Abstract: 243

Bee is for Botulism: Reported Frequency of Honey as a Sleep Aid in Infants Aged 0-11 Months

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Background For parents, poor infant sleep patterns can be a major concern, prompting some parents to pursue alternative ways to help their children sleep. Many non-medical resources recommend warm milk with honey to help adults sleep; however, this “old wives tale” presents a unique danger to infants. Honey, a potential source of spores that cause Infant Botulism, is not recommended by the American Academy of Pediatrics (AAP) for children under the age of 1 year. According to the Centers for Disease Control (CDC), in 2015, 141 cases of Infant Botulism were reported in patients with a median age of 2.7 months, almost doubling from the 2010 statistic of only 85 cases. Despite warnings, the incidence of purposeful honey ingestion is unclear for children under the age of 1 year.

Objective

Design/Methods An anonymous online survey was distributed via Amazon MTurk to parents of children aged 0-11 months (n=384).

Parents were asked demographic questions, frequency with which they use honey as a sleep aid for their infant (Never, Seldom, Sometimes, Most Times), effectiveness of use (No, Moderately, Extremely), and whether side effects were observed (Yes/ No). Parents were then asked if they discussed the use of food/ drink as sleep aids with their child's pediatrician (Yes/ No

Results Of 384 survey participants, 376 responded to all questions. The mean age of our sample was 6.4 months (SD = 2.8), with 80% of the participants identifying as White and 10% identifying as Black. Overall, 15% of all parent respondents stated that they had used honey at some point as a sleep aid for their infant (7% Seldom, 7% Sometimes, 1% Most Times). Of those who stated they used honey, 80.4% found this intervention to be effective and 11% indicated that their child experienced a side effect after use. Overall, 64% of parents stated that they did not discuss food/drink as sleep aids with their pediatrician. Notably, of the parents that indicated they used honey as an infant sleep aid, 51.8% reported that they did not discuss it with their pediatrician.

Conclusion(s) Despite warnings issued by the AAP, there is an alarming increase in Infant Botulism rates across the country, and a concerning number of parents continue to use honey as a sleep aid for infants aged 0-1 year. Given the young median age of Infant Botulism, and severity of this condition, pediatricians must stress AAP recommendations regarding the use of honey under the age of 12 months at early well-child visits.

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Abstract: 244

Prevalence of Potential Dangers and Abnormal Gait Patterns Observed During Baby Walker Usage

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Background An estimated 8800 children, <15 months, were treated in US emergency rooms for baby walker (BW) related injuries. In addition, the AAP states that BWs can delay motor development. Possible reasons for motor delays could be abnormal gait patterns (AGP) that are promoted by BW usage. To date, little research has been done on AGP of infants in BWs and the prevalence of physical obstacles (pets, furniture, etc.) and dangers (stairs, burns, drowning, etc.) that infants in BWs face. To this end, this study examines gait patterns of babies in BWs in public videos (PV), and quantifies obstacles/dangers observed.

Objective To identify demographics of BW users voluntarily posting PV on YouTube, evaluate these for obstacles/dangers during BW usage, and document gait patterns of infants in BWs.

Design/Methods A researcher analyzed 107 PV (total of 4,573,538 public views), searching keywords like "baby walker." Information recorded included: characteristics of BWs; demographics of infant subjects (baby age in video identified/not identified, estimated race, sex); video likes/dislikes and number of views; BW movement (heel/toe walking, pronated foot walking, standing on toes, standing flat feet (FF), jumping on toes, jumping FF); infant body angle relative to BW (45, 75, 90, 100 degrees); infant neck control (poor, moderate, good); the characteristics of action in BW; obstacles/dangers; reaching for previously inaccessible objects.

Results Overall, 91% of PV showed babies in BWs with AGP, and 28% of babies had poor neck control. Infant subjects were 52% male; 57% White, 3% Black, 12% Asian, and 17% White-Hispanic (Figure 1.A). The mean identified and non-identified ages in infants were 6.7 months and 4-8 months, respectively (Figure 1.B/C). It was found that 92 BWs were roll bar bottom and 13 were station-walkers. The majority of PV (72%) displayed the infant walking on toes, while 65/107 (61%) exhibited toe-standing (Figure 2.A). The most frequent filmed body angle (84%) of the infant in BWs was 45 degrees (Figure 2.B). While 74/107 (69%) PV exhibited at least one obstacle present (Figure 2.C), 14% of caregivers filmed infants using BWs in direct life-threatening situations (Figure 2.D).

Conclusion(s) The overwhelming majority of BW videos observed showed AGP. This reinforces the AAP's warnings of the potential adverse consequences of BW usage on infant motor development. In addition, significant obstacles/dangers were noted in many of the PV. Clinicians must take an active role in advising parents not to purchase or use BWs.

Figure 1

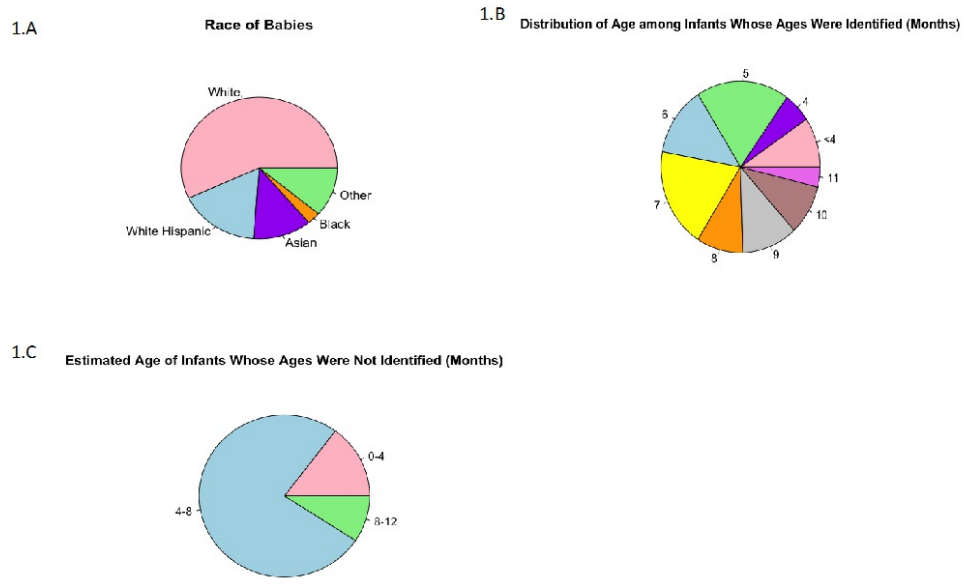

Figure 1. Demographics of infant subjects.

Figure 2

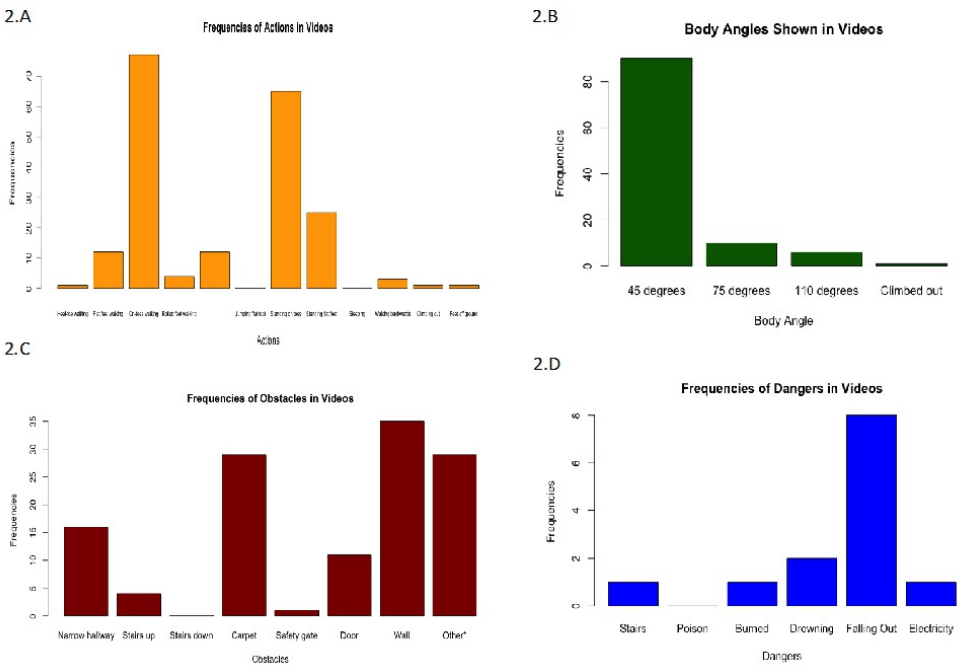

Figure 2. Body angles shown and frequencies of actions, obstacles, and dangers in public videos (PV).

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Abstract: 245

Difference in Modified Finnegan Scoring seen in Different Types of Hospitals

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Background Neonatal Abstinence Syndrome (NAS) is a result of the abrupt discontinuation of neonate's exposure to drugs that were used by the mother during pregnancy. NAS is a multisystem disorder which affects the central nervous system as well the autonomic

nervous system, and the gastrointestinal tract. There are multiple scoring systems used to assess infants with NAS, however, Modified Finnegan Scoring System (MFSS) is most commonly used. This scale quantifies the severity of the withdrawal symptoms and provides guidance regarding pharmacologic treatment. MFSS has a high inter-observer reliability and convergent validity, however, may be somewhat subjective.
Objective To determine whether there is a difference in the scoring of NAS using MFSS among nurses working in a suburban academic center versus an "inner-city" academic center level III NICU.

Design/Methods The nurses staffing two Level III NICUs were shown a standardized video with an infant exhibiting withdrawal symptoms and a MFFS of 13, and asked anonymously to provide an MFSS score. This was followed by answering a questionnaire to assess years of nursing experience, as well as experience with MFSS, with infants being monitored and treated for NAS, training in the use of MFSS, and time since most recent training. Nurses scores using MFSS of the neonate on a video and the accuracy compared to the standardized video baby, were compared between the two hospitals. Analysis was performed using ANOVAs, Independent T Test and Mann Whitney U test for continuous variables and Chi Square and Kruskall Wallis Test for categorical variables.
Results A total of 56 nurses consented to participate in the study, with 25 (45%) were at NICU 1 (inner city location) and 31 nurses (55%) were at NICU 2 (suburban location). The scores ranged from 5 to 14 at NICU 1 and from 4 to 19 at NICU 2. There was a trend towards higher mean in NICU 2, (NICU mean = 9.08; SD = 2.499and NICU 2 mean = 10.323; SD = 3.341; p = 0.13). There was no difference in the accuracy of scoring using MFSS between the two NICU's (p = 0.37).
Conclusion(s) The NAS scores given by nurses in the inner-city and the suburban NICU using MFSS were not statistically significant.
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Abstract: 246
Prevalence of Use and Reported Parental Perceived Efficacy and Side Effects of Herbal Sleep Supplements in Children Aged 0 to 5 Years
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Background As the use of herbal sleep supplements (HSS) increases in popularity, many parents may explore these advertised "natural and easy" ways to help their infant/child sleep. While there is some evidence in adult literature that HSS such as melatonin, lavender and chamomile may improve sleep duration and shorten sleep latency, their efficacy and safety are relatively unstudied in children. It is unknown to what extent parents use HSS to improve their child's sleep and their perceptions of the safety/side effects of these unproven sleep interventions.
Objective To determine the frequency of HSS use in children aged 0-5 years, assess parent-reported efficacy/ adverse effects and whether HSS was discussed with clinicians.
Design/Methods An anonymous online survey was distributed to parents of children ages 0-5 years via Amazon M-Turk. Parents were asked demographic questions, the frequency of use of common HSS (Table 1), effectiveness of HSS amongst those that used the given HSS (Table 2), incidence of side effect of HSS if used (Table 2), and perceived FDA-approval of HSS. Participants were then asked whether HSS was discussed with their clinician. Results were analyzed across age categories (AC).
Results Overall, 903 parents completed the survey (0-6 Months n=236; 7-11 Months n=127; 1-2 years n=223; 3-5 years n=258; White 82.8%, Black 8.3%, Asian 4.6%) Over 30% of all parents across all AC stated that they had used an HSS for their child, with 10% stating they had used two or more. Table 1 shows parental self-reported use of HSS for their child by AC and for specific HSS. Table 2 shows parental self-reported efficacy and observed adverse effects in commonly-used HSS across AC. Of those that used HSS, 33.7% mistakenly believed it to be FDA-approved. Only 19% of parents stated that they had discussed HSS with their clinician.
Conclusion(s) Shockingly, over a third of all parents in the present study, across all AC, reported giving their infant/child at least one HSS. While parents of infants and young children using HSS reported varying degrees of reported efficacy and incidence of side effects, only 19% stated they discussed HHS with their clinician. Clinicians should be aware of the widespread frequency of use of HSS and the side effects associated with use in order to provide the necessary guidance for parents seeking "natural" solutions to facilitate sleep.

Table 1: Parental Self-Reported Use of Natural Sleep Aids

	0-6 Months n=236		7-12 Months n=127		13 Months-2 Years n=223		3-5 Years n=258	
	n	(%)	n	(%)	n	(%)	n	(%)
Any Sleep Aid	85	(36)	45	(35.4)	83	(37.2)	115	(44.6)
2 or More Sleep Aids	35	(14.8)	13	(10.2)	22	(9.9)	47	(18.2)
Lavender	66	(28.0)	30	(23.6)	62	(27.8)	88	(34.1)
Chamomile	33	(14.0)	13	(10.2)	18	(8.1)	38	(14.7)
Melatonin	24	(10.2)	17	(13.4)	22	(9.9)	48	(18.6)
Other	34	(14.4)	24	(18.9)	17	(7.6)	50	(19.4)

Table 1: Parental Self-Reported Use of Natural Sleep Aids

Table 2: Reported Efficacy and Observed Adverse Effects in Commonly-Used Natural Sleep Aids						
	Reported Efficacy Amongst Users			Observed AEs		
	0-12 Months	13 Months-2 Years	3-5 Years	0-12 Months	13 Months-2 Years	3-5 Years
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Lavender	70 (76.1)	24 (53.3)	64 (50)	15 (16.3)	5 (13.9)	11 (9.2)
Chamomile	37 (82.2)	7 (21.2)	33 (35.5)	11 (25)	3 (12)	10 (12.3)
Melatonin	37 (92.5)	11 (28.2)	44 (40.7)	7 (17.5)	7 (21.9)	11 (11.6)

Table 2: Reported Efficacy and Observed Adverse Effects in Commonly-Used Natural Sleep Aids

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Abstract: 247

Rotavirus Vaccination of Neonatal Intensive Care (NICU) Infants During Hospitalization is Not Associated with Increased Adverse Events Compared to Historical Controls

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Background Rotavirus disease is a common source of morbidity. Preterm infants may be at increased risk of rotaviral disease. Oral reassortant vaccination (RV5) is recommended in the NICU only at discharge due to concern for viral shedding. This recommendation has precluded understanding of the tolerance of RV5 in hospitalized preterm infants at chronologic age eligibility, which is not well characterized.

Objective To compare the rate of adverse events after routine RV5 administration to hospitalized premature NICU infants to baseline symptoms in historically-matched controls.

Design/Methods Retrospective cohort study from Aug. 2015-Nov. 2017 of infants cared for in a Level IV NICU and immunized with RV5 were evaluated for changes in feeding, stooling pattern, sepsis evaluations, fever, emesis, and apneic & bradycardic events 7 days before & after immunization. RV5 was administered during hospitalization between days 42-104 of life. These events were compared to the 7 days before and after the same day of life in historical controls matched for gestational age, weight, and gender. Wilcoxon Signed Rank Test and T-test were used for analysis.

Results 100 Infants (50 immunized, 50 controls) were analyzed. Neonates receiving RV5 did not differ from controls in mean birthweight or gestational age. Mean day of RV5 administration was 63 days of life.

Within 1 day of RV5 vaccination, individual infants experienced an increased number of apneic events compared to prior to vaccination (p=0.03). This difference was not seen within 2-7 days. Infants also experienced an increased number of bradycardia events and stools per day within 7 days of RV5 vaccination (p= 0.02 and 0.003 respectively) compared to the same infant pre-vaccination. These differences were not seen within 1-3 days of vaccination. No differences in apneic and bradycardic events with stimulation, percentage of loose stools, or increased number of episodes of emesis were observed after RV5 vaccination compared to the same infants prior to vaccination.

No differences were seen when comparing apneic and bradycardic events, total stools, and percentage of loose stools compared to controls. Control infants exhibited more emesis with 2 and 7 days compare to immunized infants (p=0.04 and 0.03 respectively).

Conclusion(s) When administered routinely during NICU hospitalization at standard chronologic age, RV5 is not associated with an increase in adverse events compared to historically age-matched controls.

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Abstract: 248

Identifying Barriers to School Enrollment in Recently Arrived Middle Eastern Refugee Children In North Philadelphia

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Background Over half of the world's approximately 21 million refugee population is comprised of children under the age of 18. Although the UNHCR views education as a fundamental human right and article 22 of the Geneva convention requires states to provide equal educational opportunities for refugees, the majority of refugee children often do not receive adequate education prior to arriving to the United States.

Refugees face multiple barriers to education prior to and on arrival to the host country. Most existing studies have grouped immigrant and refugee populations. In reality, the needs of refugees may differ from those of immigrants. Further, few studies in the US have focused on children of Middle Eastern origin.

Objective The objectives were to evaluate time to enrollment, and to identify barriers and facilitators to school enrollment

Design/Methods Prospective, qualitative study conducted at the Einstein Pediatric Refugee Clinic in North Philadelphia. Interviews using a 7 question survey were conducted for recently arrived refugees from several countries ages 4-18 years. .

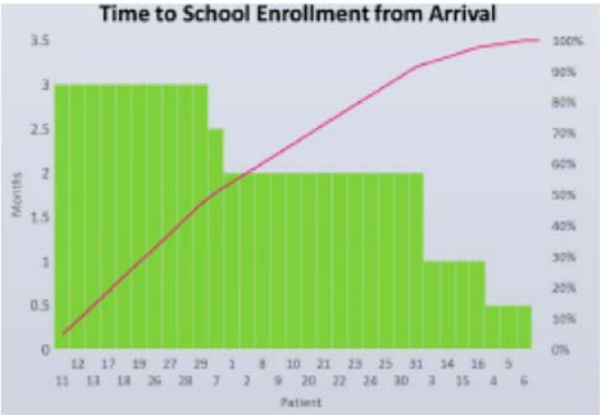
Results Of 31 patients, 74.2 % Syrian, 19.4 % Afghan, 6.5 % Sudanese. 58 % missed some schooling prior to arrival. English proficiency was low. Parental education: 57 % middle school, 17 % high school, 25 % ≥ 1 year college. Time to enrollment: ≤ 1 month

in 22.6 %, 2 -2.5 months in 45.2 %, and 3 months in 32.3 %. Bullying, poor ESL services, and transportation issues reported in 8 patients.
Main facilitator was community support. Parental education level was not a facilitator.
Barriers included medical exam/vaccine timing, job/housing search, complex registration process, language, and low quality neighborhood schools.
Conclusion(s) Education can restore a sense of normalcy and emotional healing in refugee children. Our refugee parents are motivated to provide their children with quality education, but have reported several barriers to timely school enrollment during the resettlement process. Understanding these barriers is key to facilitating the adjustment and promoting the wellbeing of these newly arrived refugee children, while empowering the parents to be advocates. Providing expedited physicals/vaccinations, helping families navigate the complex registration process, aiding in job/ housing search, and arranging strong community support through local resettlement agencies and volunteer groups helps facilitate school enrollment in the refugee pediatric population.

Barriers and Facilitators:

Barriers to School Enrollment	N: 31
Medical exam/vaccine timing	29 %
Job/housing search	13 %
Complex registration process	39 %
Language	77 %
Low quality neighborhood schools	23 %
Transportation	29 %

- In 68 %, community/refugee agency support facilitated enrollment.



Parent and Child characteristics

Parents		N:62
Mother level of Education	Middle school High school >1 yr college	31% 8% 11%
Father level of Education	Middle school High school >1 yr college	23% 13% 14%

Good English Fluency		11%
Child		N:31
Country of Origin	Syria Afghanistan Sudan	74% 19% 6%
Age	4-9yrs 10-13yrs 14-18yrs	45% 32% 23%
Previous Education	On target for age Missed <1yr Missed>1 yr	42% 26% 32%
Gender	Male Female	71% 29%
English fluency	None Some	0% 16%

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Abstract: 249

Structured Curriculum for Point of Care Ultrasound (POCUS) Training of Novice NICU Clinicians for Umbilical Line Placement/Confirmation.

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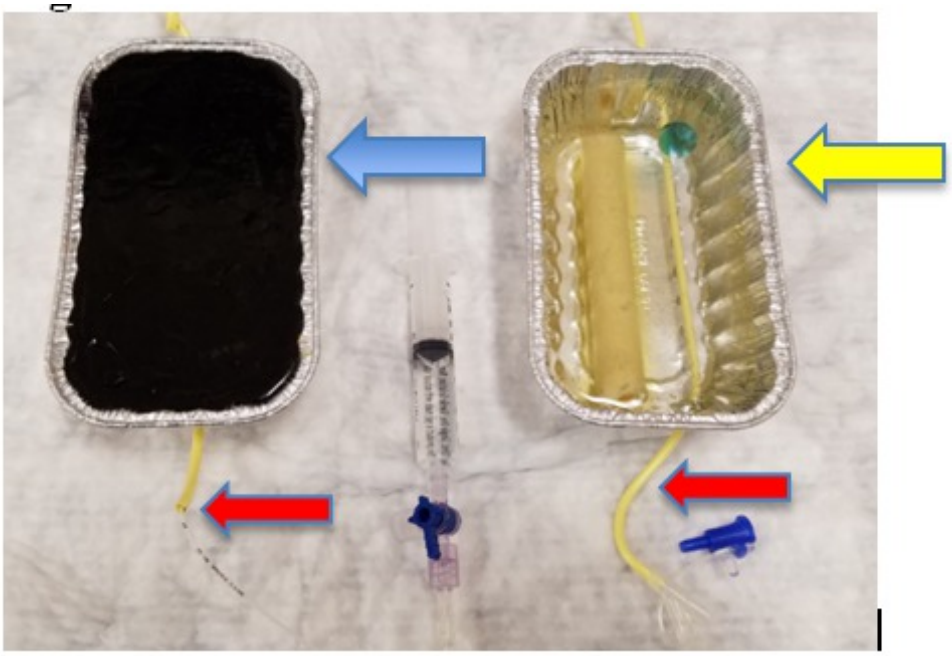
Background Although POCUS use effectively reduces the time required to place central lines and the number of xrays required to confirm placement, it is unknown how much training is required for the bedside clinician to competently employ this procedural tool. We hypothesized that novice NICU providers can learn to use POCUS for the placement of umbilical lines, but that procedural competence will be reached sooner with combined structured curriculum and hands-on instruction than with hands on instruction alone.

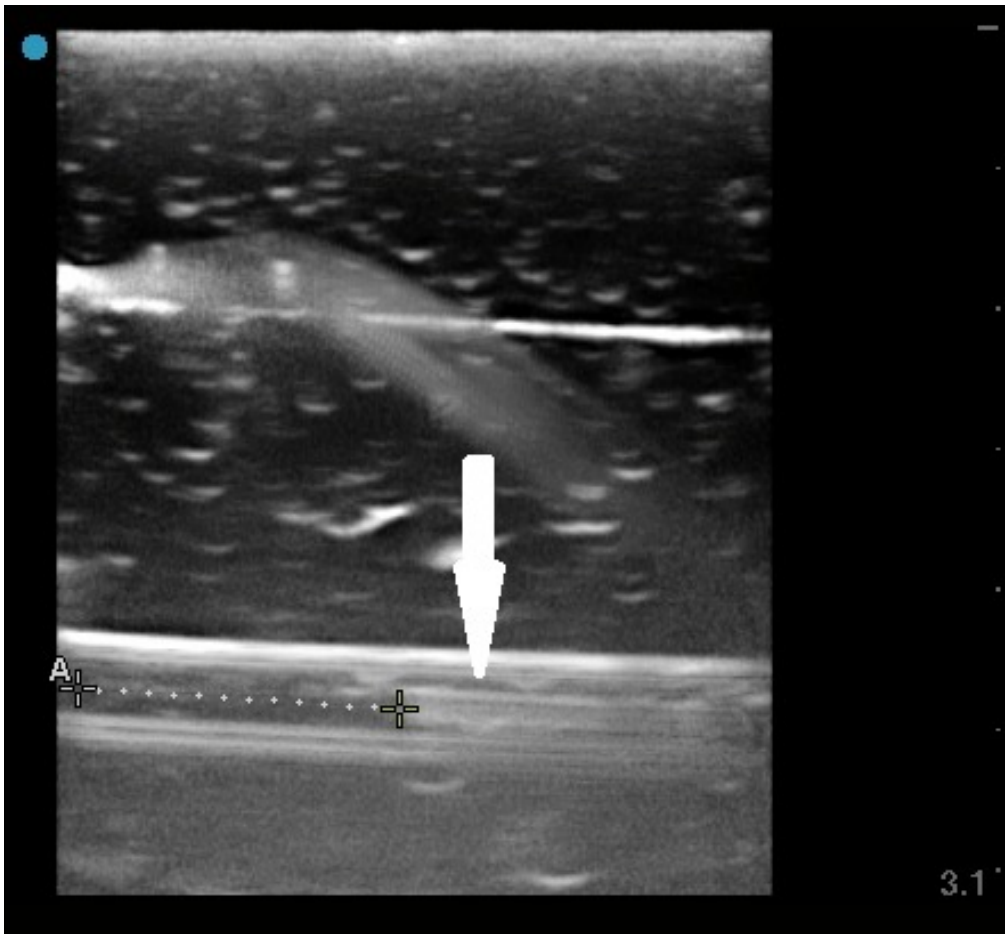
Objective To determine the effect of a structured curriculum with or without simulation training on the procedural confidence and learning curves for novice NICU providers to use POCUS for umbilical line placement/confirmation.

Design/Methods NICU providers with no prior POCUS experience were randomized to either a standard curriculum (lecture and hands-on teaching) or a simulation group (standard curriculum plus simulation training with an US model to replicate visualizing an umbilical catheter in a simulated blood vessel)(Figs. 1&2). Both groups completed questionnaires pre- and post- completing their assigned curriculum and 2 hands on training sessions. Each participant will complete 10 independent POCUS scans in phase II of the study and the data will be analyzed using learning curve-cumulative summation (LC-CUSUM).

Results Twenty-six learners were randomized to the standard curriculum (N=14) or simulation group (N=12)(Table 1); 17(65%) have completed assigned training and are ready to begin their independent scans. Prior to their training, 22(85%) learners "Somewhat/strongly agreed" that POCUS is useful for umbilical line confirmation and 25(92%) "somewhat/strongly disagree" that they were confident in using POCUS for placing umbilical lines. All 17 learners felt that POCUS was useful for the placement/confirmation of umbilical lines after completing their training (p-value 0.004, Mann-Whitney U test). Confidence increased among all participants after completing training, ($p< 0.0001$). After training, the simulation group either "Somewhat/strongly agreed" that the simulation session increased their confidence, but the post-training confidence was similar between the control and simulation groups ($p=0.749$).

Conclusion(s) Training novice NICU providers to use POCUS for confirming umbilical line placement increases their confidence to perform the procedure. The addition of an ultrasound model did not affect the gains in confidence between the control and simulation group.





Participant Demographics

	Simulation, n (%)	Control, n (%)
Fellow	3 (25)	4 (29)
NNP	6 (50)	7 (50)
Attending	3 (25)	3 (21)

Male	1 (8)	0 (0)
Female	11 (92)	14 (100)
<35 yo	5 (42)	6 (43)
35-45 yo	4 (33)	4 (28)
> 45 yo	3 (25)	4 (28)
White	8 (67)	9 (64)
Asian	2 (17)	5 (36)
African American	2 (17)	0 (0)
< 5 yrs experience	3 (25)	7 (50)
5-10 yrs experience	3 (25)	3 (21)
> 10 yrs experience	6 (50)	4 (29)
Total	12	14

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Abstract: 250

Does Your Pediatrician Make You Feel Like a Bad Parent? Demographic Differences in Perceived Parent Shaming

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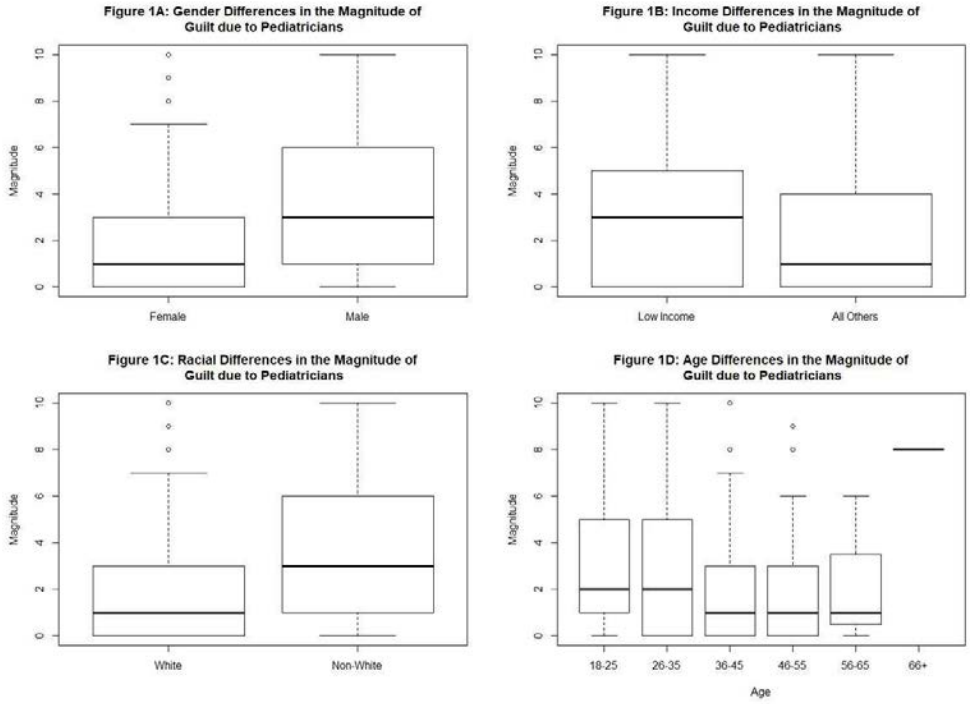
Background For many parents, pediatricians play an important role in the healthcare of their children. For some parents, however, pediatricians may be perceived as a potential source of harmful shaming. The resulting unhealthy parent-pediatrician relationships can negatively impact children and parenting outcomes. To date, there is limited existing research on parental shaming. Moreover, previous studies have not explored the role of pediatricians in perpetuating parental guilt, or the specific demographic groups most at risk for perceived pediatrician-inflicted shaming.

Objective To analyze the extent to which pediatricians may play a role in parental shaming, and assess demographic differences in perceived magnitudes of pediatrician-inflicted parental guilt.

Design/Methods An anonymous online survey was conducted through Amazon's M-Turk system, collecting responses from 1,128 parents of children aged 5-12 years. The survey included demographic questions. Participants were asked to indicate perceived sources of parental guilt. Additionally, subjects were asked to report, on a scale of 0 to 10, the magnitude of guilt they specifically attribute to their child's pediatrician.

Results Of the 1,128 parent participants, the majority were between 26 and 35 years old. 57% of subjects identified as White, 7.9% identified as Black, and 27.2% identified as Asian. In total, 18.6% of subjects indicated a healthcare professional as one of their top 3 external sources of guilt. Male participants reported experiencing higher levels of guilt than did female participants (Fig. 1A; $t= -9.7585$, $p<.001$). Subjects who identified as White experienced significantly lower magnitudes of pediatrician-inflicted guilt than did their non-White counterparts (Fig. 1B; $t= -10.956$, $p<.001$). Furthermore, low-income subjects experienced more severe guilt than subjects with higher income levels (Fig. 1C; $t= 3.747$, $p<.001$). Additionally, there was a negative correlation between the age of the parent and the magnitude of pediatrician-inflicted guilt (Spearman $rho= -.156$, $p<.001$).

Conclusion(s) Statistically significant differences were noted in the severity of pediatrician-inflicted guilt when assessed in subjects of different genders, races, income levels and ages. Although pediatricians are responsible for giving advice regarding the care of children and should always advocate on behalf of the child's best interests, pediatricians must be mindful of the tone of their recommendations in order to minimize the perpetuation of parental guilt.



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Abstract: 251

Parent Reported Frequency, Efficacy, and Side Effects of Over the Counter Medication Use for Improved Sleep in 5 to 11 Year Olds

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Background Studies estimate over one-third of elementary school aged children experience parent-defined sleep problems. Moreover, a lack of sleep is associated with poor academic performance, daytime somnolence, irritability, as well as other physical and psychological issues. To this end, parents may turn to over the counter medications as sleep aids (OTC) in order to achieve improved sleep patterns in their children. While some OTC are specifically formulated for sleep, others, such as a Benadryl and generic cough syrup, are not. However, the parent-reported incidence of OTC sleep aid use, efficacy, and side-effects in the elementary school aged population is unclear in the existing literature.

Objective

Design/Methods An anonymous online three-part survey was distributed via Amazon Mechanical Turk to parents of children aged 5-11 years (n = 406). In Part 1, parents answered non-identifiable demographic questions. In Part 2, respondents indicated the frequency with which they used OTC (Benadryl, Advil PM, Tylenol PM, Nyquil, ZZZquil, Unisom, “Cough Syrup”) for their children on a 4-point scale (Never, Seldom, Sometimes, Most Times). Participants who used OTC rated their perceived effectiveness as sleep aids (No, Moderately, Extremely), their awareness of side effects listed on the bottle (Yes/No), and their observance of side effects following use (Yes/No). In Part 3, parents indicated whether they discussed the use of OTC as sleep aids with their child’s physician (Yes/No).

Results The mean age of the child sample was 7.5 years, with 82.8% of parents identifying as White, 9.4% identifying as Black, and 3.7% identifying as Asian. Table 1 reports the frequency, parent perceived efficacy, side effect occurrence, and parental side effect knowledge of OTC use. Of all OTC examined, Benadryl was found to be the most frequently used as a child sleep aid (23.9%) and most parents cited OTC to be extremely effective child sleep aids (86.7%-100%). Overall, 78.3% of parents stated that they did not discuss OTC as sleep aids with their child’s physician.

Conclusion(s) A concerning number of parents reported using OTC products to help their children achieve better sleep, reporting high efficacy and low incidence of side effects. The AAP needs to address the use of OTC for the specific use of sleep improvement. Pediatricians need to specifically discuss child sleep patterns with parents of elementary school aged children and address unadvised OTC use in this population.

Table 1: Frequency of Use, Perceived Effectiveness, and Acknowledgement of Side Effects of Over the Counter Medication																
	Frequency of Use								# Found Effective of Those Who Used Method n (%)		# Acknowledge Side Effects Listed on Bottle n (%)		# Experienced Side Effects n (%)	
	Never n (%)		Seldom n (%)		Sometimes n (%)		Most Times n (%)							
Benadryl	310	(77.1)	59	(14.7)	31	(7.7)	2	(.5)	81	(90)	68	(78.2)	22	(25.3)
Advil PM	379	(94.3)	11	(2.7)	10	(2.5)	2	(.5)	21	(100)	11	(52.4)	4	(20.0)
Tylenol PM	372	(93)	12	(3)	11	(2.8)	5	(1.3)	24	(88.9)	17	(63.0)	8	(29.6)
NyQuil	369	(92)	16	(4)	13	(3.2)	3	(.75)	29	(96.7)	22	(75.9)	7	(24.1)
ZzzQuil	377	(95)	10	(2.5)	8	(2)	2	(.5)	17	(89.5)	9	(47.4)	3	(16.7)
Unisom	384	(96)	4	(1)	9	(2.3)	3	(.75)	13	(86.7)	7	(46.7)	5	(33.3)
Cough Syrup	338	(85.4)	32	(8.1)	21	(5.3)	5	(1.3)	45	(88.2)	35	(71.4)	13	(27.1)

Table 1: Frequency of Use, Perceived Effectiveness and Acknowledgement of Side Effects of Over the Counter Medication

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Abstract: 252

Trending Infections with Antibiotic Resistant Organisms (AROs) in the Neonatal Intensive Care Unit (NICU)

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Background AROs such as methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant enterococci (VRE), and gram negative rods (MDR-GNR) resistant to third generation cephalosporin agents are a source of morbidity and mortality for neonates in the NICU. Safe and effective antimicrobial therapy for neonates infected with AROs is limited. Thus active surveillance may be an important intervention to prevent transmission and infection with AROs in the NICU. Optimal surveillance strategies for this population have not been fully evaluated. We have previously shown that surveillance data collected from infants transferred to the 2 NICUs affiliated with New York-Presbyterian (NYP) Hospital detected low rates of ARO colonization in the first week of life. As a result of these findings, in July 2013, we changed our strategy of performing ARO surveillance on all transferred infants to performing targeted surveillance on transferred infants ≥7 days old.

Objective To examine the potential effect of this policy change, trends in ARO infections in the NICUs of NYP are examined from July 2007-June 2013 vs. July 2013-June 2016.

Design/Methods Data from all infants admitted to the NICUs at NYP from 2007-2016 were used. Trends in ARO infection pre-and post-policy change were assessed with a difference-in-difference analysis utilizing a generalized linear model. Stratified analysis by birthweight category was performed. Site 1 elected not to adopt the change in surveillance policy, and was used as a control institution.

Results From 2007-2016, 16467 infants were admitted to the NYP NICUs and included in the analysis, 7198 at Site 1 and 9269 at Site 2; There were 380 positive clinical cultures during that time period (2.3%): 105 (0.6%) for MRSA, 13 (0.1%) for VRE and 262 (1.6%) for MDR-GNR.

In the final models, there was a 1.036 increased risk of any ARO infection post-policy change (CI 95 1.014, 1.059; p<=0.0011). This change was primarily in infants with a birth weight of < 750grams (RR 1.18, CI 95 = 1.03, 1.36; p = 0.017), and driven by MDR-GNR.

Conclusion(s) Infections with MDR-GNR are increasing in the NICU population over time. Further studies are needed to assess the epidemiology of these organisms and develop appropriate surveillance strategies.

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Abstract: 253

NICU Orientation Needs Assessment

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Background Most trainees have no exposure to NICU prior to starting Pediatric Residency. A thorough literature search found no publications addressing the orientation needs of pediatric interns prior to starting their neonatal intensive care unit (NICU) rotation.

Objective Currently we have no formalized NICU orientation at Floating Hospital for Children at Tufts. Our aim is to provide a formalized orientation for the Pediatric interns to the NICU to boost confidence and enhance knowledge retention.

Design/Methods To aid in development a needs assessment was distributed to all Pediatric residents. We anticipated the Pediatric residents would prioritize clinical topics on the needs assessment.

An IRB approved needs assessment survey was created and distributed via email to the current Pediatric residents. Consent was implied by completing the online needs assessment.

Results The response rate was 18/41 (43%). The majority of the respondents were PGY-1, n= 7 (39%). 66% percent had no prior NICU experience. 88% said they did/would have benefitted from prior NICU experience. 100% said they would have benefitted from a

NICU orientation. We had 6 topics to be ranked in order of importance by the residents. They were all clinical. Common equations and NRP were ranked 1 and 2 respectively. Free text comments revealed respondents prioritized an orientation to NICU specific systems including EMR, paper documentation, and protocols.
Conclusion(s) In conclusion, our needs assessment revealed that Pediatric residents prioritize an orientation to NICU specific systems over clinical topics and believe this could enhance their confidence and knowledge retention. Going forward we plan to prioritize orientation to include NICU specific systems.

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Abstract: 254

Predictors of attrition from a protocol-based enriched medical home intervention (EMHI) proven to improve adherence to recommended clinical care

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Background Attrition from clinical interventions targeting underserved populations, especially those that include home visitation, is a substantive challenge to achieving optimal health outcomes.
Objective To identify predictors of attrition from a protocol-based EMHI that utilizes community health worker (CHW) home visitation and is proven to improve adherence to recommended clinical care so that this information can be used to target future outreach efforts.
Design/Methods We performed a secondary data analysis of 304 families participating in the EMHI. Completers (N=190) finished the program with mutual agreement that the family can independently adhere to recommended clinical care. Non-completers (N=114) were lost to follow-up or dropped out before reaching this milestone. The 304 EMHI participants were primarily <24 months (N=180), insured by Medicaid (N=210), and Spanish/Hispanic/Latino (N=168).
Results In univariate testing, caregiver's primary spoken language, current living situation, referral source, program module, referral reason "difficulty navigating the healthcare system," "newborn care" and "overcoming barriers/health literacy" program goal, primary caregiver's trust in neighbors and risk of depression were significantly associated with attrition ($P<0.05$ for each predictor). Current living situation was not included in the later analysis due to limited event size and strong association with trust in neighbors. Multiple imputation procedure with Markov Chain Monte Carlo method was applied due to the large amount of missing values of primary caregiver's trust in neighbors. Significant factors on univariate tests were further considered in a multivariable logistic regression model, adjusting for the interaction between caregiver's primary spoken language and KFH goal as "overcoming barriers/health literacy." In the multivariable model, selection of the "newborn care" program goal and primary caregiver's spoken language of "Spanish" (among patients with KFH goal as "overcoming barriers/health literacy") were associated with less likelihood of attrition and inability to trust people in the neighborhood was associated with greater likelihood of attrition.
Conclusion(s) With this information, we plan to target families requiring extra support to achieve program completion and assist them in achieving health care navigation independence. With further investigation, our findings may be useful in outreach efforts for other clinical interventions using home visitation.

Estimated adjusted odds ratios for predictors of attrition using multiple imputation (average C-index=0.724)

Predictor	Level	Odds Ratio	95% Confidence Interval	P-value*
Caregiver's risk of depression	At risk vs. Not at risk	0.58	0.29-1.18	0.1323
People in my neighborhood can be trusted.	Disagree vs. Agree/Neither agree or disagree	2.45	1.05-5.69	0.0382
Referral source	Hospital-based referral vs. Newborn nursery; Primary care vs. Newborn nursery; Specialist vs. Newborn nursery	0.54; 0.59; 0.97	0.24-1.20; 0.26-1.33; 0.36-2.67	0.1321; 0.2006; 0.9603
Referral reason = "Difficulty navigating the healthcare system"	Yes vs. No	1.64	0.91-2.96	0.0969
EMHI Module	Chronic condition vs. Other	1.12	0.48-2.61	0.7920
EMHI goal = improving newborn care	Yes vs. No	0.35	0.16-0.78	0.0099
Interaction of EMHI goal as overcoming barriers/health	Yes vs. No at Parent language=Spanish; Yes vs. No at Parent language=Both/English	0.33; 0.79	0.10-1.05; 0.45-1.41	0.0601; 0.4286

literacy and primary caregiver's preferred spoken language				
Interaction of primary caregiver's preferred spoken language and EMHI goal as overcoming barriers/health literacy	Spanish vs. Both/English at EMHI goal as overcoming barriers/health literacy=Yes; Spanish vs. Both/English at EMHI goal as overcoming barriers/health literacy=No	0.29; 0.71	0.12-0.72; 0.27-1.89	0.0075; 0.4974

*P-values were based on 10 sets of multivariable logistic regression analyses using Rubin's rule.

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Abstract: 255

Innovative oxygen saturation profiling to predict symptomatic respiratory viral illness during neonatal intensive care

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Background The multiplex reverse transcription polymerase chain reaction assay identifies respiratory viruses (RV), however a positive result, does not predict whether a patient will develop symptoms with comorbidities (SYM) or remain asymptomatic (ASYM). Recent innovations in big-data storage and analytic capabilities may help to predict SYM infants by profiling oxygen saturation (SpO_2) from bedside continuous pulse oximetry data.

Objective To assess whether continuous SpO_2 data can predict which RV colonized infant will become SYM during neonatal intensive care.

Design/Methods This single center retrospective observational study included 40 infants (median birth weight = 918g, median gestational age = 27 weeks) who had a RV detected between 5/1/2012 and 5/31/2017. Testing for RV (D0) was performed due to clinical suspicion of a RV or potential RV exposure. Infants were classified as SYM vs ASYM. SYM infants had clinical respiratory symptoms, or required increased respiratory or nutritional support. ASYM infants had no clinical respiratory symptoms and no increased support. SpO_2 data from a week prior (pre) and a week after (post) RV detection were extracted from high resolution continuous physiological data sampled at 240 Hz that was collected from bedside GE monitors using BedMasterEx system (Excel Medical, Jupiter, FL). After removing the artifact using a custom Matlab algorithm, SpO_2 data were summated over daily percentage of time spent in SpO_2 ranges < 85, 85-89, 90-95 and >95. Oxygen desaturation index (ODI) was computed from the ratio of percent daily time spent with SpO_2 <85 and >89. SpO_2 ranges and ODI were compared between ASYM and SYM infants using t-tests.

Results 11 (28%) infants remained ASYM and did not have higher percentage of time with SpO_2 <85% despite RV detection. SYM infants spent a higher percentage of time with SpO_2 <85% ($p<0.03$) and with greater ODI ($p<0.0001$) compared to ASYM infants pre and post RV detection (Figures 1 and 2).

Conclusion(s) Continuous SpO_2 profiling can measure the subtle, yet significant, difference in time SYM and ASYM infants spend in a hypoxic state. The potential utility is to retrospectively calculate pre ODI on D0, to differentiate the ASYM from the SYM infants, who are at risk for increased lability from a RV in the upcoming days (D1 to D7). Future direction includes determining if higher pre ODI may be used to predict SYM prospectively, since this study demonstrated differences as early as one week prior to clinical appreciation of RV infection.

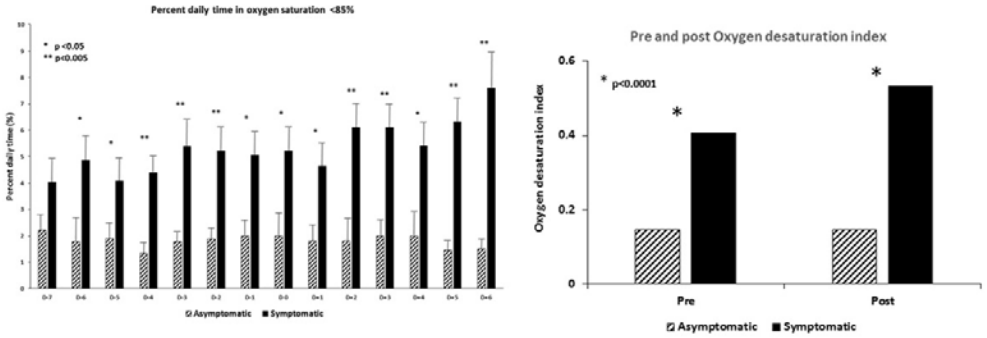

Figure 1 and Figure 2

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Abstract: 256

Utility of Urinalysis in Diagnosing UTI in Young Febrile Children

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Background The diagnosis of urinary tract infection (UTI) in young children can be challenging, because the typical signs and symptoms usually associated with the diagnosis of UTI in older children may not be present. Additionally, dilute urine is common in this age group, and the presence of bacteria or leukocytes may only yield small amounts of sediment in the urine. These undermine the use of urinalysis for identifying urinary tract infection in this population.
Objective To determine the utility of urinalysis in young febrile children with dilute urine.
Design/Methods We conducted a retrospective chart review of 235 Hispanic and African American children 2-36 months of age with an unidentified source of fever, in which urinalysis and urine culture were obtained from 2007-2017 in an inner city affiliated community hospital. For this study a dilute urine was defined as having a specific gravity of < 1.015. ROC curve analysis and regression analyses were conducted to assess the relationship between specific predictor variables.
Results 12% of patients in the study group had a UTI. Mean age was 8.8±7.6 months (mean±SD). Of the various urinalysis components, WBC, RBC, nitrates and leukocyte esterase significantly predicted an UTI. 82% of patients with UTI had dilute urine. Female patients were more likely to have dilute urine (70%). WBC performed better in a dilute urine sample, conversely RBC performed better in a concentrated urine sample (Table 1).
Conclusion(s) These data suggest that concentration of urine affects the predictability of urinalysis in young febrile children. Further studies should investigate the utility of applying these results in a prospective study.

Table 1 Results

UA Component	Diluted urine AUC	Concentrated urine AUC	Difference	P-value
WBC	0.926	0.567	0.359	0.01
RBC	0.064	0.324	-0.26	0.02
Nitrates	0.351	0.400	-0.049	0.72
Leukocyte esterase	0.727	0.557	0.17	0.26

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Abstract: 257
Increased Susceptibility to Electronic Cigarette Flavorings in the Immature Lung
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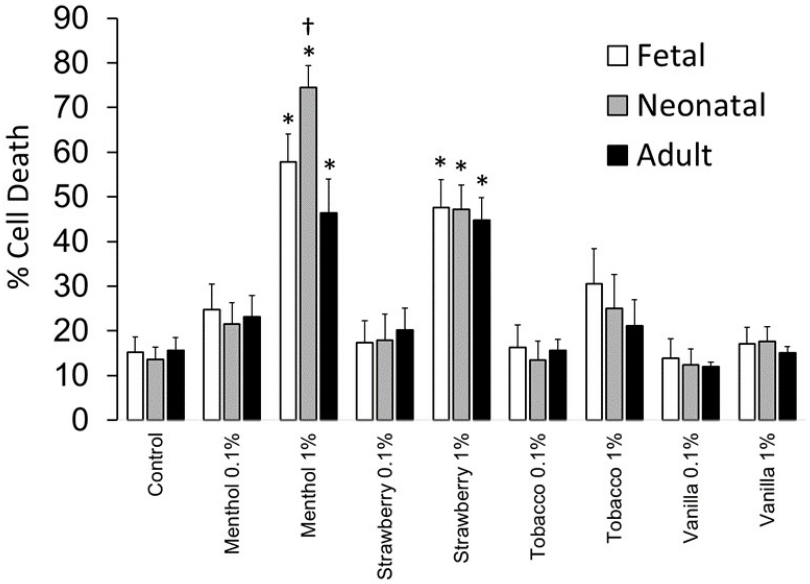
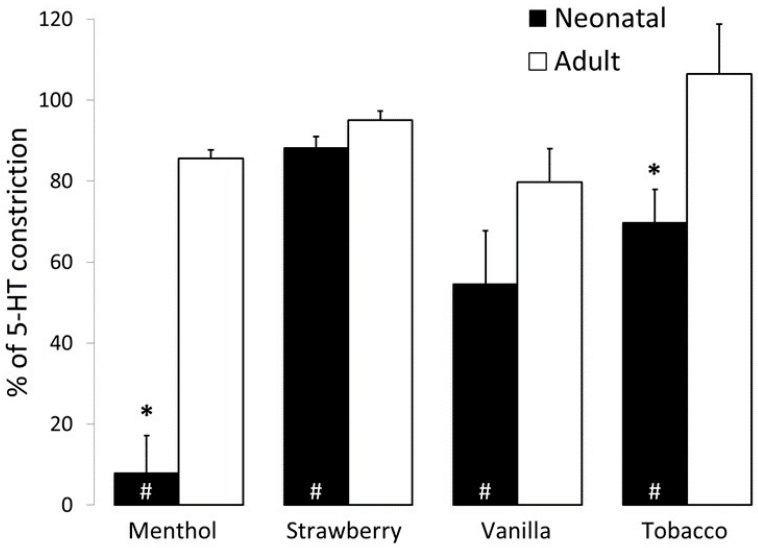
Background Electronic cigarettes are being aggressively marketed as a substitute to smoking with a common misconception that they are a safer in pregnancy. The immature, developing lung is uniquely susceptible to toxins and may actually be at increased risk of lung injury with gestational or secondhand exposure to E-cigarettes constituents. However, developmental susceptibility and functional response to common E-cigarette additives, most notably flavorings, remains unknown.
Objective To determine if the immature lung exhibits increased susceptibility to flavoring toxicities or funcational differences with flavoring exposure.
Design/Methods Fetal, neonatal and adult ovine pulmonary artery smooth muscle cells (PASMC) were treated with select flavored E-liquids [Menthol, Strawberry, Tobacco, and Vanilla; ECTO, 0mg nicotine], pure propylene glycol (PG) or pure vegetable glycerin (VG) at 0.1 and 1% concentrations for 24 hours. Viability was determined by lactate dehydrogenase (LDH) assay. Vasoreactivity to 0.1% E-liquids was determined on isolated neonatal and adult ovine intrapulmonary bronchial rings (BR) and pulmonary arteries (PA).
Results Neither PG or VG at 1% concentration impacted viability of immature or adult cells. Treatment with menthol and strawberry E-liquids induced cell death at 1% concentration with exaggerated toxicity in immature PASMC exposed to menthol (Figure 1). Calculated IC50s identify increased susceptibility to flavoring-induced cell death in immature PASMC (Table 1). Functional response to E-liquids were also developmentally regulated, with bronchodilation in neonatal but not adult BR in response to 0.1% of all 4 flavorings (Figure 2). Exaggerated airway relaxation was observed with menthol in the neonate [8.0 $\pm$ 9.2% (neonate) versus 84.7 $\pm$ 5.6% (adult) constriction when normalized to untreated controls, $p < 0.001$]. At comparable 0.1% dosing, strawberry, tobacco and vanilla did not alter reactivity of immature or adult PAs. However, menthol flavoring induced relaxation of adult but not neonatal PAs.
Conclusion(s) E-cigarettes represent a rapidly growing threat to the fetal and newborn population. Use of flavorings with E-Cigarettes has far out-paced our understanding of their implications for health. Our data suggesting developmental susceptibility to popular

flavorings as well as potential enhanced delivery of toxicants via flavoring-induced bronchodilation argues the critical need for further evaluation of these products with pre- and postnatal exposure.



* $p < 0.05$ vs control; † $p < 0.05$ vs adult



5-HT = 5-hydroxytryptamine or serotonin
# $p < 0.05$ vs control; * $p < 0.05$ vs adult

Immature PASMC demonstrate increased susceptibility to E-flavorings by calculated IC50s (% concentration)

	FETAL	NEONATAL	ADULT

Menthol	0.62	0.59	1.62
Strawberry	1.14	1.34	2.15
Tobacco	2.23	2.95	5.60
Vanilla	>10	6.61	>10
PG	>10	>10	>10
VG	>10	7.19	>10

IC50 (inhibitory concentration 50%): concentration at which 50% cell death occurs PG = propylene glycol; VG = vegetable glycerin

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Abstract: 258

Baby See, Baby Do: Parental Influences on Toddler Digital Device Usage

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Background The American Academy of Pediatrics (AAP) emphasizes that parents should act as their child's "media mentor" when introducing them to digital devices (DD), helping them explore their potential uses, and supervising them during usage. However, it is unknown how often parents follow supervision recommendations, the purposes parents believe DD serve for their children, and whether parental usage or parental characteristics contribute to longer or more frequent toddler digital device usage (TDU).

Objective To determine whether parental supervision, income, and education level predict frequency and duration of TDU, as well as to assess the purposes parents believe DD serve for their child.

Design/Methods Parents of children aged 0-3 years were recruited for an anonymous Amazon Mechanical Turk survey. Parents were asked to indicate their demographics, including income and education level. They then identified DD present in their household, DD utilized by them and their child, as well as frequency and duration of TDU of each device. Parents also answered how often TDU is supervised and the purposes for DD usage. Linear regressions were used to determine whether supervision and demographics predicted TDU.

Results There was an 80.2% effective response rate from 637 respondents (n=511, children: 43.6% female, 29.7 month mean age), of which 90.6% of parents reported that their child used at least one household DD. When asked whether their child had adult supervision during TDU, parents responded 30.4% Always, 23.7% Often, 18.0% Frequently, 19.1% Sometimes, 7.0% Rarely, and 1.7% Never. The majority of parents (78.2%) used DD for entertainment purposes, 77.1% for education, 70.1% to occupy children while doing tasks, and 34.1% for reward. In addition, for every DD other than laptop computers, parent usage significantly predicted TDU ($p<0.001$). Table 1 reports prediction of frequency, usage, and duration for each DD by parent income and education. Table 2 shows how parental supervision of each DD's usage predicts frequency and duration of TDU.

Conclusion(s) An alarming majority of over 500 parents stated that they do not always supervise their toddlers during digital device usage and cited entertainment as the most popular reason for TDU. Even from an early age, income and parent education level were negatively correlated with DD usage and TDU duration, particularly with regards to television. Given increasingly early DD exposure, clinicians must reinforce the importance of parental supervision of TDU and AAP media guidelines to parents of toddlers.

Table 1: Comparing TDU and parental demographics (β)				
		Frequency	**Duration**	**Usage**
TV	*Education*	0.003	-0.121 **	0.005
	Income	0.021	-0.120 *	0.010
Desktop	*Education*	-0.109	0.058	-0.018 *
	Income	-0.273	-0.243	-0.005
Laptop	*Education*	-0.070	0.059	-0.15 *
	Income	-0.142	-0.136	-0.007
Tablet	*Education*	-0.039	-0.132 **	0.009
	Income	0.037	-0.050	0.027
Smartphone	*Education*	0.071	-0.042	-0.005
	Income	0.070	-0.150 *	-0.011
Gaming System	*Education*	-0.163	-0.061	-0.234 **
	Income	0.406	-0.005	-0.015
* p<0.05, **p<0.01, *** p<0.001				

Table 1: Comparing TDU and Parental Demographics

Table 2: Comparing TDU and parental supervision (β)		
	Frequency	**Duration**
TV	0.075	-0.171 **
Desktop	0.132	-0.406
Laptop	-0.109	-0.405 **
Tablet	-0.068	-0.318 ***
Smartphone	-0.100	-0.109
Gaming System	-0.211	-0.403 **
* p<0.05, **p<0.01, *** p<0.001		

Table 2: Comparing TDU and Parental Supervision

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Distinct temporal trends in GABA and glutamate in the cerebellum and frontal cortex of preterm infants.

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Background Proton magnetic resonance spectroscopy (^{1}H-MRS) studies in preterm infants have revealed altered brain biochemical profiles and have been linked with adverse neurodevelopmental outcomes. Major neurotransmitters gamma-aminobutyric acid (GABA) and glutamate are pivotal to brain development as well as injury related to preterm birth. However, technical challenges due to their low concentrations and overlap by dominant metabolites interfere with reliable measurement in the developing brain.

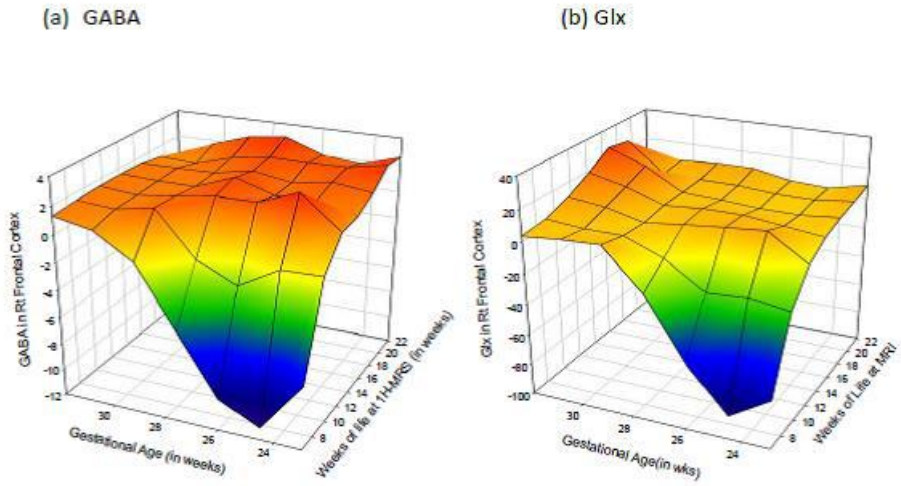
Objective To determine GABA and glutamate concentrations in the cerebellum and frontal cortex of preterm infants at term equivalent age (TEA).

Design/Methods We prospectively performed ^{1}H-MRS in preterm infants born at ≤32 weeks gestational age (GA) and ≤1500 g birth weight admitted in a level IV NICU. Infants with metabolic/genetic disorders were excluded. Enrolled infants underwent a non-sedated MRS scan at TEA on a 3 Tesla MRI (Discovery MR750). ^{1}H-MRS was obtained from 3 cm^3 voxels placed in the middle of the cerebellum and right frontal cortex. To overcome the challenges in measuring in-vivo GABA and glutamate (combined with glutamine; Glx), we used a Mescher-Garwood point resolved spectroscopy (MEGA-PRESS) spectral editing technique. MRS spectra were processed using LCModel to calculate metabolite concentrations and were included for analysis if they met inclusion parameters for signal-to-noise ratio, frequency width and Cramer-Rao lower bounds.

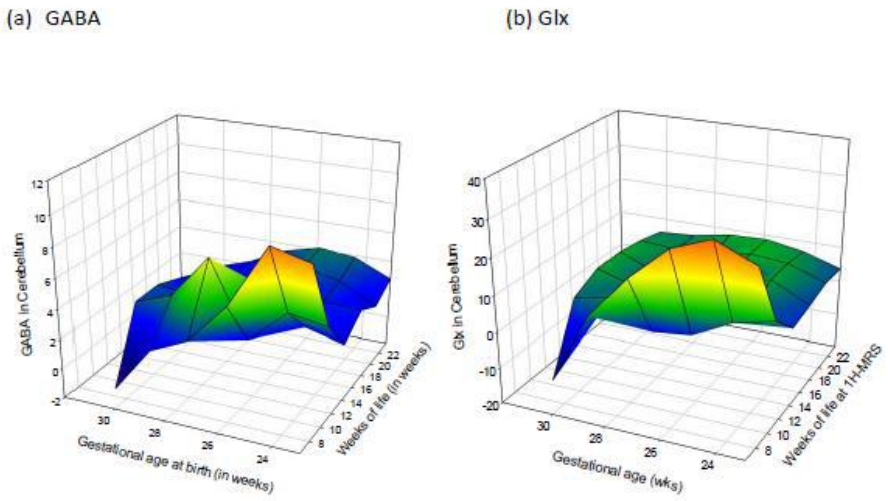
Results 44 preterm infants with a mean GA at birth of 26.5 ± 2.3 weeks underwent ^{1}H-MRS at a mean post-menstrual age (PMA) of 40.3 ± 3.2 weeks. GABA and Glx positively correlated with PMA in the frontal cortex (R=0.42, p=0.01 and R=0.35, p=0.03

respectively) but not the cerebellum (Table 1). N-acetylaspartate (NAA; R = 0.7, p<0.001) and creatine (Cr; R=0.52, p=0.008) positively correlated with PMA in both regions. Metabolites also demonstrate positive temporal trends with increasing GA and weeks of life (WOL) at ^{1}H-MRS (Figure 1 & 2).

Conclusion(s) We report for the first time a significant positive temporal relationship of GABA concentration in the frontal cortex whereas a minimal positive trend in the cerebellum of premature infants. Whether this reflects differential regional maturity of the developing brain and how clinical factors influence these neurotransmitters warrants further investigation. Understanding the prognostic and diagnostic importance of GABA and glutamate in the preterm brain will guide future neuroprotective interventions.



Metabolite temporal trends in the frontal cortex with GA at birth and weeks of life at preterm ^{1}H-MRS scan.



Metabolite trends in the cerebellum with GA at birth and weeks of life at preterm ^{1}H-MRS scan.

Biochemical profile of the cerebellum and right frontal cortex and correlation with postmenstrual age (PMA) at 1H-MRS

Brain Metabolites and Ratios	Right Frontal Cortex Mean ± SD	Pearson correlation R with PMA (P value)	Cerebellum Mean ± SD	Pearson correlation Rnwith PMA (P value)
Gammaaminobutyric acid (GABA)	1.68 ± 0.44	0.42 (0.01)*	2.68 ± 0.87	0.21 (0.2)
Glutamate+Glutamine (Glx)	4.2 ± 1.63	0.35 (0.03)*	5.31 ± 2.39	0.31 (0.08)

Glutathione (GSH)	1.79 ± 0.95	0.19 (0.4)	3.31 ± 1.93	0.27 (0.2)
N-acetylaspartate (NAA)	4.14 ± 1.1	0.81 (<0.001)*	4.23 ± 1.09	0.51 (0.005)*
Choline (Cho)	2.11 ± 0.28	0.32 (0.06)	3.3 ± 0.47	0.3 (0.07)
Creatine (Cr)	3.75 ± 0.76	0.76 (<0.001)*	6.45 ± 1.37	0.56 (<0.001)*
GABA/Cr	0.46 ± 0.11	-0.16 (0.4)	0.42 ± 0.12	-0.27 (0.2)
GABA/Cho	0.22 ± 0.1	0.04 (0.8)	0.82 ± 0.2	0.02 (0.9)
Glx/Cr	1.17 ± 0.48	-0.08 (0.6)	0.85 ± 0.37	-0.09 (0.7)
Glx/Cho	2.1 ± 0.28	0.32 (0.06)	1.65 ± 0.6	0.02 (0.9)
NAA/Cr	1.08 ± 0.12	0.52 (0.002)*	0.64 ± 0.14	0.12 (0.53)
Cho/Cr	0.58 ± 0.09	-0.64 (<0.001)*	0.55 ± 0.15	-0.34 (0.04)*

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Abstract: 260

Parental Preferences, Priorities and Experiences while Making an initial Appointment to see a Developmental Behavioral Pediatrician

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Background Developmental and behavioral concerns among US children are common. Developmental pediatricians receive specialized training in the diagnosis and medical management of developmental and behavioral conditions through subspecialty fellowships in developmental behavioral pediatrics or neurodevelopmental disabilities. There is a paucity of information regarding families' preferences and expectations regarding developmental pediatric evaluations.
Objective To understand 1) how parents decide to seek a developmental pediatrics evaluation, and 2) their expectations for the visit.
Design/Methods This is a qualitative study featuring depth interviews of participants who made an appointment to see a developmental pediatrician at Children's Specialized Hospital. Participants were parents who called to schedule an initial appointment. After an extensive literature and process of self-reflection, an interview guide was developed by the study team which included developmental pediatricians, a psychologist, and a parent. A trained study team member conducted all interviews until thematic saturation was achieved when no new ideas were generated from additional interviews. Each transcribed interview was coded for significant utterances and a codebook was created in order to sort the data into categories. The interviews were then analyzed to identify themes attending to patterns and connections within the data.
Results We achieved saturation after 9 interviews, all of whom were with mothers. The age range of the children was 16 months to 9 years old. There were three main themes that emerged from our study. Recommendations from professionals such as healthcare providers and educators influenced the parents' decision to pursue a developmental pediatrics evaluation. In making the appointment, parents hoped to put together information they had received from various professionals and other sources. Expectations for the appointment included gaining a better understanding of the developmental or behavioral concern and having a plan to support the child at the end of the appointment.
Conclusion(s) Participants in our study interacted with multiple people and professionals before their initial appointment. They seek clarity, direction and possible solutions from their Developmental Behavioral Pediatrician appointment.

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Abstract: 261

Progression of neonatal oro-motor sucking measures with age: A prospective observational study of infants born at ≤35 week gestation.

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Background Neonatal oro-motor suck (OMS) plays an essential part in successful oral feeding. In premature infants, mature OMS patterns develop postnatally. Identifying postnatal OMS measures that develop in consistent patterns with increasing age can provide patient-specific objective measures for assessment of feeding readiness and proficiency.
Objective To identify (1) OMS measures of non-nutritive suck (NNS) and nutritive suck (NS) that correlate with increasing postmenstrual age (PMA); (2) NNS measures at 31-33 wks, and NS measures with the first clinical attempt at oral feeds that correlate with duration from start of oral feed (SOF) to full oral feeds (FOF).
Design/Methods This is a 2 year (10/2015-10/2017) prospective study of infants born at <36 week gestation and enrolled at 32-35 weeks PMA. OMS measures were obtained using a signal transduction device connected to the feeding interface, either a pacifier for NNS or a nipple for NS. The transducer was attached to a mobile unit with a laptop that transcribed the pressure changes. NNS

recordings of 10 ±2.5 minutes and NS recording comprising of the full oral feed were recorded on at 200Hz (Biopac Systems, Goleta, CA). Matlab was used to analyze the waveforms into sucks (0.3 to1.3 seconds duration) and bursts ((≥ sucks with no >2 seconds pauses). OMS parameters investigated for effect included sucks per minute, bursts per minute, sucks per burst, sucks per second within a burst, mean burst duration and mean suck amplitude. All demographics, clinical and feeding variables were obtained prospectively. Univariate correlations were tested using Pearson correlation coefficient.

Results Of 107 enrolled infants, 42 NNS measures (between 32-35 weeks PMA) and 103 NS measures (obtained at first clinical feed trial) from 103 infants were used. Table 1 shows the population characteristics. Duration between SOF and FOF did not correlate with any of the first NNS or NS measures (Table 2). Significant correlation with PMA was obtained for sucks per second within a burst in NS (Table 2 and Figure 1).

Conclusion(s) We found significant correlation of sucks per second within a burst and increasing PMA which suggests pattern of development that occurs consistently over age. However no single early measure predicted duration from SOF to FOF. Next steps include defining parameters that identify synchrony and symmetry of multiple OMS measures as predictors for feeding skills and overall development

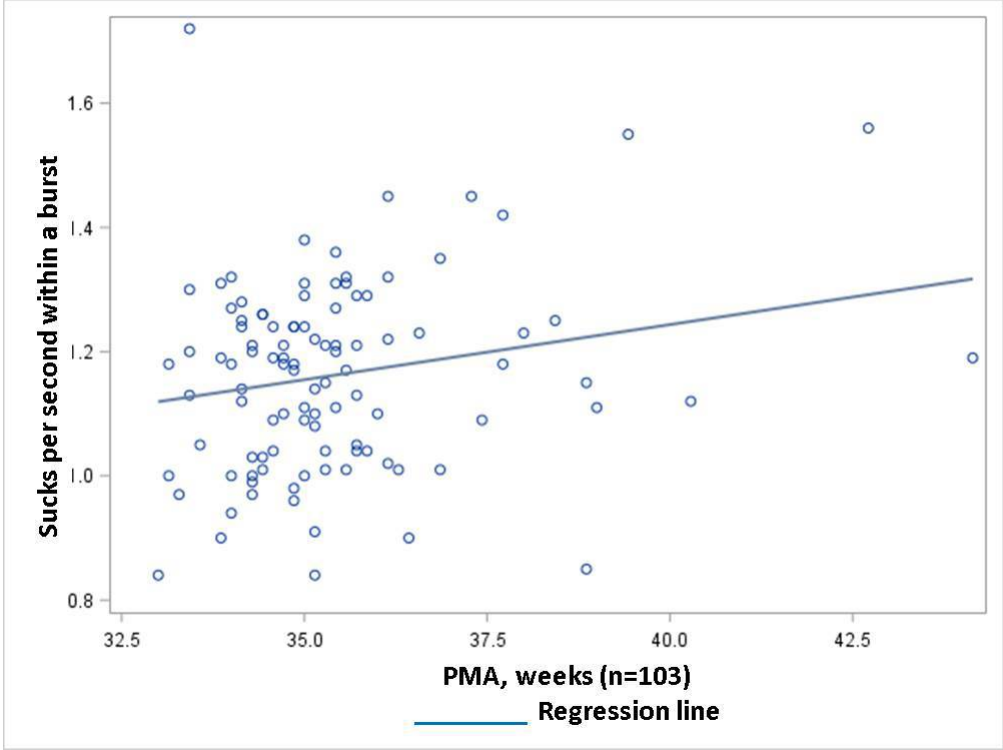

Figure 1: Scatter plot with regression line for 103 NS measures and increasing PMA

Table 1: Basic demographics of study infants and details of OMS studies

Infant Characteristics	n=103
Birth weight, Mean (SD)	1612 (578)
Birth weight categories, n(%) <1000 1000-1499 >=1500	 16 (15.5) 32 (31.1) 55 (53.4)
Gestational age, Mean (SD)	31.1 (2.5)
Gestation age categories, n(%) <28 0/7 28-31 6/7 >=32 0/7	 12 (11.7) 47 (45.6) 44 (42.7)
Female (%)	43 (41.8)
Apgar of <5 at 5 min	2 (1.9)

Multiple gestation	32 (31.1)
PMA (weeks) at start of oral feeds, Mean (SD) Range for PMA at start of oral feeds	34.7 (1.8) 32-44
Means Days (SD) from start to full oral feeds Range of days from start to full oral feeds	13 (7.7) 1-39
PMA in weeks at full oral feeds, Mean (SD) Range for PMA at full oral feeds	36.7 (2.2) 34-47

Table 2: Correlation between OMS measures with age and duration from start to full oral

	NNS measure 32-35 weeks PMA, n=42 Pearson correlation coefficient P value		NS measure at first feed, n=103 Pearson correlation coefficient P value	
OMS measure	PMA weeks	Days from SOF to FOF	PMA weeks	Days from SOF to FOF
Burst Duration	0.13 0.41	-0.04 0.8	0.001 0.99	-0.13 0.19
Average sucks per burst	0.14 0.37	-0.05 0.770	0.06 0.53	-0.1 0.32
Sucks per second within a burst	-0.08 0.6	0.12 0.43	0.21 0.03	0.16 0.12
Study duration (seconds)	-0.17 0.28	-0.23 0.15	0.12 0.23	-0.14 0.17
Sucks per minute of study	0.05 0.73	0.02 0.89	0.25 0.012	-0.04 0.712
Bursts per minute of study	-0.08 0.6	0.07 0.64	0.14 0.164	0.05 0.62

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Abstract: 262

Methemoglobinemia in a Neonate

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History (including chief complaint, history of present illness and relevant past and family medical history) CC: A one-week-old ex-37 week male infant with a cervical lymphangioma, presenting with hypoxemia.

HPI:

He was intubated at birth due to airway compromise from the cervical lymphangioma. Due to the absence of lung disease he required minimal ventilator settings and no supplemental oxygen. Interventional Radiology was consulted and elected to treat with sclerotherapy using doxycycline.

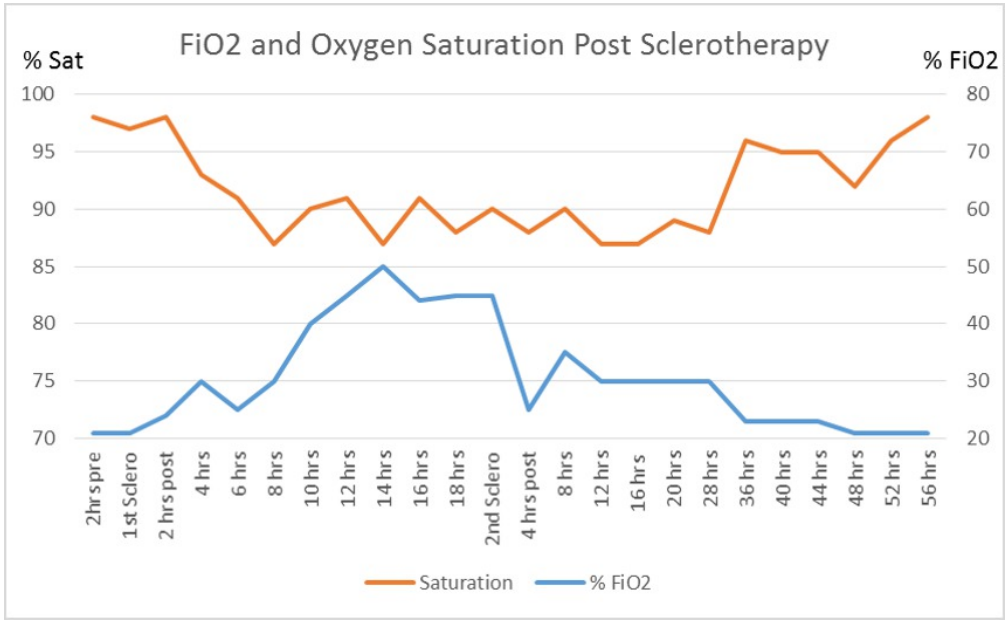
The first dose of doxycycline (500 mg injected into the lymphangioma) was on DOL8. Later that night he desaturated to 85-92%. The FiO2 was increased to 50% with no improvement in saturations. Blood gases demonstrated intact ventilation. A chest radiograph, blood gases, and blood work revealed normal lung fields, anemia and an evolving mild acidosis. It was also noted that his urine was dark.

Birth History:
Singleton infant born to a 29 year old G4P4 mother. Maternal prenatal labs notable for: Blood type B+, antibody negative, GBS positive. Prenatal medications included: prenatal vitamins, Vitamin D. No maternal substance use. Prenatal ultrasound showed a left cervical lymphangioma extending into the airway.

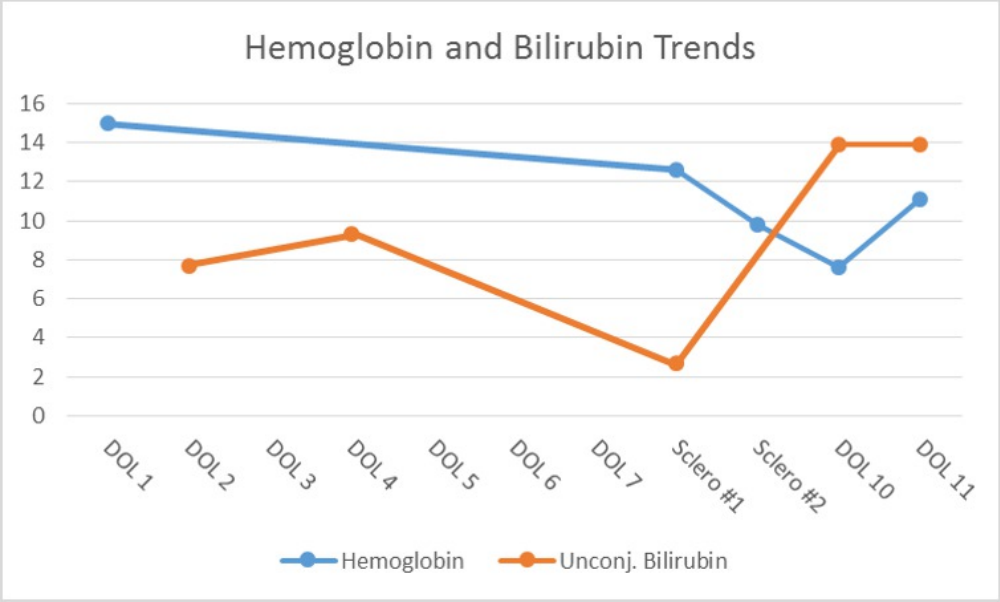
Delivery was via cesarean section.

At birth, he required PPV and then transitioned to CPAP. He continued to demonstrate work of breathing and was intubated. Apgars were 6 & 8.
Physical examination findings (including vital signs) Vitals:
HR 130, RR 29, BP 87/45, Saturation 90% (on FiO2 of 21-100%), Temp 37.0 C

Pertinent Exam:
General: alert, responsive
ENT: large, soft mass on left neck, 8cm x 8cm, slight blue discoloration
Chest: symmetric aeration with normal respiratory effort
Cardiac: regular rate and rhythm, no murmurs, 2+ distal pulses and capillary refill 1-2 seconds
Abdomen: no hepatosplenomegaly
Skin: mild pallor
Laboratory or Diagnostic imaging or Procedures Laboratory Evaluation:
Venous blood gas: 7.36/42/51/24/-2
Arterial blood gas: 7.36/44/185/25/-1
Hemoglobin: 9.8 (previous 12.6)
Chest radiograph: clear lungs
G6PD: Positive
Final Diagnosis A methemoglobin level was elevated at 8.8%, confirming a diagnosis of methemolobinemia. Methylene blue was not administered because the level was not in excess of 30% and also because he was G6PD positive. The metHb level peaked at 14.2% and saturations improved as the level decreased. Doxycycline has not previously been described as an inciting agent for methmoglobinemia, but it is possible this is the first time due to the high doses used. An alternative explanation is that the metabolic acidosis that occurred as a side effect of sclerotherapy predisposed the patient to illness-associated methemoglobinemia.



FiO2 compared with oxygen saturation surrounding sclerotherapy treatment



Hemoglobin and bilirubin trends

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Abstract: 263

A Cause of Hyperammonemia Missed by Newborn Screening

K. Taylor Wild, Rebecca D. Ganetzky, Marc Yudkoff, Lynne Ierardi-Curto

Pediatrics, Division of Human Genetics, Children's Hospital of Philadelphia, Perelman School of Medicine at the University of Pennsylvania, Philadelphia, Pennsylvania, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A male neonate weighing 1.385 kg was born at 31 2/7 weeks gestation due to maternal preeclampsia. APGARs were 8 and 9. The mother had received regular prenatal care and had negative prenatal labs and reassuring ultrasounds. On day of life (DOL) 4, he required intubation for worsening apnea and lethargy. Antibiotics were initiated; however, blood, urine and CSF cultures were negative. On DOL5, hyperammonemia (1300 mmol/liter) was discovered and he was transferred to a metabolic center.

Physical examination findings (including vital signs)

Laboratory or Diagnostic imaging or Procedures Transient hyperammonemia of the newborn, a non-genetic entity associated with prematurity, was initially considered. However, despite the ammonia quickly normalizing with intravenous sodium phenylacetate, sodium benzoate, and arginine, he remained critically ill with hypotension, hepatic dysfunction and coagulopathy. The newborn screen was normal; detailed evaluation showed only slight increases of phenylalanine and methionine, consistent with liver immaturity. However, formal plasma amino acid analysis showed increased glutamine and ornithine. The elevated ornithine was attributed to arginine supplementation; however, it continued to rise and a low blood lysine and citrulline developed. Urine orotic acid was initially high, but declined to normal. Urine amino acid quantitation initially showed a generalized aminoaciduria, consistent with prematurity, but repeat analysis showed a disproportionate increase of urine ornithine. A chromosomal microarray was normal.

Final Diagnosis Simultaneously, molecular testing showed 2 pathogenic variants in SLC25A15, confirming Hyperornithinemia-hyperammonemia-homocitrullinuria syndrome (HHH). Urine homocitrulline, a pathognomonic feature of HHH, was also qualitatively present on retrospective analysis. His therapy was then changed from arginine to citrulline and lysine was added. Since then, blood pressure, liver function and ammonia have all normalized without any recurrent episodes. HHH is the rarest of the urea cycle disorders and is characterized by extreme phenotypic variability and diverse ages of onset. This is the first reported premature infant with HHH deficiency. Because HHH is not detected by newborn screening and the characteristic biochemical triad may be subtle or even absent, it has the potential to be underdiagnosed; however, making the diagnosis has critical therapeutic implications. As developmental outcomes correlate with episodes of hyperammonemia, it is important to consider in a differential diagnosis of any patient with hyperammonemia of unknown etiology.

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Abstract: 264

A case report of right sided fixation of sigmoid colon with late onset Hirschsprung’s disease

Ravikumar Hanumaiah

Pediatric Radiology, UTHSC, Le BonHeur Childrens Hospital, Memphis, Tennessee, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A 10 year old female presented with chronic abdominal pain since 2 years. No relevant past and family medical history.

Physical examination findings (including vital signs) A mass was palpable in the right lower quadrant.

Laboratory or Diagnostic imaging or Procedures Sonography demonstrated anechoic to hypoechoic mass in the right lower quadrant. CT was suggested for further evaluation of the suspected right lower quadrant mass. CT demonstrated the suspected right lower quadrant mass to be a dilated sigmoid colon. The rectosigmoid ratio was less than 1, with gradual narrowing of the rectum, suggestive of Hirschsprung's disease. The duodenojejunal junction was in the normal position to the left of L1 pedicle. However the superior mesenteric vein was anterior to the superior mesenteric artery suggestive of malrotation. There was highly placed cecum in the right upper quadrant. The descending colon originated in the left upper quadrant and coursed horizontally across the midline, anterior to the kidneys, aorta, IVC, towards the right upper quadrant, then curved anteriorly and continued inferiorly as the dilated sigmoid colon on the right side. Findings were consistent with colonic malposition and right sided fixation of sigmoid colon associated with Hirschsprung's disease.

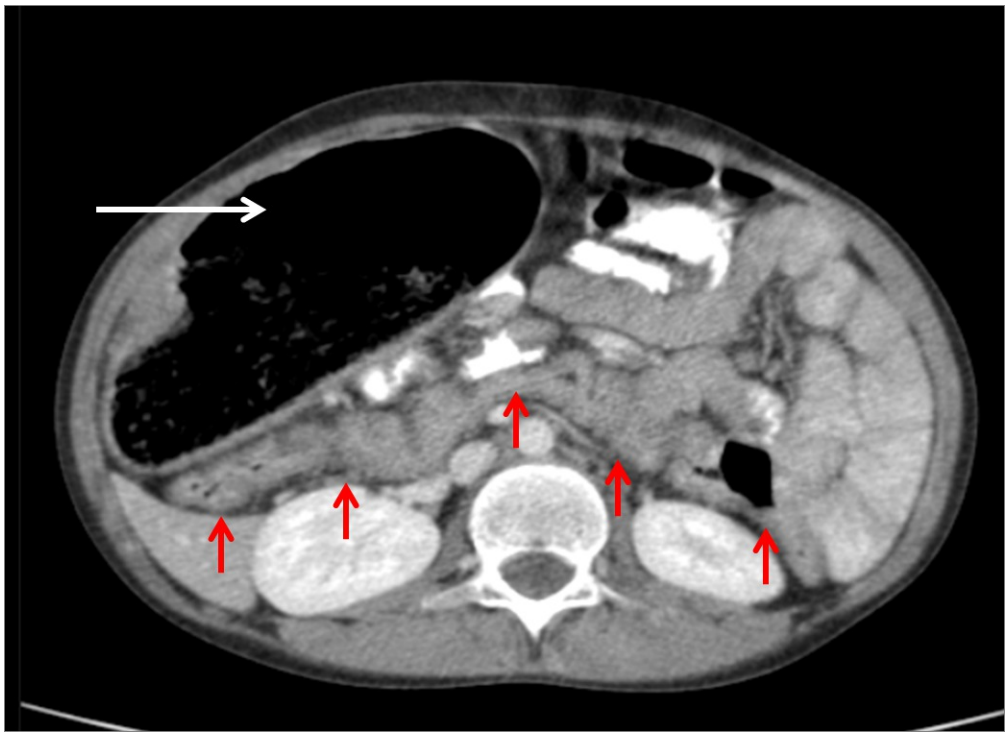
Final Diagnosis

To our knowledge, this possibly is the first case of right sided fixation of sigmoid colon with associated late onset Hirschsprung's disease.

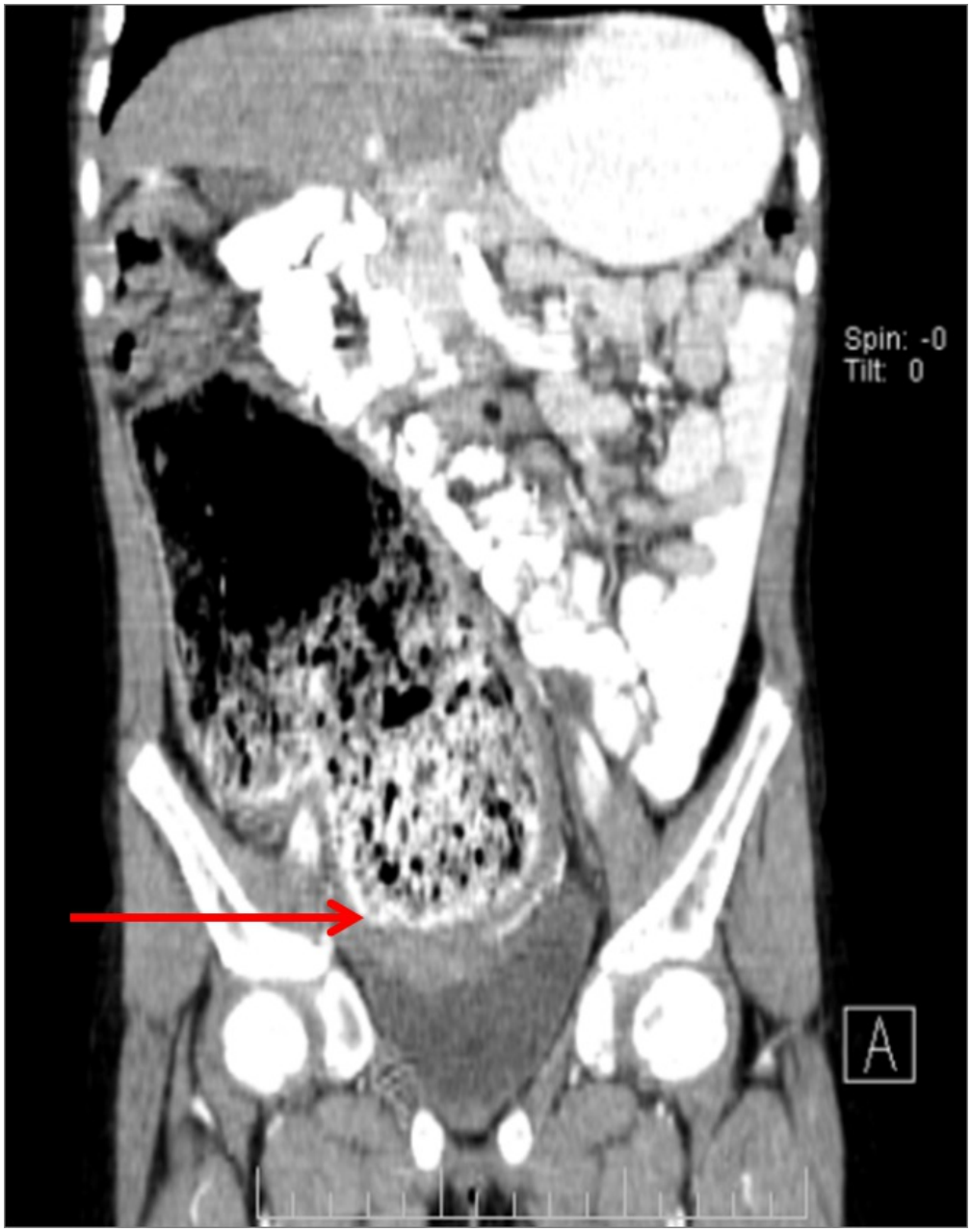
Right sided fixation of sigmoid colon, is congenital colonic malposition which occurs possibly due to an extra long sigmoid colon or midgut malrotation. Generally, the sigmoid colon is situated in the left lower quadrant with the sigmoid mesococlon attached to the peritoneum on the left side.

Hirschsprung's disease is a congenital functional obstruction of the colon caused by absence of ganglion cells in its distal portion, generally seen in the neonatal period. In a new born, Hirschspriungs disease should be suspected with delayed passage of meconium, whereas in an older child the disease presents generally with chronic abdominal pain associated with constipation and weight loss. Other symptoms may include subacute obstruction with bilious vomiting, abdominal distension and failure to thrive.

We wish to emphasize that in addition to the imaging findings of Hirschspriungs disease, radiologists have to look for associated colonic malrotation or right sided fixation of sigmoid colon.



Axial post contrast CT of the abdomen demonstrates an abnormal horizontal course of the descending colon across the midline, anterior to the kidneys, aorta and IVC - extending up to the right upper quadrant (red arrows). The descending colon then curves anteriorly and continues inferiorly as the sigmoid colon (on the right side of abdomen, white arrow) which is markedly distended with fecal material.



Coronal post contrast reformatted CT image of the abdomen and pelvis demonstrates a grossly dilated sigmoid colon situated in the right side of abdomen and pelvis suggestive of right side fixation of the sigmoid colon. There is gradual narrowing of the rectum in the pelvis (red arrow) with rectosigmoid ratio less than 1, suggestive of Hirshsprung's disease.

##PAGE_BREAK##

Abstract: 265

Costotransverse joint septic arthritis with abscess and Methicillin Sensitive Staphylococcus Aureus (MSSA) bacteremia

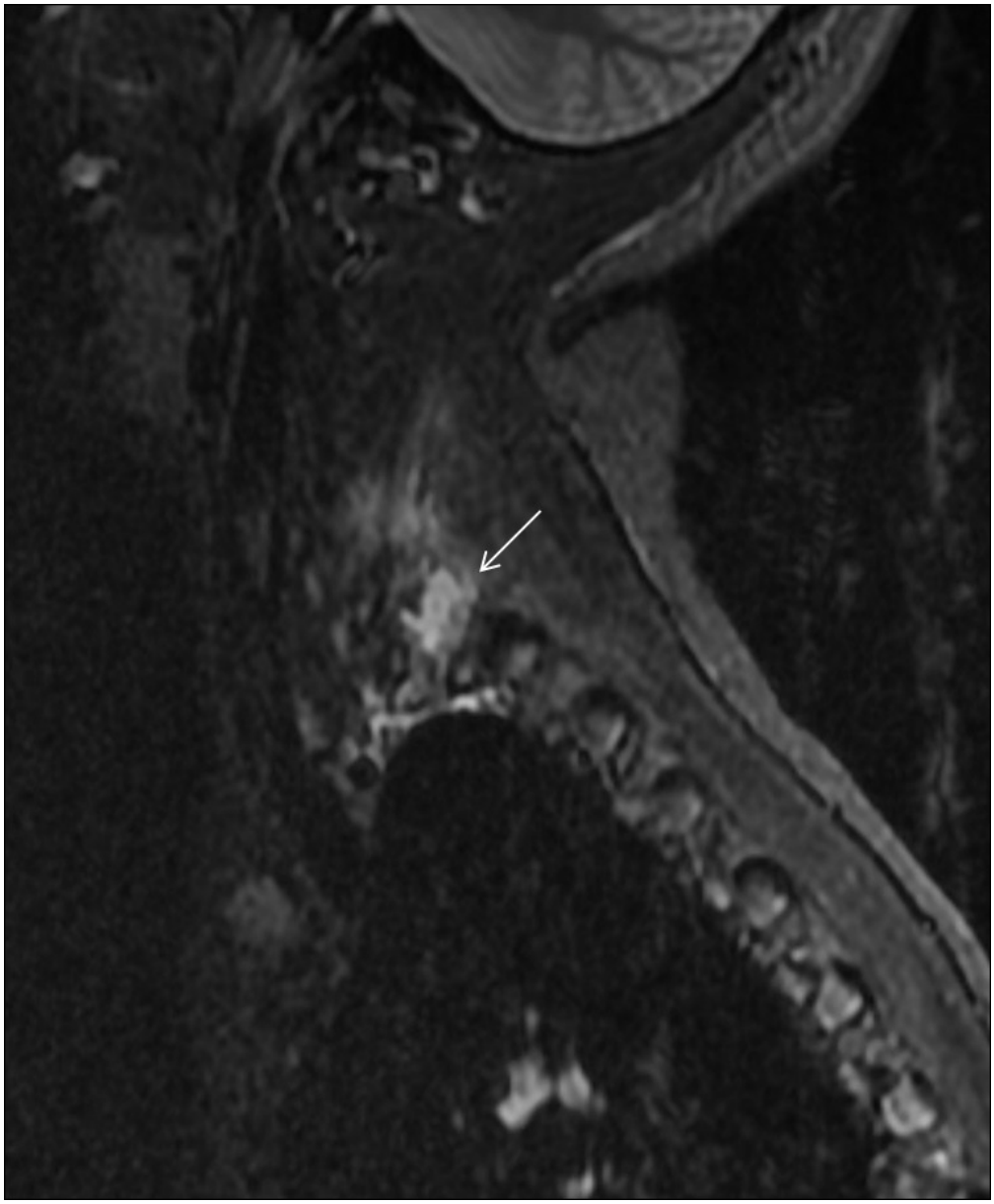
Ravikumar Hanumaiah, Dr. Anna K Thomas
Pediatric Radiology, UTHSC, Le BonHeur Childrens Hospital, Memphis, Tennessee, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A 5 year old female presented to the Emergency Department with right upper back pain, fever, and MSSA bacteremia.
Physical examination findings (including vital signs)
Laboratory or Diagnostic imaging or Procedures MRI of Thoracic spine showed right T1 costotransverse joint septic arthritis with a small abscess and osteomyelitis of the contiguous right 1st rib and right T1 transverse process. An attempt to aspirate the joint under contrast CT guidance was unsuccessful as the abscess could not be visualised. The patient was admitted and treated initially with intravenous Cefazolin. Repeat MRI a week later, revealed spread of infection to the T1 vertebral body, without increase in size of the right T1 costotransverse joint abscess. However, there was clinical improvement and she was discharged on oral Cephalexin with return to normal self on follow-up after 20 days.
We searched for cases of costotransverse septic arthritis and rib osteomyelitis in our Institution for the past 4 years and found 1 additional case. The other case revealed a subperiosteal abscess along the right 9th rib on contrast CT of the chest with probable septic

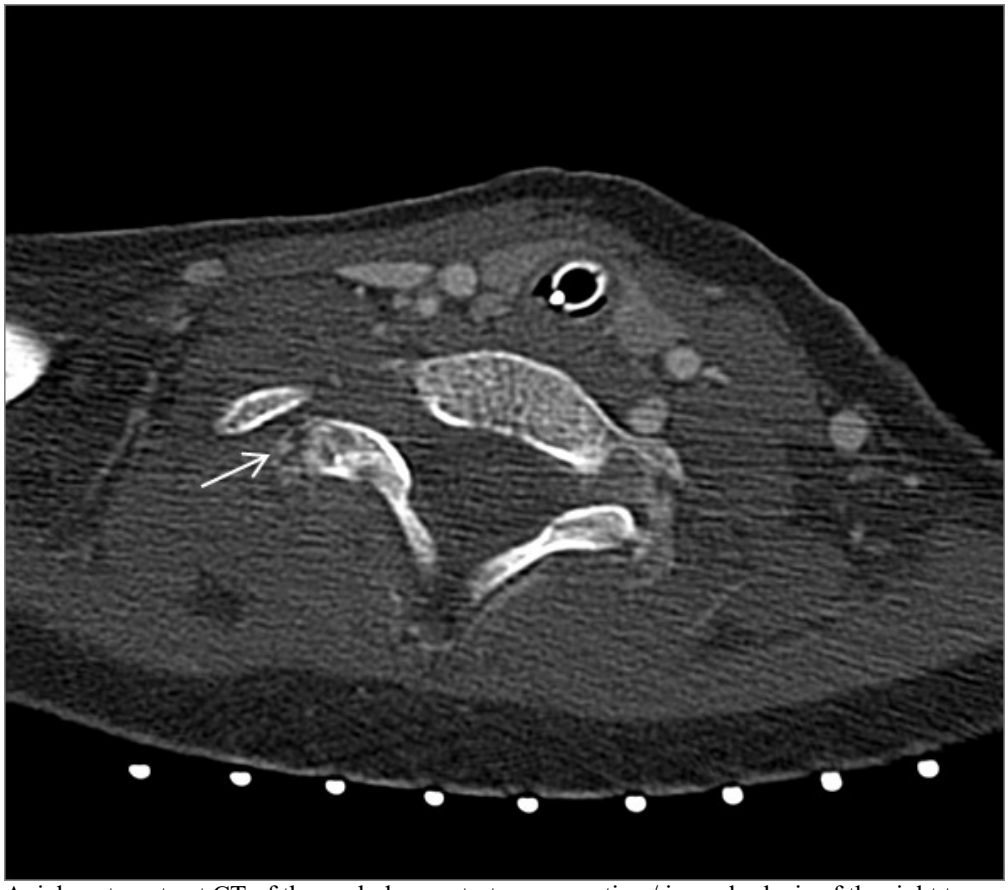
arthritis of the contiguous costotransverse joint. This case was also managed conservatively with patient improving on oral antibiotic therapy.
Final Diagnosis We present a case of a young patient with right costotransverse joint septic arthritis and Methicillin Sensitive Staph Aureus (MSSA) bacteremia. This infection later spread to the T1 vertebral body. This is the first reported pediatric case of isolated costotransverse joint septic arthritis with MSSA bacteremia noted in the literature.

The costotransverse joint articulates between the rib and transverse process of the vertebra. Septic arthritis of costotransverse joint is not easily recognized due to small size of area involved and the relative insensitivity of most imaging studies to establish an abnormality in this location. Significant morbidity occurs because of delayed diagnosis.

Early diagnosis of septic arthritis of costotransverse joint is challenging but important to prevent associated morbidity. The costotransverse, costovertebral and facet joints have to be carefully evaluated on MRI for signs of infection when a patient presents with fever, back pain, and elevated inflammatory markers. Contrast enhanced MRI is the most sensitive and specific test for the diagnosis of atypical sites of septic arthritis and rib osteomyelitis.



Sagittal STIR image of the cervical spine demonstrates a 8 x 7 mm fluid collection at the right T1 costotransverse joint suggestive of an abscess.



Axial post contrast CT of the neck demonstrates permeative / irregular lysis of the right transverse process of the T1 vertebra, however the abscess clearly seen on the MRI is not visualised.

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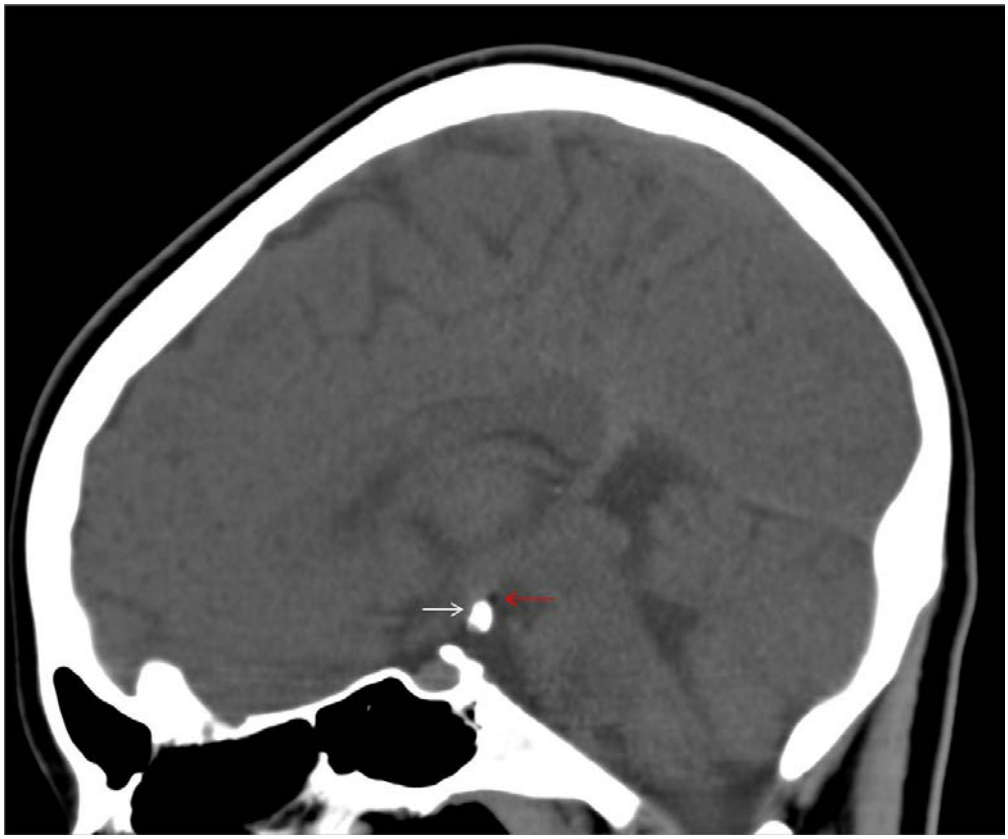
Abstract: 266

Osteolipoma of the Tuber Cinereum

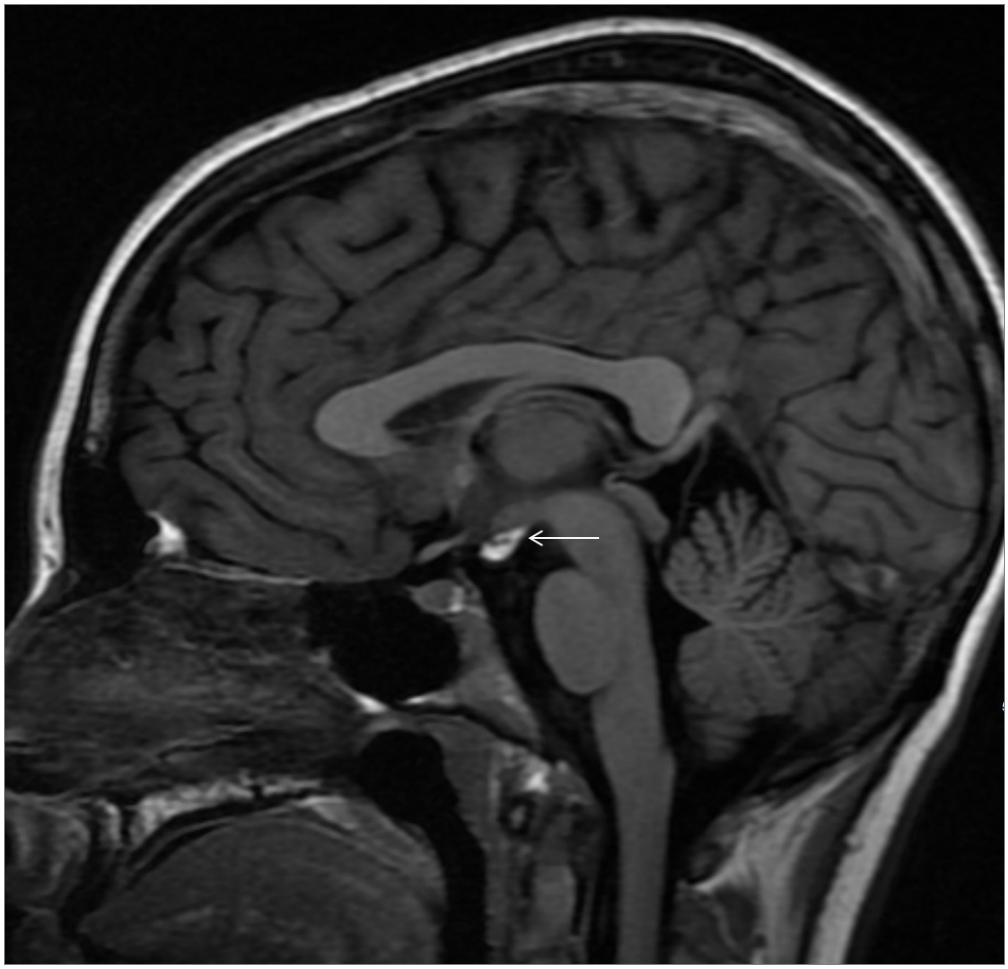
Ravikumar Hanumaiah, Dr. Anna K Thomas, Dr. Asim Fiaz Choudhri
Pediatric Radiology, UTHSC, Le BonHeur Childrens Hospital, Memphis, Tennessee, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A 16 year old female presented with history of occasional episodes of syncope, since 2006. No relevant past and family medical history.
Physical examination findings (including vital signs)
Laboratory or Diagnostic imaging or Procedures CT of the head demonstrated a primarily calcified lesion with small elements of fat in the region of the tuber cinereum. An MRI of the Brain demonstrated a predominantly T1 hyperintense lesion with susceptibility signal abnormality representing a combination of fat and calcification, abutting the tuber cinereum. The lesion did not exert significant mass effect on or infiltrate/ involve the optic pathway, infundibular stalk, pituitary gland or the third ventricle. The patient had a prior CT head in 2006 which showed a small fat density lesion with thin linear peripheral calcification in the region of the Tuber Cinereum. The lesion had slightly increased in size and demonstrated more calcification now, compared to the prior CT.
Osteolipomas arise from remnants of the meninx primitiva or from the mesenchyme of the craniopharyngeal duct. The typical site of origin is from the tuber cinereum of the hypothalamus between the pituitary stalk and the mammilary bodies. The lesions consist of central adipose and peripheral osseous tissue which distinguishes them from intracranial lipomas at other locations. They project into the suprasellar or interpeduncular cisterns.
The lesions are mostly incidental findings on CT or MRI scans done for other reasons. These lesions are usually not associated with significant clinical symptoms or abnormalities and do not need surgical excision.
After an extensive search of our institutional data base spanning the last four years, we found 2 additional cases of osteolipomas of the tuber cinereum which were discovered incidentally on Head CT examinations performed after head injury.
Final Diagnosis Intracranial osteolipomas are very rare, with approximately 30 cases having been reported in the literature (1).

Intracranial osteolipomas have typical site of origin from the tuber cinereum and consist of central adipose and peripheral osseous tissue which distinguishes them from intracranial lipomas at other locations. In most cases, they are detected as incidental findings. Awareness of the imaging features is essential as these lesions are benign and do not need surgery.



Sagittal reformatted CT image demonstrates a predominantly calcified lesion (white arrow) with focus of fat density (red arrow) abutting the Tuber Cinereum, suggestive of an osteolipoma.



Sagittal T1W MRI of the Brain demonstrates a 10 x 5 x 8 mm (AP x CC x TR) predominantly T1 hyperintense lesion abutting the Tuber Cinereum, likely representing a large fatty component of the lesion, suggestive of an osteolipoma.

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Abstract: 267

7 Year Old Boy with Refractory Epilepsy

Ryan E. Alanzalon

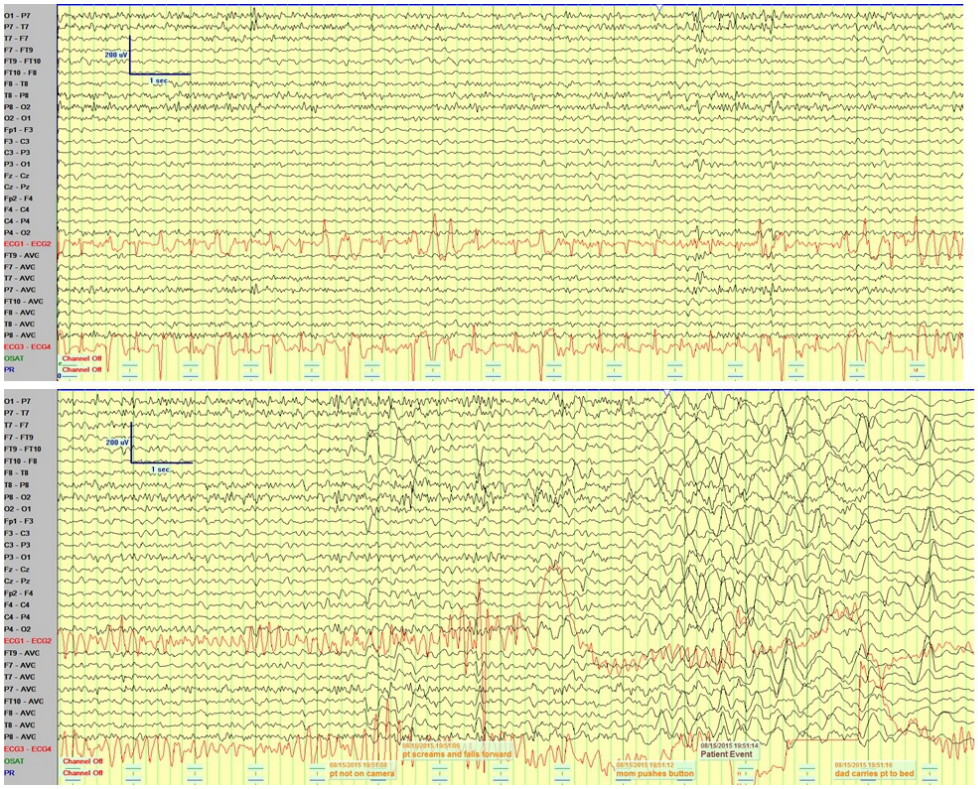
Pediatics, University of Rochester Medical Center, Rochester, New York, United States

History (including chief complaint, history of present illness and relevant past and family medical history) see word document attached

Physical examination findings (including vital signs) see word document attached

Laboratory or Diagnostic imaging or Procedures See word document attached

Final Diagnosis Long QT syndrome



EEG Tracing

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Abstract: 268

A Term Infant with Suspected Fetal Skeletal Dysplasia

Sarah Beaudoin, Christiana N. Oji-Mmuo, Kristen Glass

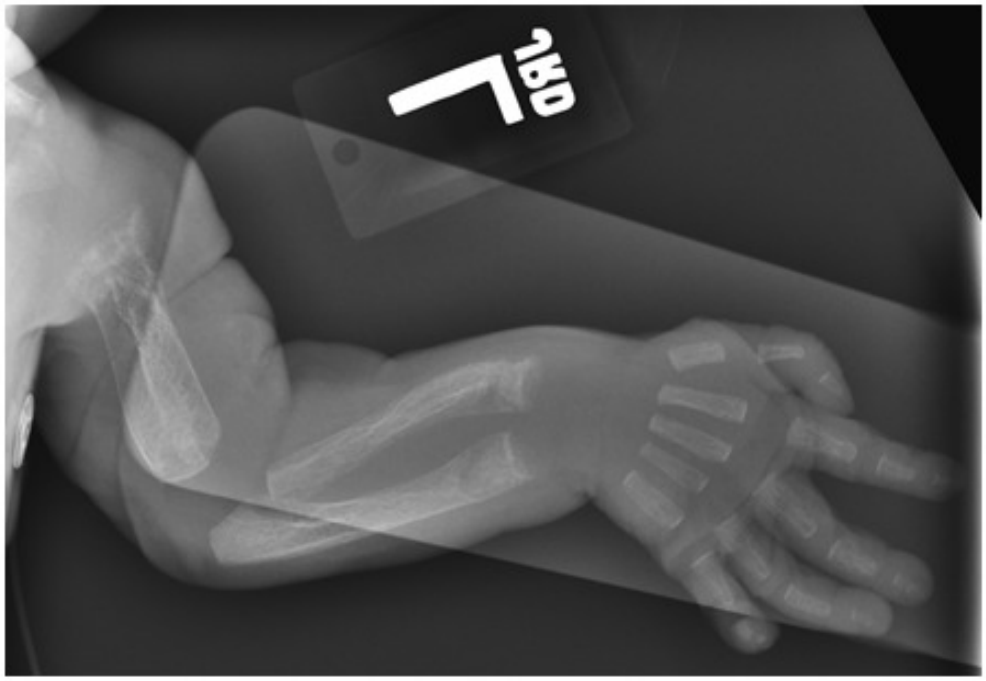
Pediatrics, Penn State Hershey Medical Center, Hershey, Pennsylvania, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A term female infant presents with IUGR, foreshortened long bones with thickened diaphyses and irregular metaphyses, osteopenia, elevated alkaline phosphatase, low Vitamin D, thrombocytopenia, direct hyperbilirubinemia, poor feeding, and intermittent desaturations. She was born at 37 4/7 weeks' gestation by urgent C-section due to non-reassuring fetal heart tones. At the time of delivery, there was a nuchal cord x2, but the infant did not require resuscitation. Apgar scores were 8 and 9 at 1 and 5 minutes, respectively. The mother is a 26-year-old G2 P2 who had no significant past medical history and unremarkable prenatal serology, but whose pregnancy was complicated by IUGR and suspected fetal skeletal dysplasia. No prenatal genetic testing was performed. There is no known consanguinity and the family is of German Baptist descent. There is no known family history of any genetic or metabolic conditions. The parents have a 2-year-old daughter who is well. The infant had poor oral feeding skills and received most of her nutrition via nasogastric tube feedings. She also had frequent desaturation events both during feeds and while sleeping, but they were most often self-limited and did not require intervention.

Physical examination findings (including vital signs) See attached narrative

Laboratory or Diagnostic imaging or Procedures Laboratory studies were notable for several abnormalities. There were abnormal RBCs with increased erythroid precursors that were bi-nucleated and polychromatophilic, with occasional blasts, as well as persistent thrombocytopenia. Platelets were 41K/UL on admission and remained low for several days, then spontaneously recovered without treatment. She presented with a gapped metabolic acidosis (Na 137mmol/L, K 5mmol/L, Cl 102mmol/L, HCO3 16mmol/L, Anion gap 19mmol/L), which slowly resolved by DOL 7. She also developed mildly elevated transaminases (AST 111unit/L), an elevated GGT (554unit/L), but normal coagulation studies and ammonia slightly elevated (135umol/L). She also developed a direct hyperbilirubinemia. Total bili peaked at 14mg/dL on DOL 3, and direct bili peaked at 4.6mg/dL on DOL 9. Her newborn screen was normal, and additional metabolic tests (serum amino acids, urine organic acids, acyl carnitine profile, VLCFA profile) were all normal. Testing for tyrosinemia and alpha-1-antitrypsin was also negative. Alkaline phosphatase was consistently elevated, peaking at 2912unit/L. Vitamin D testing was low (17ng/mL). A skeletal survey was completed (see image). Genetic testing, including a full microarray, was sent.

Final Diagnosis Mucolipidosis II alpha beta and Leigh Syndrome



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Abstract: 269

Natural Drugs, Not So Natural Effects

Lauren Davidson, Munmun Rawat, Praveen Chandrasekharan
Neonatology , University at Buffalo, East Amherst , New York, United States

History (including chief complaint, history of present illness and relevant past and family medical history) CC: 2 do baby with poor feeding, hypertonia, and tremors
HPI: A 37 wk female born at an outside facility and presented on day 2 with reducing oral intake, worsening tremors, and increasing tone.
Maternal Hx: G2P1, singleton natural conception. Past medical hx of chronic low back pain, fibromyalgia and anxiety. Her medications included prenatal vitamins, gabapentin (600mg PO TID), clonazepam (0.5mg PO 1-3 times per day) and herbal supplements (1-3 times a day). Maternal labs: blood type A pos, RPR non-reactive, Hep B surface antigen negative, HIV negative, Rubella immune, GBS positive, urine tox screen negative. Social hx was positive for tobacco use during pregnancy.
No significant family hx of genetic disorders.
Birth: Baby born by normal SVD under epidural anesthesia and did not require resuscitation at birth. The Apgar scores were 8 and 9 at one and five minutes of age respectively. Baby's birth weight was 2.3 kg (10.6% for gestational age(GA)), length was 45.7 cm (22.7% for GA) and her head circumference was 28 cm (<1% for GA).
Nursery course: She underwent routine newborn nursery care. By her second day of life baby, she began to feed poorly, was found to be jittery and hypertonic. A urine toxicology screen sent on the baby on day 1 of life secondary to maternal hx and was negative. A CBC with diff was within normal limits. Unclear if symptoms were secondary to drug withdrawal, the Finnegan scoring was initiated on the baby. With worsening of signs and symptoms, the baby was transferred to our tertiary center for further evaluation and management.
Physical examination findings (including vital signs) On admission to tertiary center:
Vitals: Temp - 37.1 C, HR – 145/m, RR – 51/m, BP - 82/44 mmHg
HEENT: Microcephaly with normal facies, intact palate. AFOF. Red reflex present b/l.
RESP: Breath sounds clear and equal. No distress.
Cardio: Reg rhythm, no murmur. Good perfusion.
ABD: Soft, non-distended. No hepatosplenomegaly or mass is palpable.
GU: Term female with patent anus
Neuro: jittery, hypertonic
Neck/Spine: intact without deformity
Extremities: Hips normal. Extremities without deformity.
Skin: jaundice
Laboratory or Diagnostic imaging or Procedures CBC with diff: WBC - 6.1, Hgb - 17.3, hct- 49.4, Plt – 329 with Segments-37, Bands-0, Lymphocytes-32
BMP: Na 143/K 5.2/113/17/10/0.59/46/9.2 Bili 11.7 (direct-0.5)
Toxoplasma Gondii Ab IgG 0.08

Toxoplasma Gondii Ab IgM 0.00
Urine Cx for Cytomegalovirus negative
Head Ultrasound: Normal Head Ultrasound
Final Diagnosis Further Hx taken on admission to tertiary center revealed the final diagnosis
Neonatal Abstinence Syndrome – secondary to Mitragyna speciose (an herbal supplement also known as Kratom).
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Abstract: 270
A Nursing Communication Tool to Improve the Multidisciplinary Approach to Neonatal Nutrition
Renita pushparajah[2], Shakuntala Chandra[1], Bethany Jung[1], Delena Allen[1], Kayla Uzleber[1]
[1]Neonatology, Saint Peter's University Hospital, Belle mead, New Jersey, United States, [2]Pediatrics, Saint Peter's University Hospital, New Brunswick, New Jersey, United States

Background 54 bed level 3 neonatal ICU,450 bed non profit catholic institution, 6500 deliveries with 1200 NICU admissions: Average 100-120 infants < 1500 gms per year.
Extrauterine growth retardation (EUGR) of preterm infants ≤1500 grams < 10th percentile at discharge for the corrected gestational age. Our EUGR rate from Vermont Oxford Data in 2015 was 64%.
Adequate postnatal growth has been one of the most important goals in optimizing the quality of life for premature infants
There's a paucity of knowledge in how interdisciplinary communication can influence patient outcomes in a NICU
Objective To improve nurse participation and awareness and create a standardized method of communication between bedside nurse and multidisciplinary team regarding neonatal nutrition and growth by 50% in the next 6 months
Design/Methods NICU nurses were evaluated for baseline knowledge and educated regarding neonatal nutrition and EUGR by:
Nursing day to day huddles
PowerPoint Presentations

Nutritional Communication Assessment Tool (NCAT) was designed to ensure a standardized process of communication during rounds that can assist frontline staff to assess and evaluate the growth trends of the premature infants.

All neonatal nurses were educated on the NCAT using:
Comprehensive Unit-based Safety Program (CUSP) methodologies
Peer to peer teaching methodology
Nursing day to day huddles

Measures:
Bedside nurse participation/awareness measured by evaluating the completion of the upper portion of the NCAT form
After daily nutrition plans were finalized by providers (Neonatologist/NP/Residents/Fellows/PA) acknowledged the nurse presenting the information and signed the lower portion as a measure NCAT
Data collected over 14 months once NCAT was implemented and data was evaluated using Microsoft Excel Data
Results 65 Charts reviewed, 1354 NCAT forms for their hospital stay
1259 of 1354 (93%) of the upper portion of the NCAT were completed by bedside nurses
866 of 1354 (64%) of the lower portion of the NCAT was completed by the primary care provider
Conclusion(s) NCAT Bedside tool implementation:
In the 14 month period we improved the nursing participation and neonatal nutrition and growth awareness by 93 %
In the 14 month period we improved the multidisciplinary team participation by 64%
We created a standrized method of communication to improve the communication amgonst the nurses and multidisciplinary team.

•**Date:**_____

•**NICU Nutrition Data Collection Maintenance Form**

•**Infants <2000 grams**

•**Shift: Night**

•Feeding: EBM/Formula Enf Fort/Sim Fort
Calories_____

•**Based on tonight's weight: _____Scale#_____**

•Total Enteral Feeds=ML/KG/DAY_____

• Goal **volume** of 160 mL/kg/day

•Today's weight (gms): _____

•Weight 7 days ago (gms): _____

•Difference of (#1&#2): _____

•Answer (#3)/7: _____

•Answer (#4)/today's weight in kg _____

•Goal**: weight** gain **= 18 grams/kg/day over past 7 days (range 15-20g/kg/d)**

•**Shift: Day**

•**Rounding Team:**

•**Physician/NNP_____RN_____**

•**Date of Rounding ____/____/_____ Time_____**

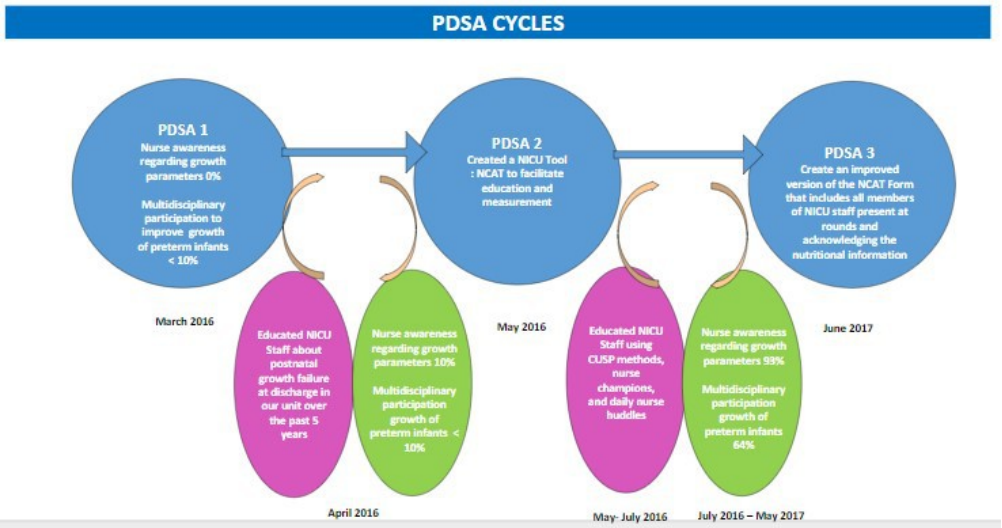
•**Nutritionist present YES NO**

•**Physician and nurse rounded together at bedside YES No**

•**If no, Reason_____**

•(Not a part of the permanent medical record

Nutritional Communication Assessment Tool



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Abstract: 271

Determinants of the Lung Microbiome in Intubated Premature Infants at Risk for Bronchopulmonary Dysplasia

Mariana R. Brewer, Diana Maffei, Seungjun Ahn, James DeVoti, Champa Codipilly, Annette Lee, Barry Weinberger

Neonatal-Perinatal Medicine , Cohen Children's Medical Center, Lilling Family Neonatal Research Lab, Feinstein Institute for Medical Research, Northwell Health, New Hyde Park , New York, United States

Background The lung microbiome in intubated preterm infants may be affected by the in-utero environment, mode of delivery, antibiotics, and micro-aspiration of oral contents. Early oropharyngeal colostrum (OPC) administration alters the oral microbiome,

which may impact microbial colonization of the lung. Patterns of colonization and reduced microbial diversity in the lung may be associated with inflammation and the development of bronchopulmonary
dysplasia (BPD).
Objective To develop a model for evaluating the interaction of oral and lung microbiota in intubated infants < 32 weeks gestation, and their effect on the risk for BPD. Specific aims were to compare the composition of oral and tracheal microflora on days 3 and 7, and to characterize the effects of prolonged intubation and OPC administration on microbial diversity.
Design/Methods The oral microbiome was analyzed on day 3 by 16S ribosomal DNA sequencing. Microbial contents of tracheal aspirates on days 3 and 7 were evaluated as a surrogate for the lung microbiome (n=34). OPC was administered as soon as possible after birth, as per standard practice. Microbial diversity was quantified using the Shannon diversity index.
Results The oral microbiome on day 3 contained Firmicutes (70% Staph., 18% Strep.) and Ureaplasma (12%). The day 3 tracheal microbiome was made up of Firmicutes (50%, Staph.), Ureaplasma (25%), and Proteobacteria (25%, Escherichia & Halomonas), but evolved to Firmicutes (78% Staph.) and Ureaplasma (22%) by day 7. There was a trend towards decreased microbial diversity in day 3 saliva and day 7 trachea in infants who developed BPD or expired. Each additional 10 hrs of intubation was related to a 4.1% decrease in microbial diversity (95% CI: -9.4%- 1.6%; $p<0.1$). Each 5hr delay in OPC administration was associated with a 2.1% decrease in diversity in saliva and trachea (95% CI: -5.8%- 1.8%; $p<0.2$). Delayed OPC ($\geq$ 21 hrs) was also associated with increased gene expression of CD66 and IL-1β in tracheal neutrophils and macrophages, respectively.
Conclusion(s) The diversity of the lung microbiome decreases with prolonged intubation, suggesting an association with BPD. The day 7 tracheal microbiome is similar to day 3 saliva, supporting that it is acquired in part through microaspiration. Delayed colostrum administration is associated with decreased bacterial diversity and increased leukocyte inflammatory activity in the airway, suggesting a role for early OPC in establishing protective microbial environments in both the mouth and airway.

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Abstract: 272

Noise Exposure from Neonatal High-Frequency Ventilators

Justin Goldstein, Alyse Laliberte, Martin Keszler
Pediatrics, Brown University, Providence, Rhode Island, United States

Background Noise has detrimental effects on clinical stability and neuro-developmental outcomes in neonates. Newborn infants show a physiologic response to sound starting at 23-25 weeks of gestation, which can affect their stability during a long NICU course. Current recommendations are for NICU noise to not exceed 45 decibels (dB), as it can induce apnea, bradycardia, blood pressure fluctuations and oxygen desaturations. Newborns exposed to loud noise can also develop hearing impairment with subsequent speech delay and IVH with resulting neurologic impairment. Noise also has a potentiating effect on ototoxic medications. High frequency ventilators (HFV) are one of the loudest noise producers in the NICU. New generations of HFV devices including the Dräger VN 500 and Bunnell Life Pulse model 204 jet ventilator may be quieter.
Objective To quantify and compare the noise created by four high frequency ventilators over a range of clinically appropriate settings. Our hypothesis was that the new generation of HFV devices are quieter than the older models.
Design/Methods Four high frequency neonatal ventilators (Dräger VN 500, Sensormedics 3100A & Bunnell Life Pulse Jet Ventilator models 203 and 204) were set to a range of settings and attached to a test lung. Ventilators were placed next to an open warmer and a high-fidelity decibel meter (EXTECH 407780A) was placed on the warmer. Steady-state sound levels were recorded over a range of ventilator settings. For the oscillators (Dräger and Sensormedics) frequency, mean airway pressure and amplitude were adjusted. For the jet ventilators, frequency, positive end expiratory pressure and peak inspiratory pressure were adjusted. Data were analyzed by t-tests, ANOVA and regression models.
Results Dräger was the quietest ventilator, with average sound levels of 49.8 ± 0.49 dB. Sensormedics sound levels were 53.6 ± 2.01 dB, Bunnell Model 203 was 54.1 ± 1.09 dB and Bunnell Model 204 was 53.7 ± 1.45 dB. Frequency/rate and MAP/PEEP had minimal effect on noise level, yet amplitude/PIP had marked effects on noise. Sensormedics and Bunnell ventilators were louder than the Dräger at all settings, and the difference became greater as amplitude/PIP increased. The Model 204 jet was not quieter than the Model 203, with most noise coming from the humidification cartridge.
Conclusion(s) The Dräger VN 500 in high-frequency mode is significantly quieter that both the Sensormedics and Bunnell ventilators. These data suggest that using the Dräger VN 500 in HFOV mode may reduce the potential for adverse outcomes created by ventilator noise.

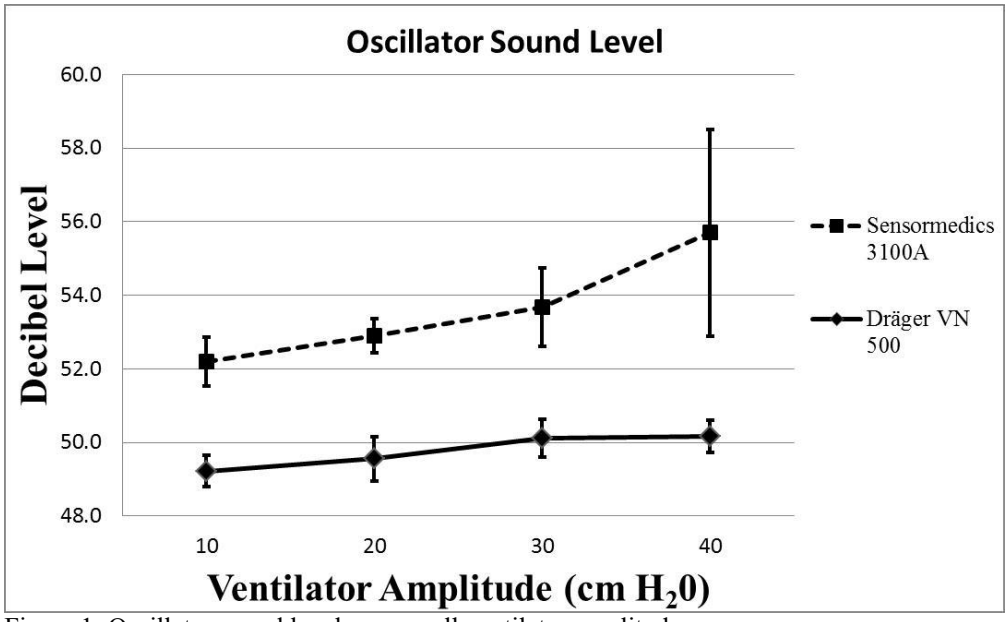

Figure 1: Oscillator sound levels across all ventilator amplitudes

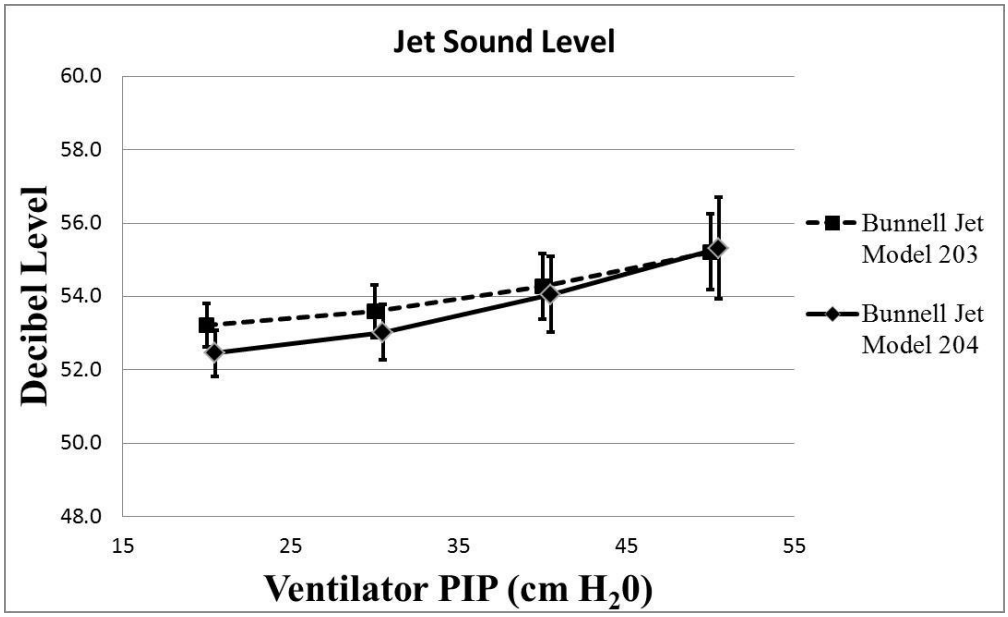

Figure 2: Jet sound levels across all ventilator PIPs

Decibel Level at each Amplitude/PIP

Oscillator Amplitude (cm H_2O)	Dräger VN 500	Sensormedics 3100A	PIP (cm H_2O)	Bunnell Jet Model 203	Bunnell Jet Model 204	p-value
10	49.2 (48.9-49.5)	52.2 (51.8-52.6)	20	53.2 (52.8-53.6)	52.4 (52.0-52.8)	<0.01
20	49.5 (49.2-49.9)	52.8 (52.4-53.3)	30	53.6 (53.1-54.1)	53.0 (52.6-53.5)	<0.01
30	50.1 (49.6-50.6)	53.7 (53.0-54.4)	40	54.3 (53.6-55.0)	54.1 (53.4-54.8)	<0.01
40	50.2	55.7	50	55.2	55.3	<0.01

	(49.2-51.1)	(54.3-57.1)		(53.9-56.6)	(54.0-56.7)	

Table 1: Mean sound level (in decibels) with 95% confidence intervals reported. Data analyzed by linear regression with the Dräger ventilator as reference

Mean Ventilator Sound Levels

Ventilator	Mean Sound Level
Dräger VN 500	49.8 ± 0.5
Sensormedics 3100A	53.6 ± 2.0
Bunnell Jet Model 203	54.1 ± 1.1
Bunnell Jet Model 204	53.7 ± 1.5

Table 2: Mean sound levels of each ventilator (in decibels), includes all settings tested (St. Dev. Reported)

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Abstract: 273

Four-Extremity Blood Pressure Measurements In Neonates and Impact on Nursing Workload

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Background The goal of performing four-extremity blood pressures (4-BP) in neonates is to aid in the clinical diagnosis of potentially life-threatening aortic arch abnormalities, including Coarctation of the Aorta (COA), Aortic Arch Hypoplasia (AAH) and Interrupted Aortic Arch (IAA). Pulse oximetry screening, recommended by the American Academy of Pediatrics (AAP) as a screening test for critical congenital heart disease (CCHD) in neonates, is less effective in identifying such aortic arch abnormalities when compared to detecting other forms of CCHD. Thus, despite not being officially recommended by the AAP in CCHD screening, 4-BP screening has commonly been implemented as a screening test for neonates at many institutions. In our NICU, we started routinely having nurses perform 4-BP on every neonate prior to discharge starting in October 2016. However, at this point in time, the utility of 4-BP in neonates as a good and worthwhile screening test has yet to be proven in the literature. In a study by Patankar et al. 2016, it was found that ~25% of their case neonates with COA/IAA, had normal mean BP differences, inferring that measuring 4-BP may have high specificity but low sensitivity. Moreover, the impact of this screening test (with inherent high measurement variability) on nursing workload, has yet to be assessed.

Objective To assess the impact of pre-discharge 4-BP measurement in neonates on nursing workload.

Design/Methods This is a prospective study on infants discharged from the NICU in the month of December 2017, at NYU Winthrop Hospital (a regional perinatal center with a level 4 NICU). BPs were recorded using appropriate sized cuffs by oscillometric method. Total number of attempts and time required to obtain BPs while infant is in a calm state were recorded. A value of 4 was considered the minimum number of attempts for the 4 extremities. A mean BP gradient of >10 mmHg between the upper and lower extremity is considered abnormal.

Results Data collected from 40 infants show that an average of 9 attempts (9.42 ± 4.2) were required to obtain the BPs in a calm state and required an average of 25 minutes of nursing time (24.52 ± 14.8) per patient. At our institution, which has ~750 discharges per year, it translates to ~15% of 1 full time equivalent nursing time. None of the infants during the study period had an abnormal screen.

Conclusion(s) Measuring 4-BP in neonates is workload intensive on nurses' time. Its utility as a routine screening test to detect CCHD, like COA, AAH, and IAA in neonates, remains to be validated in larger studies.

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Abstract: 274

Provider and Patient Factors that Impact Neonatal Referral for Organ Donation

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Background The US organ transplant waitlist exceeds 120,000, with ~2,000 pediatric patients awaiting organs. Determination of brain death is infrequent in neonates. Thus, the AAP endorses donation after circulatory determination of death (DCDD) as an acceptable alternative to close the gap between supply and need. Despite this recommendation, neonatal organ donation is rare. Factors that impact

provider referral to organ procurement organizations (OPOs) for organ donation have not been reported.
Objective To describe characteristics influencing NICU referral patterns for organ donation and compare local OPO eligibility to published OPO criteria from other regions.
Design/Methods All deaths occurring in an urban Level 4 NICU from April 2007 to December 2017 were reviewed retrospectively. Data extracted included timing, nature and outcome of OPO interaction as well as patient characteristics (demographics, circumstances of death, warm ischemic time, and presence of exclusion criteria for organ donation). Data were analyzed using chi-square analysis for categorical variables and Wilcoxon rank sum test for continuous variables.
Results 329 deaths were identified; 64 were excluded due to previable death in the delivery room or absent documentation. Of the remaining 265, 4 infants not referred before death may have met local OPO criteria for DCDD; no organs or tissues were donated. Based on regional OPO criteria published in the literature, a variable but larger number of neonates would be eligible (Table 1). Characteristics of referral to local OPO are described in Table 2. 4% of referrals occurred prior to patient death; 96% of referrals were declined for organ donation due to patients no longer being mechanically ventilated at the time of the OPO referral. There was a significant increase in referrals before death (a requirement for organ donation) when the call was made by an attending neonatologist, in the setting of planned withdrawal or non-escalation/DNR, and based on increasing birthweight, GA, and PMA. Circumstances associated with a decrease in referral to the OPO included male gender, lower weight at death, earlier PMA, lack of anomalies, and death that occurred despite maximal support.
Conclusion(s) Based on local OPO criteria, fewer neonates qualified for organ donation than those reported in the literature from other regions. In addition, referral to the OPO after death disqualified the small number of potential donors. Further education of providers is warranted to improve local referral patterns for neonatal organ donation.

Table 1:Comparison of Local NICU Deaths and OPO Criteria to Published Data

Published Organ Donation Criteria	Local OPO Baltimore, MD	OPO#1 Salt Lake City, UT Stiers et al., 2015[1]	OPO#1 Salt Lake City, UT Bennett et al., 2015[2]	OPO#2 Los Angeles, CA Hanley et al., 2014[3]	OPO#2 Los Angeles, CA Mathur et al., 2011[4]	OPO#3 Boston, MA Labrecque et al, 2011[5]	OPO#4 Kansas City, MO Weiner et. al., 2014[6]
Organs Evaluated	heart valves kidney	hepatocytes heart valves kidney	kidney liver	kidney	heart	heart kidney liver	unspecified solid organs
WIT [a], min	kidneys: <90	hepatocytes: <180 kidneys: <90	kidney: ≤60 liver: ≤20	all: <120	heart: <30	heart: <30 liver/kidney: <60	all: ≤90
GA or PMA [b] (weeks)	≥32 GA at birth	not specified	not specified	not specified	not specified	≥37 PMA	≥32 PMA
Weight (kg)	kidney: ≥2.5	hepatocytes, kidney: ≥2	>2	>1.8	>2.5	>3	not specified
Exclusion Criteria							
Congenital Anomalies	chromosomal, CHD, abdominal wall defects, hydrops	renal-relative contraindication	not specified	renal anomalies	CHD (excludes PDA)	organ failure, renal, “major” CHD	not specified
Infection	“active infection”	relative contraindication	not specified	positive blood or urine culture w/in 72 hr. of death,	positive blood or urine culture w/in 48 hr. of death, known	“active infection”	not specified

				known chronic infection	chronic infection		
Other	HIV, malignancy	not specified	not specified	HIV	HIV	HIV, malignancy, encephalopathy of unknown etiology, brain death	not specified
Hemodynamic Instability	not specified	not specified	not specified	not specified	Dopamine ≥10 mcg/kg/min multiple vasocative meds	multiple vasoactive meds	not specified
Inclusion Criteria							
WLST[c]	Required	Required	Required	Required	Required	Required	Required
Renal Function UOP (ml/kg/hr) Creatinine (mg/dL)	Not anuric Not specified	not specified	not specified	>1 ≤ 1.5	not specified	not specified ≤1.5	not specified
Age (days)	>7	not specified	not specified	not specified	not specified	no minimum	not specified
Heart Valves: GA[b] (weeks)[b] Weight (kg)	>36 ≥3.18	not specified ≥2.72	not specified	not specified	not specified	not specified	not specified
Number of Deaths	265	136	81	609	265	192	141 deaths at ≥32 wks PMA
Timeframe	4/2007-12/2017	1/2010-5/2013	2011-2012	11/2002-10/2012	6/2003-6/2008	1/2005-12/2007	1/2009-12/2012
% WLST [c]	51%:12% planned, 39% terminal	48%; 4% not mechanically ventilated	86%	26%	59% of >2.5 kg	not specified	74%
%DCDD Candidates	kidney:1.5%	kidney: 33% hepatocytes: 40%	kidney: 49% liver: 23%	kidney: 7%	heart: 4%	kidney: 5% liver: 7% heart: 5%	80% of deaths at ≥ 32 wks PMA
% Heart Valve Candidates	5%	42%	not evaluated	not evaluated	not evaluated	not evaluated	not evaluated
% Who Donated	0	3%	3%	0	not specified	not specified	not specified
WIT [a] (min) Median	28 (41.75)	48	53 (77)	not reported	31	23.8 ± 12.7	187 ± 507

(IQR) [d] or Mean± SD							
Qualification Based on OPO Criteria [e]	kidney: 1.5% heart valves: 5%	kidney: 9% hepatocyte:15% heart valves: 11%	kidney: 8.3% liver: 6%	kidney: 6%	heart: 4%	kidney: 5% liver: 6% heart: 2%	16% of total, 33% of >32wk

a=Warm ischemic time (WIT): Time from discontinuation of mechanical ventilation to time of death; b=Gestational Age (GA), Post-maturational age (PMA); c=Withdrawal of life-sustaining treatment (WLST); d=Interquartile range (IQR). Numbers as reported in publication; e= Local study population evaluated for potential for organ donation based on criteria published in other reports. Listed values are percentage of local candidates for organ/tissue donation using other OPO's reported criteria. 1. Stiers J, Aguayo C, Siatta A, Presson AP, Perez R, DiGeronimo R. Potential and actual neonatal organ and tissue donation after circulatory determination of death. JAMA Pediatr. 2015;169(7):639-645. 2. Bennett EE, Sweney J, Aguayo C, Myrick C, Antommaria AH, Bratton SL. Pediatric organ donation potential at a children's hospital. Pediatr Crit Care Med. 2015;16(9):814-820. 3. Hanley H, Kim S, Willey E, Castleberry D, Mathur M. Identifying potential kidney donors among newborns undergoing circulatory determination of death. Pediatrics. 2014;133(1):e82-7. 4. Mathur M, Castleberry D, Job L. Identifying potential heart donors among newborns undergoing circulatory determination of death. J Heart Lung Transplant. 2011;30(4):389-394. 5. Labrecque M, Parad R, Gupta M, Hansen A. Donation after cardiac death: The potential contribution of an infant organ donor population. J Pediatr. 2011;158(1):31-36. 6. Weiner J and Sharma J. Solid Organ Donation in the Neonatal Intensive Care Unit: Does it Have a Place? In: Proceedings of the 2014 Annual Meeting of the American Academy of Pediatrics; 2014 Oct 11-14; San Diego, CA: AAP; 2014. Abstract nr 18.

Table 2: Characteristics of Patients Referred to Local OPO

	OPO Call After Death (N=207)	OPO Call Befor e Death (N=8)	p-value	OPO Not Called (N=50)	OPO Called (N=215)	p-value
Cir cumstances of Death: n (%) Planned WLST[a] Terminal extubation[b] Despite maximal support[c] Non-escalation/DNR	 24 (12%) 89 (43%) 80 (39%) 14 (7%)	 4 (50%) 3 (38%) 0 1 (13%)	0.0066**	 5 (11%) 9 (20%) 25 (56%) 6 (13%)	 28 (13%) 93 (43%) 80 (37%) 5 (7%)	0.0167*
Gender Male Female	 99 (48.1%) 107 (51.9%)	 3 (37.5%) 5 (62.5%)	0.7238	 32 (70%) 14 (30%)	 103 (48%) 112 (52%)	0.0076**
Race/Ethnicity African-American Caucasian Hispanic Asian/Pacific Islander Other	 123 (60%) 63 (31%) 6 (3%) 6 (3%) 7 (3%)	 3 (37.5%) 4 (50%) 1 (12.5%) 0 0	0.3768	 29 (63%) 11 (24%) 2 (4%) 2 (4%) 2 (4%)	 126 (59%) 61 (32%) 7 (3%) 6 (3%) 7 (3%)	0.8394
Congenital Anomalies Present Absent	 101 (49%) 107 (51%)	 6 (75%) 2 (25%)	0.1686	 16 (34%) 31 (66%)	 108 (50%) 109 (50%)	0.0502
Birthweight (grams)	833 (1423)	2093 (1213)	0.0161*	690 (1480)	850 (1444)	0.2970

Median (IQR)[d]						
Gestational Age (weeks) Median (IQR)	27.43 (9.86)	35.14 (3.86)	0.0205*	26.64 (10.14)	27.57 (10)	0.0553
Weight at Death (grams) Median (IQR)	1285 (1915)	3085 (2500)	0.0043**	865 (1512)	1345 (1915)	0.0252*
Age at Death (days) Median (IQR)	3 (22)	42.5 (68.5)	0.1693	0 (3.5)	3 (25)	<.0001***
PMA at Death (weeks) Median (IQR)	31.29 (10.57)	40.43 (10.79)	0.0063**	28.21 (10.62)	31.43 (10.71)	0.0036**
OPO caller: n (%) Fellow Attending NNP Resident RN	 165 (80%) 15 (7%) 8 (4%) 16 (8%) 2 (1%)	 3 (43%) 3 (43%) 0 1 (14%) 0	0.0171*	N/A	N/A	N/A

*a=Planned Withdrawal of life-sustaining treatment – discontinuation of support in a patient who was not otherwise imminently dying; b=Terminal extubation – death following removal of endotracheal tube in a patient who would have died regardless; c=Despite maximal support – death following CPR or in the setting of maximal interventions (mechanical ventilation, vasoactive medications) except a full code; d=Interquartile Range (IQR)

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Abstract: 275

Improving Asthma Management through Practice-Based Interventions in a Suburban Academic Primary Care Center Serving Immigrant Families

Mary Makaryus[1], Anchara Vivek[1], Rebecca Papa[1], Allison Driansky[1], Michael Anagnostopolos[2], Caren Steinway[1], Sophia Jan[1]

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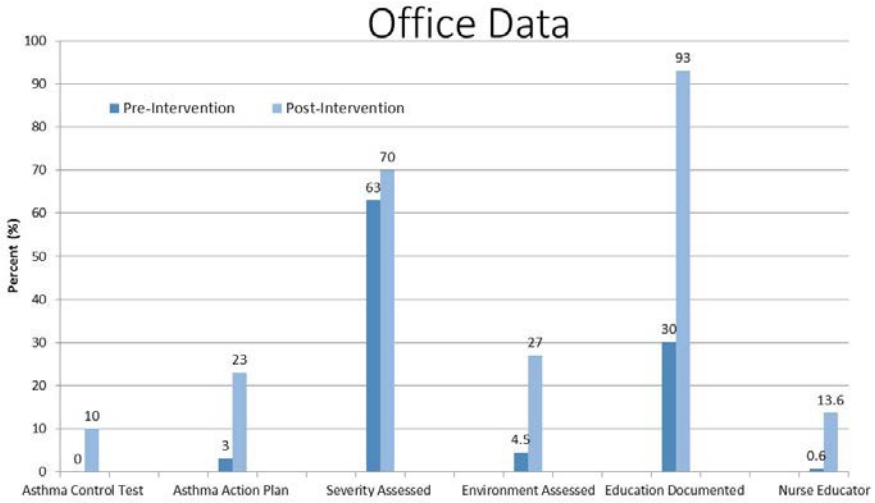
Background Over 6 million children in the US suffer from asthma, causing more school absences and hospitalizations than any other chronic illness. Furthermore, significant ethnic disparities in asthma care exist. Despite the existence of asthma management guidelines effective in decreasing acute care utilization, primary care practices adhere to these guidelines poorly. Guideline adherence can be even more challenging when serving ethnically diverse families with limited English proficiency (LEP). Evidence suggests that provider and staff education and electronic medical record supports can improve guideline adherence.

Objective To improve adherence to asthma guidelines in a primary care center (PCC) through the use of a practice-based intervention bundle.

Design/Methods A practice-based intervention bundle was developed with an asthma-focused community-based organization, and included: 1) asthma management guideline education for PCC clinicians by a pediatric pulmonologist; 2) stocking asthma control tests (ACTs), asthma action plan (AAP) sheets, educational materials, inhalers and spacers in the PCC; and 3) certifying two nurses as asthma educators. Outcome measures included documentation of severity, control and education, assessment of environmental triggers, nurse educator involvement, and AAP use. Baseline and post-intervention measures were assessed for a random selection of patients with asthma seen in clinic for the 12 months prior to and after bundle implementation.

Results In the PCC, 63% of patients in the PCC have Medicaid; 40% had LEP; 950 patients (8%) had asthma, and were seen an average of 1.83 times/year. A total of 154 charts were reviewed at baseline; 236 charts were reviewed after bundle implementation. Compared to baseline, there were statistically significant increases in documentation of asthma severity (69% vs. 63%); asthma control assessments (as measured by ACT use) (10% vs. 0%); AAP distribution (23% vs. 0.6%); environmental trigger discussion (27% vs. 4.5%); and asthma education (93% vs. 29%). After becoming available, nurse educators were involved in 13% of visits.

Conclusion(s) Implementation of a practice-level asthma intervention bundle significantly increased documentation of ACT, AAP, and patient education in a PCC serving families with high LEP and social needs, suggesting improved adherence to asthma treatment guidelines and asthma control among a particularly vulnerable pediatric population.



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Abstract: 276

Development of a Dedicated Asthma Clinic in a Suburban, Academic, Primary Care Center Serving Immigrant Families

Mary Makaryus[1], Anchara Vivek[1], Rebecca Papa[1], Michael Anagnostopolos[2], Allison Driansky[1], Caren Steinway[1], Sophia Jan[1]

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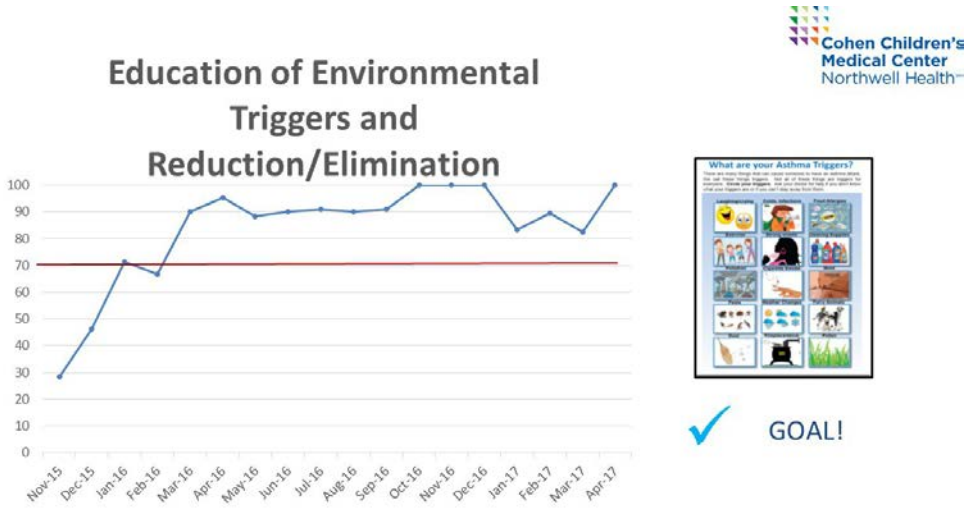
Background Over 6 million children in the US suffer from asthma, causing more school absences and hospitalizations than any other chronic illness. Furthermore, significant ethnic disparities in asthma care exist. Despite the existence of asthma management guidelines effective in decreasing acute care utilization, primary care practices adhere to these guidelines poorly. Guideline adherence can be even more challenging when serving ethnically diverse families with limited English proficiency (LEP).

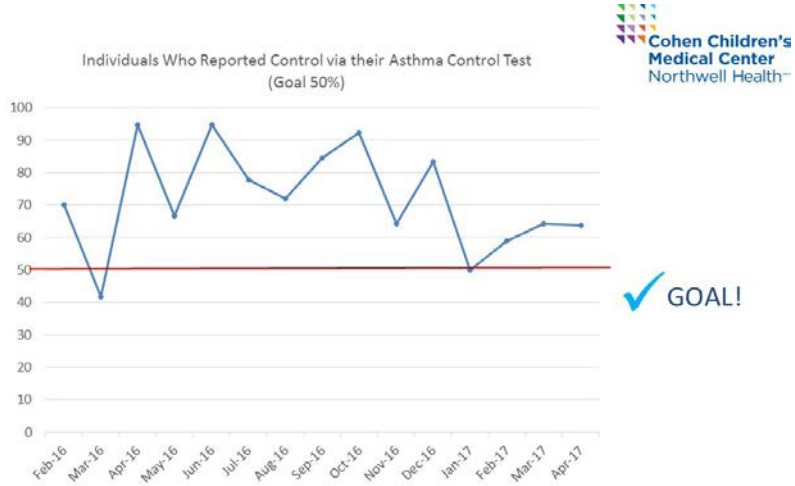
Objective To test the feasibility and efficacy of a dedicated asthma clinic to improve asthma guideline adherence within an academic suburban primary care center (PCC) serving immigrant families with LEP.

Design/Methods A team of 2 physicians and 2 certified nurse educators staffed a dedicated asthma clinic 2 half days/week at a PCC serving nearly 12,000 patients; 63% have Medicaid and 40% are LEP (Spanish, Bengali, Hindi, Urdu, Chinese, Creole). Prior to each visit, the team reviewed the patient's medical history, determined paperwork and the need for spirometry. Physicians assessed history, symptoms, adherence to medications, aero chamber technique, and triggers. The team then identified the patient's clinical severity, level of control, asthma action plan (AAP), and potential medical and community referrals. Nurses then provided standardized education, using language lines as needed. Asthma severity, control, asthma control test (ACT), inhaled corticosteroid (ICS) and AAP use, and trigger education were recorded prospectively. Data were summarized using standard descriptive statistics.

Results From Nov 2015 to Jun 2017, 182 unique patients were seen in the asthma clinic (20% of total asthma patients seen at the PCC). Compared to baseline, there was an increase in asthma self-management and trigger avoidance education by June 2017 (100% vs. 28%), AAP distribution (100% vs. <5%), control documentation (80% vs. 35%), and severity documentation (100% vs. 63%), and ICS distribution for those with persistent asthma (>90% vs <5%).

Conclusion(s) Creating a dedicated asthma clinic within a PCC with dedicated staff, standardized workflow can significantly improve asthma guideline adherence, even when serving patients with LEP and significant social needs. Future directions will include following patients longitudinally to assess if health outcomes are affected.





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Abstract: 277

Assessment of Asthma by Pediatricians in a High Risk Patient Population in an Ambulatory Setting

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Background Studies have shown that the severity of pediatric asthma and its level of control are frequently underestimated, leading to under treatment and poor outcomes. This increases the morbidity of asthma in a high-risk population such as East New York, Brooklyn, NY, where pediatric hospitalization rates due to asthma are more than 50% higher than the rest of Brooklyn.

Objective To assess how well primary care pediatricians gather information regarding asthma severity during each ambulatory visit.

Design/Methods This is a retrospective, descriptive, observational study; data collected of pediatric patients with asthma who were followed at any of the four Brookdale Family Care Centers from July 2015 to July 2017. One hundred charts of asthmatic patients were selected through a computer randomization program. Appropriate documentation of the assessment of asthma severity (AAS), which includes emergency room visit (ER) ambulatory acute care visit due to asthma exacerbation (ACV) and hospitalization (H), was collected. Means and standard deviation for continuous variables and frequencies, percentages and Chi-square for categorical variables were calculated.

Results Of 100 charts reviewed, 18 were excluded for lost to follow up; hence, data was obtained from 82 charts. Patients range from 20 months to 20 years old, averaging 9.2 years old (SD=4.7), 38 of the patients were male (46%). Most patients lived in East-Brooklyn (82%). In 49/82 patients (60%) lacked documentation of AAS. The need of ER /ACV/H among patients who had no documentation of AAS was higher [34/49 (70%) vs. 16/33 (48%)]; however, differences were not statistical significant (p=0.094). Controller medication was prescribed more often when there is documented ER/ACV/H as compared to patients with ER/ACV/H but not documented [13/16 (81%) vs. 21/34 (62%)]. Documentation of parameters linked to AAS was variable [Patients' ACV/ ER/H (40%), medication compliance (33%) , missed school days (1.5%), peak flow in patients older than 4 year-old (11%) and asthma action plan given (35%)]

(see table 1).
Conclusion(s) The majority of asthma patients in our outpatient clinics lack appropriate documentation of AAS. Patients lacking AAS were less likely to be on controller medication and more likely to increase ER visits, ACV and to require hospitalization (and therefore health care costs). Increasing awareness about the importance of implementing a standard questionnaire to AAS during each patient encounter is essential to improving asthma morbidity.

Table 1

Documentation	ER/ACV/H	Compliance	MSD (>4 yrs. old)	Peak Flow (>4 yrs. old)	Asthma Action Plan
Yes	33 (40%)	13 (33%)	1 (1.5%)	7 (11%)	29 (35%)
No	49 (60%)	26 (67%)	64 (98.5%)	58 (89%)	53 (65%)
Total	82 (100%)	39 (100%)	65 (100%)	65 (100%)	82 (100%)

Table 1. Documentation of asthma severity by asking about emergency room (ER) visits, acute care visits (ACV), or hospitalizations (H); documentation of compliance with controller medication, missed school days (MSD), peak flow and asthma action plan.

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Abstract: 278
Trending infections with Antibiotic Resistant Organisms (AROs) in the Neonatal Intensive Care Unit (NICU)
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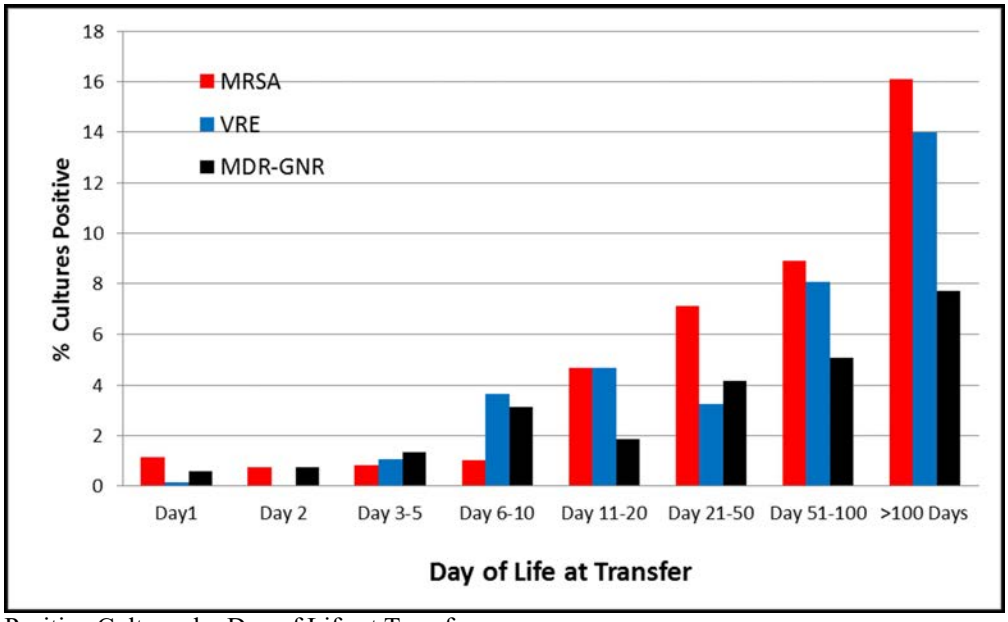
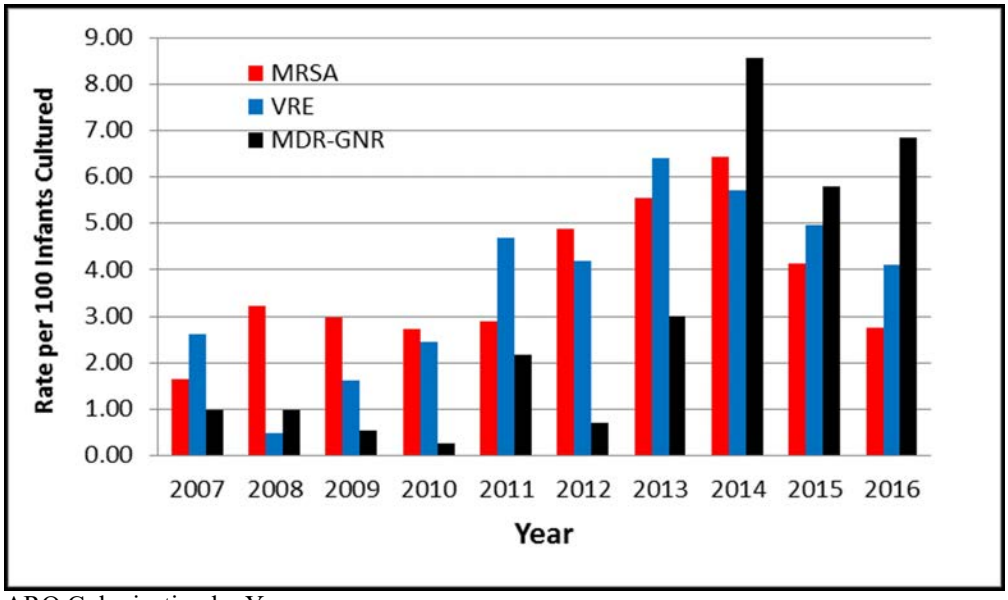
Background AROs i.e. methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant enterococci (VRE), and multi-drug resistant gram negative rods (MDR-GNR) among infants hospitalized in the NICU are associated with mortality and serious morbidities. Appropriate infection control policies may help prevent transmission of AROs. However, the most effective strategies for surveillance of AROs in the NICU are unclear. Prior data collected from infants transferred from outside hospitals to 2 NICUs affiliated with New York-Presbyterian (NYP) Hospital detected low rates of ARO colonization in the first week of life. Thus, in 2013 the strategy of performing surveillance on all transferred infants for AROs was changed to performing targeted surveillance on infants transferred at ≥7 days of life (DOL). This policy change provides an opportunity to assess different surveillance strategies and monitor ARO colonization trends in the NICU.
Objective To compare trends in ARO colonization and infection of transferred infants from July 2007-June 2016 and to compare risk factors for ARO colonization in transferred infants from July 2007-June 2013 vs. July 2013-June 2016
Design/Methods Data from all infants transported to the NICUs at NYP from 2007-2016 were used. Risk factors for colonization with AROs including demographics and admitting diagnoses were explored using a multivariable binomial mixed model clustered by transferring hospital and controlled for NYP NICU. Trends in ARO colonization over time were assessed using negative binomial regression.
Results From 2007-2016, 2925 infants were transferred to the NYP NICUs, 1101 at Site 1 and 1824 at Site 2; 2571 (88%) had surveillance for at least 1 ARO. There were 226 positive surveillance cultures in 204 infants (8%): 94 (3.7%) for MRSA, 78 (3%) for VRE and 54 (2%) for MDR-GNR. Site 1 elected not to adopt the change in surveillance policy.
In the final models, transfer DOL remained a highly significant (OR per day = 1.018, CI_{95} 1.014, 1.022, $p< 0.001$) predictor of colonization with any ARO (Figure 1). There was no significant increase in the incidence of colonized infants over time; this remained true in infants who were < 7 days of life at Site 1. There was a trend towards increased incidence of infants colonized with MDR-GNR over time (Figure 2).
Conclusion(s) These data support the rationale for our change in surveillance policy.



Positive Cultures by Day of Life at Transfer



ARO Colonization by Year

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Abstract: 279

Improving Compliance with Medications for Non-Emergent Intubations in a Level III Neonatal Intensive Care Unit

Elizabeth Antosy[2], apurv barche[1], Jessica Davidson[1]

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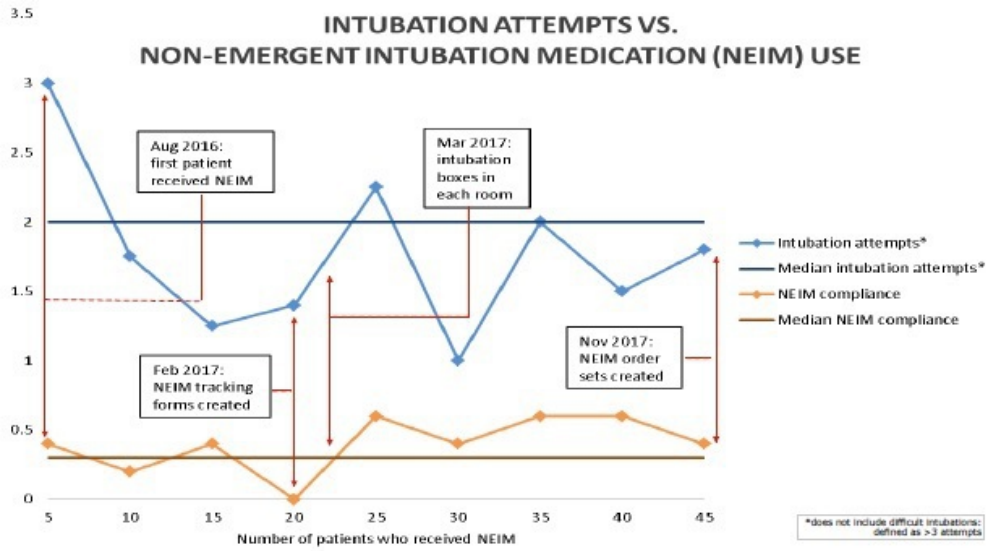
Background The 2010 American Academy of Pediatrics (AAP) Clinical Report recommends pre-intubation medication for all non-emergent endotracheal intubations, regardless of gestational age: atropine (vagolytic), fentanyl (analgesic) and vecuronium/rocuronium (muscle relaxant). Intubation procedures put infants at risk for pain due to noxious stimuli, hypoxia due to apnea/airway obstruction, bradycardia due to vagal response, and intracranial hypertension due obstructed cerebral venous return (anatomic or stress related). These adverse effects have potential for short and long term effects and the risk increases with each intubation attempt. Premature infants have an exaggerated response to pain with a greater potential for long term effects. As of July 2016 there was no routine use of medication prior to intubation.

Objective Using the Model for Improvement, we aim to improve compliance with nonemergent intubation medications (NEIM) from 30% to 80% and decrease the number of intubation attempts for every successful intubation from 2.8 to 1.5 within 30 non-emergent

intubations or 1 year.
Design/Methods Guidelines and a Pyxis drawer dedicated to NEIM were created and staff education was completed in July 2016. We define compliance as administering the appropriate three medications if attending present (atropine, fentanyl, vecuronium) or two medications when attending not present (atropine, fentanyl). A multidisciplinary team implemented Plan-Do-Study-Act (PDSA) cycles to improve compliance and create a high reliability practice. NEIM compliance was 30% and intubation attempts averaged 2.8 through the first ten babies who received medications starting in August 2016, and these values were used as the medians for our run charts. Our interventions included staff education, non-emergent intubation tracking forms, and intubation boxes with trigger tools. Order sets for medications in EPIC went live November 2017.
Results Results are shown on an annotated run chart.
NEIM compliance has increased to 50% and the number of intubation attempts has decreased to 1.7 with the last ten non-emergent intubations. Common reasons for not using NEIM include inadequate medication preparation time, perceived lack of benefit, and concern for adverse effects.
Conclusion(s) We continue to use PDSA cycles to address barriers in order to achieve high reliability care.
Education of new staff is essential and on-going. We expect further improvement in compliance and attempts with our most recent PDSA: implementation of NEIM EPIC order sets.



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Abstract: 280
Association of Food Insecurity with Psychosocial Determinants of Health
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Background Food insecurity is highly prevalent in urban lower income communities. There is emerging evidence that food insecurity is associated with other psychosocial determinants of health.
Objective To evaluate the association of food insecurity with other adverse social determinants of health in an urban, low income, minority community.
Design/Methods We conducted a cross-sectional survey at a pediatric practice in an academic medical center that serves an urban, low income, minority community. At well child visits, caretakers are routinely screened with SEEK (Safe Environment for Every Kid), a validated 15-item tool that assesses specific psychosocial determinants of health (smoking, food insecurity, parenting difficulties, parental depression/stress, parental alcohol/substance abuse, and domestic violence). The study sample included all SEEK forms completed in the electronic medical record 12/2015-10/2017. Outcome measures examined were prevalence of individual psychosocial determinants and association of food insecurity with the other psychosocial determinants.
Results We analyzed 4414 SEEK forms. The majority (66%) were positive, and of these, 55% were positive for 1 determinant, 23 % for 2, and 22% for 3 or more determinants. The prevalence of individual determinants was 30% for smoking, 27% for food insecurity, 30% for parenting difficulties, 27% for depression/stress, 9% for alcohol/ substance abuse, and 8.5% for domestic violence. Food insecurity was strongly associated with all of the other determinants. Caretakers who identified as food insecure were nearly twice as likely to smoke, almost 3 times as likely to report parenting difficulties, 4 times as likely to report depression/stress, 16 times more likely to report alcohol/substance abuse, and 22 times more likely to report domestic violence. Food insecurity had very high negative predictive value for the other psychosocial determinants of health (see Table).
Conclusion(s) In an urban, low income community, the majority of caretakers reported at least one adverse psychosocial determinant of health. Food insecurity was highly associated with smoking, depression/stress, parenting difficulties, alcohol/substance abuse, and domestic violence. Our study findings suggest that families who screen negative for food insecurity are less likely to screen positive for other adverse psychosocial determinants of health. Further studies are needed to explore these findings in other high risk communities.

Association of Food insecurity with Other Psychosocial Determinants

	Odds Ratio	95% CI	p-value	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Smoking	1.9	1.6 -2.2	<0.001	40.5%	73.3%	23.2%	76.8%
Parenting Difficulties	2.8	2.5 -3.3	<0.001	47.3%	76%	42.3%	79.5%
Depression/Stress	4.33	3.7 -4.9	<0.001	49.1%	81.6%	49.7%	81.2%
Domestic Violence	22.1	16.4 -29.9	<0.001	49.1%	81.6%	49.7%	81.2%
Alcohol/Substance Abuse	16.6	12.7 -21.7	<0.001	27%	98.4%	85.9%	78.4%

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Abstract: 281

Complications Associated with Umbilical Catheter Use in a Level IV NICU

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Background Umbilical catheters are routinely used in the neonatal intensive care unit (NICU) population, but not without complications. The Centers for Disease Control and Prevention recommend that umbilical arterial (UACs) and venous catheters (UVCs) not be left in place for >5 days and >14 days, respectively. These recommendations cite evidence from 4 studies comprising data from 719 UACs and 389 UVCs.

Objective To analyze complications and risk factors associated with UACs and UVCs use in a large cohort of infants from a single level IV NICU.

Design/Methods Prospective observational cohort study using a prospectively-maintained electronic database containing multiple variables. Adjusted complication rates (AR) and 95% confidence intervals (CI), adjusted for birth weight (BW), gestational age, gender, and number of catheter lumens, were calculated. Poisson regression was used to estimate adjusted rates and risk factors, and multiple logistic regression to estimate adjusted complication event-rates for each cumulative day of use.

Results From January 1, 2008 to July 31, 2017, 1821 UVCs and 1863 UACs were placed in our NICU. 251 UVC-related complications (13.8% of UVCs) and 47 UAC-related complications (2.5% of UACs) were identified. Positional issues comprised the majority of UVC-related complications (82.0%) and broken hubs the majority in UACs (44.7%). (Table 1). The AR of all UVC-related complications was 17.9 per 1000 line days, and 4.5 per 1000 line days for UACs. The rate declined when UVC-related positional issues were removed from the analysis (AR=17.9 to 2.6 per 1000 line days). Compared to single-lumen UVCs, double-lumen UVCs had a significantly higher rate of all complications, of those excluding positional issues, and of central line-associated bloodstream infections (Table 2). After excluding positional complications, the adjusted event rate among UVCs increased significantly during the first 7 days of use, plateauing until day 16, followed by a sharp increase (Figure 1). For UACs, an initial decline in complication rate was noted during the first 7 days of use, plateauing until day 14 when the rate began to increase exponentially (Figure 2).

Conclusion(s) We investigated the outcome of >3500 UVCs and UACs over nearly a decade and determined the number of UVC lumens and duration of UVC and UAC use was associated with a higher rate of complications. These findings may impact future recommendations in an effort to reduce central line-associated complications

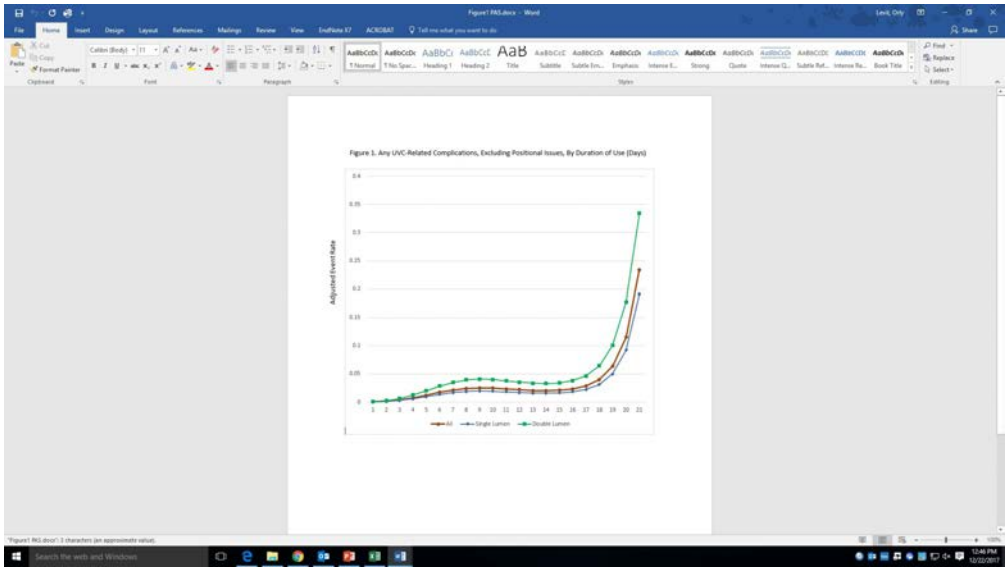

Figure 2. Any UAC-Related Complications by Duration of Use (Days)

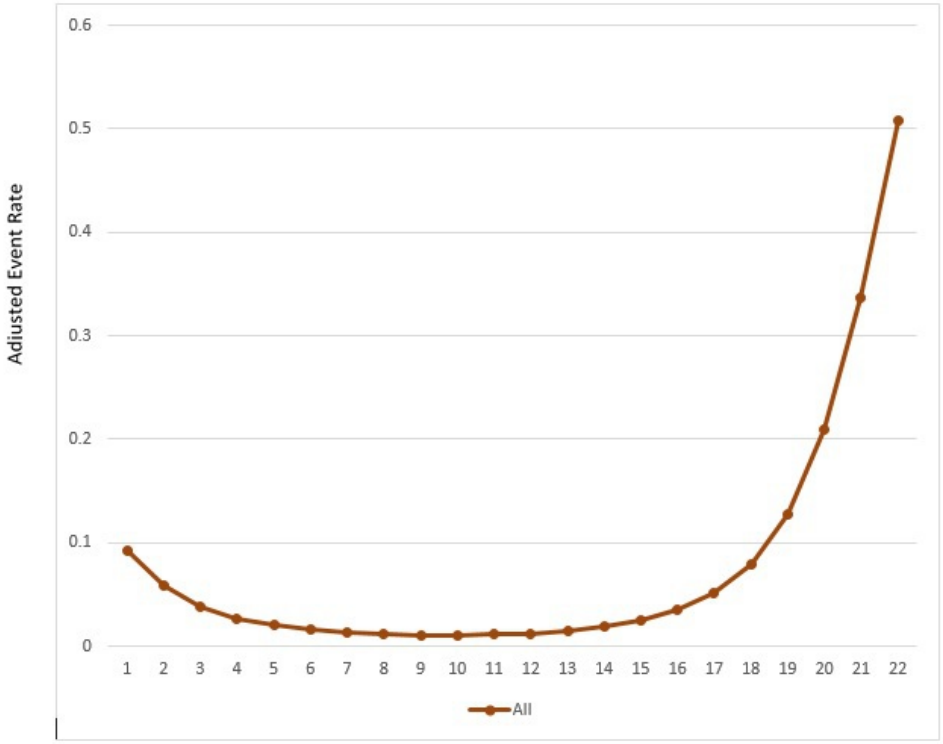

Table 1. Complications Related to UVC and UAC Utilization

Type of Complication*	UVC(N=251)	UAC(N=47)**
Abnormal position	206(82.0%)	7(14.8%)
CLABSI	18(7.2%)	3(6.4%)
Clotted	5(2%)	10(21.2%)
Cracked	8(3.2%)	21(44.7%)
Decreased perfusion to lower extremities	N/A	5(10.6%)
Inadvertently pulled out	9(3.6%)	0
TPN effusion	2(0.8%)	N/A

Thrombosis	3(1.2%)	2(4.3%)
-Aorta	-N/A	-2(4.3%)
-IVC	-1(0.4%)	-N/A
-Portal vein	-1(0.4%)	-N/A
-Renal vein	-1(0.4%)	-N/A

*Data presented as N (%) **One line had 2 complications CLABSI: central line-associated blood stream infection, IVC: inferior vena cava; TPN: total parenteral nutrition, UAC: umbilical arterial catheter; UVC: umbilical venous catheter

Table 2.Rate of Complications Adjusted for Birthweight, Gestational age and Gender

Complications	Single lumen UVC(N=150)*	Double lumen UVC(N=101)*	UAC(N=47)**
All Complications	15.7(13.3-18.6)	18.0(14.6-22.3)	4.5(3.4-6.0)
Complications excluding positional issues	1.9(1.2-3.1)	3.6(2.2-5.8)	3.9(2.8-5.3)
CLABSI	0.7(0.3-1.6)	1.6(0.7-3.5)	1.3(0.8-2.0)

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Abstract: 282

Pediatric Resident Preparedness in Caring for Children with Special Health Care Needs

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Background Children with special health care needs (CSHCN) comprise a large and growing segment of the pediatric population. A major goal of pediatric residency programs is to prepare residents to provide quality care for these children. Resident feedback can guide efforts to enhance residency training in this area.
Objective To assess the self-reported level of preparedness of pediatric residents in the management of CSHCN.
Design/Methods Pediatric residents at an urban community academic medical center were invited to participate in an anonymous on-line survey in December 2017. The survey describes 4 clinical scenarios: a child with Down's syndrome, a child with cerebral palsy, a child with autism, and a premature infant. Residents rated their level of preparedness of caring for these children in 4 patient care domains: 1. Development (screening/surveillance, early intervention); 2. Growth and nutrition (growth assessment, caloric goals, formula selection, swallowing dysfunction), 3. Medical management (immunizations/palivizumab, neuromuscular assessment, pressure sores, adaptive equipment, incontinence, drooling, lab surveillance); and 4. Advocacy (letters of medical necessity, care plans, insurance issues, home health care, SSI, schools/community resources). Responses were on a 5-point Likert scale (5- extremely well prepared, 1- not at all prepared). Outcome measures were scored by clinical scenario, patient care domain, and year of training.
Results All residents (n=31) completed the survey. Residents felt significantly ($p<0.001$) better prepared to care for a premature infant (mean 3.2), followed by a child with autism (2.7), and least prepared for children with Down Syndrome (2.5) or cerebral palsy (2.4). For domains of care, residents felt significantly ($p<0.001$) better prepared in the domain of development (mean 3.1), followed by medical (2.8), growth and nutrition (2.7), and least prepared for advocacy (2.4). 3rd year residents reported significantly higher level of preparedness in all areas (mean 3.2) as compared to 1st (2.4) and 2nd year residents (2.4). Residents identified PICU, developmental pediatrics, NICU, and ambulatory/care coordination rotation as most helpful in preparing them to care for CSHCN.
Conclusion(s) Pediatric residents reported higher levels of preparedness caring for premature infants and in the domain of development. Resident needs assessments can help guide the development of experiential opportunities and curricular efforts to enhance their level of preparedness in the care of CSHCN.

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Abstract: 283

Hyponatremia and Clinical Outcomes in Children Hospitalized with Bronchiolitis

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Background Hyponatremia has been associated with worse clinical outcomes in children hospitalized with bronchiolitis in the pediatric intensive care unit (PICU) setting. Studies have shown an increase in mortality, ventilator time and duration of PICU stay

among patients with hyponatremia. Limited data however exists on the relationship of serum sodium concentration and clinical outcomes in children with bronchiolitis requiring hospitalization but not necessarily intensive care treatment at the time of admission.
Objective The goal of this study was to observe the association of serum sodium values with clinical outcomes in children hospitalized with bronchiolitis not requiring PICU treatment at the time of admission.
Design/Methods We conducted a retrospective cohort study of children who were admitted to the pediatric floor of our hospital between 11/01/13 – 02/28/17 with a discharge diagnosis of bronchiolitis. Patients were divided into hyponatremic (initial sodium concentration < 135mmol/L) and normonatremic group (serum sodium concentration between 135mmol/L – 145mmol/). Children with hyponatremia were younger than those with normonatremia. There was no difference in other demographic characteristics (Table 1). We compared the need for PICU transfer, oxygen requirement during hospitalization and length of hospital stay in relationship with the baseline serum sodium status for any differences. Variables were compared using independent group t-tests and chi square analysis. A p value of <0.05 was considered statistically significant.
Results Of a total of 193 children included in our study, 18 (9%) had hyponatremia. Children with initial hyponatremia were significantly more likely to be transferred to the PICU (28% of patients in the hyponatremic group compared to 10% in the normonatremic group; p-value of 0.022). There was also a trend of longer duration of stay (89.4 hours vs 70 hours) and increased requirement of oxygen therapy (61% vs 46%) in the hyponatremic group compared to the normonatremic group although neither was statistically significant (p-value of 0.262 and 0.230 respectively).
Conclusion(s) Hyponatremia is associated with increased transfer to the pediatric intensive care unit in children hospitalized with bronchiolitis not requiring ICU care at the time of admission. Studies with a larger sample size may reveal an association with hyponatremia and longer length of stay or increased oxygen requirement

	Total: n=193 (100%)	Hyponatremia: n=18 (9%)	Normonatremia: n= 175 (91%)	p-value
Mean Age (months)	7.37	3.72	7.74	0.016
Gender				0.670
Female	95 (49%)	8 (44%)	87 (50%)	
Male	98 (51%)	10 (56%)	88 (50%)	
Race				0.951
African-American	149 (77%)	14 (77%)	135 (77%)	
Other/Unknown	44 (23%)	4 (23%)	40 (23%)	
RSV Status				0.704
RSV positive	99 (51%)	10 (56%)	89 (50%)	
RSV negative	94 (49%)	8 (44%)	86 (50%)	

Demographic Analysis

	Total n (%)	Hyponatremia	Normonatremia	p-value
Transfer to PICU n (%)	22 (11%)	5 (28%)	17 (10%)	0.022
Mean Length of hospital stay (hours)	71.7	89.4	70.0	0.262
Need for oxygen therapy n(%)	92(48%)	11 (61%)	81 (46%)	0.230

Clinical Outcomes

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Abstract: 284

Risk Factors for Car Seat Tolerance Screening Failure in Late Preterm Infants

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Background The AAP recommends Car Seat Tolerance Screening (CSTS) for all infants born prematurely to monitor for desaturations and bradycardia in the car seat. Evidence suggests that late preterm (LPT) infants born 34-36.6 weeks may be at increased risk of failure. The largest study to date of LPT infants found that ~26% fail an initial CSTS. Identifying characteristics of high risk infants could help focus CSTS inclusion criteria and minimize unneccessary testing.
Objective To identify incidence and risk factors for failure of CSTS in LPT infants.
Design/Methods Retrospective medical record review of LPTs born 2013-2016. Inclusion criterion: LPT. Exclusion criteria: subjected died prior to discharge or family declined testing. Identified incidence of failure of initial CSTS. Bivariate analysis using T-test, Wilcoxon Rank Sum, Chi Square, and Fisher Exact Test as appropriate to compare demographic and clinical factors such as weights, gestational age (GA), age at CSTS, sex, race, respiratory support requirements, medications, location of admission (NICU vs. nursery), Apgars, and comorbidities between subjects who passed vs. failed initial CSTS.
Results We identified 792 eligible subjects born late preterm, of whom we had CSTS data on 709 (89.5%). Of these, 38 failed (5.4%). Mean (SD) birth weight (BW) of the cohort was 2468g (516) and median (IQR) birth GA was 36 weeks (1.4). We found no difference between those who passed vs. failed in terms of BW, birth GA, sex, race, Apgars, location of admission, GBS status, multiple gestation, initial resuscitation requirement, surfactant treatment, level of prenatal care received, treatment with diuretics or reflux medications at time of CSTS, or weight or age at time of CSTS. We did find that subjects who failed were significantly more likely to have a tracheostomy ($p=0.005$), gastrostomy tube ($p=0.012$), been treated with CPAP ($p=0.033$), been on a ventilator ($p=0.002$), received post-natal steroids ($p=0.0098$), had an intraventricular hemorrhage ($p=0.023$), been delivered by C-section ($p<0.001$), and had longer lengths of stay ($p=0.012$).
Conclusion(s) We found a 5.4% incidence of failure in LPT infants, which differs from previously reported failure rate of 26%. Factors hypothesized to increase risk of failure such as weight and age at time of CSTS were not significant. However, infants with positive pressure requirements and those born via c-section had significantly increased incidence of failure. This data may begin to allow us to focus CSTS on high risk subjects, minimizing unnecessary testing.

Table 1. Demographic and Clinical Risk Factors for CSTS Failure in Late Preterm Infants

	Pass CSTS (n=671) N (%) or Mean (SD)	Failed CSTS (n=38) N (%) or Mean (SD)	P-Value
Birth Weight, gm	2477 (501)	2530 (630)	0.6083
Birth Gestational Age, wk	35.5 (0.9)	35.6 (0.9)	0.5214
Weight at CSTS, gm	2505 (495)	2660 (637)	0.1485
Male Sex	351 (52%)	20 (53%)	0.9692
Admission Location NICU	367 (55%)	23 (61%)	0.4943
CPAP Requirement	146 (24%)	15 (39.5%)	0.0326
Ventilator Requirement	62 (10%)	10 (26%)	0.0022
Low Flow Nasal Canula Requirement	89 (15%)	10 (26%)	0.0525
C-section Delivery	325 (49%)	30 (79%)	0.0003
Intraventricular Hemorrhage	9 (1.4%)	3 (8%)	0.0025
Race: African American Caucasian Other	421 (63%) 184 (27%) 109 (18%)	18 (47%) 16 (42%) 4 (11%)	0.1263
Multiple Gestation	134 (20%)	6 (16%)	0.5261
Tracheostomy	1 (0.2%)	1 (2.6%)	0.0050
Gastrostomy Tube	7 (1%)	3 (8%)	0.0122

Prenatal Care: Adequate Late/Limited: None:	343 (82%) 62 (15%) 14 (3%)	16 (88%) 1 (6%) 1 (6%)	0.5034
Resuscitation Requirement with Positive Pressure in Delivery Room	194 (29%)	12 (31.6%)	0.7423
Post-natal Steroid Treatment	1 (0.2%)	2 (5.3%)	0.0098
Chronological Age at CSTS, dy (median and IQR)	5 (10)	7 (11)	0.1277
Length of Stay, dy (median and IQR)	7 (11)	12 (18)	0.0122

CPAP, continuous positive airway pressure; CSTS, car seat tolerance screen; IQR, interquartile range; NICU, neonatal intensive care unit

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Abstract: 285

Effects of Volume Infusion at Resuscitation on Hemodynamics Immediately after Birth

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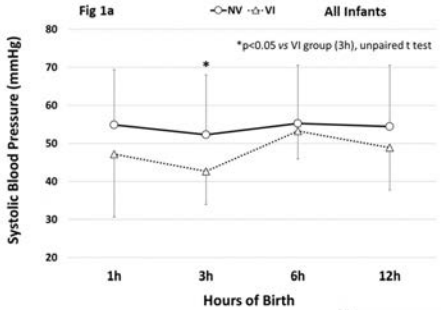
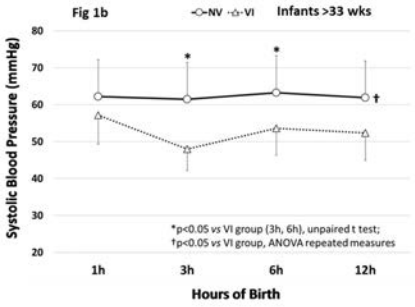
Background Recommendations for volume infusion (VI) at birth include known or suspected blood loss and infant's heart rate (HR) that has not responded adequately to other resuscitative measures (NRP Guidelines, 2010). Despite its use, there is little evidence to support VI during neonatal cardiopulmonary resuscitation (CPR).
Objective To determine the resuscitation characteristics of infants with VI and its effects on systemic blood pressure (SBP) in the first 12 hours after birth.
Design/Methods We performed a retrospective chart review of all infants admitted to Level 4 NICU, with HR < 100/min at 1min requiring positive pressure ventilation (PPV) at birth (1/11 - 2/17). Infants were classified into two groups: (1). Volume Infusion group (VI): infant received volume at resuscitation (2). No Volume Group (NV): infants did not receive any volume at resuscitation. Demographic & resuscitation characteristics, hematocrit (admission, @ 24h), SBP (up to 12h), inotrope use and mortality studied in both the groups. Analysis performed with student t test & ANOVA repeated measures to assess significance.
Results 19 infants were resuscitated with VI following intensive CPR (Table 1). Cord pH and pH at 1h were significantly lower & base deficit (birth & 1h) significantly higher in VI group (Table 1). Apgar scores were significantly lower at 1, 5 & 10 min and over time in the VI group ($p<0.001$, ANOVA repeated measures, Table 1). Infants in VI group received intensive CPR as suggested by BMV, ETT intubation, chest compressions, ET-epi & IV-Epi (Table 2). Death was significantly higher in the VI group ($p<0.0001$ vs NV group, Fisher's Exact test). HR prior to VI was 50±36/min; HR >100/min was achieved by 13.8±5.9min. Average VI was 15±7mL/kg. Only three (16%) infants in the VI group received PRBC transfusions.
SBP was significantly lower in VI group at 3h in all infants (Fig 1a). SBP was significantly lower in the VI group in infants >33 wk GA ($p<0.05$, ANOVA repeated measures; Fig.1b). Heart rate was significantly lower in the VI group at 1h in all infants (Fig.2a) and in infants > 33wk GA (Fig.2b).
Conclusion(s) Volume is often administered to infants with significant bradycardia requiring intensive CPR. Death in VI group reflects significantly sicker infants with hypoxic-ischemic (HI) insult at birth. Infants > 33 weeks GA requiring intensive CPR have significantly lower SBP in the first 12h of birth, implying HI insult to the myocardium. VI may worsen myocardial responses following HI at birth.





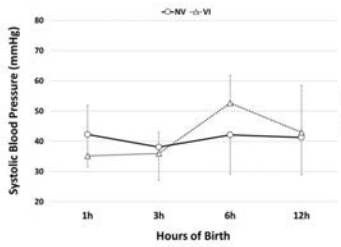
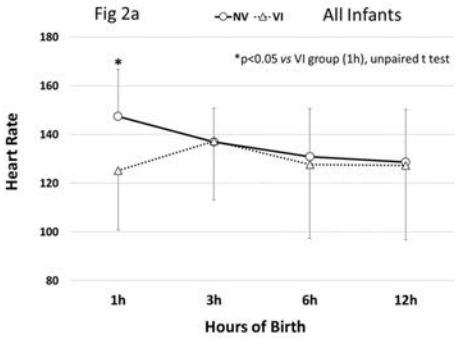
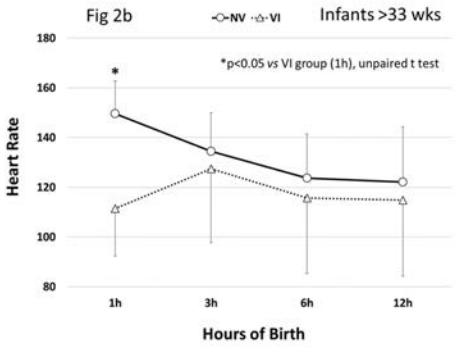


Fig 1c

Infants < 32 wks





Prenatal and Birth Characteristics of the Two Resuscitation Groups

Characteristics	Volume Group (n=19)	No Volume Group (n=82)
Gestational Age (wks)	31.1 ± 6.2	33.5 ± 6.0
Birth Weight (grams)	1986 ± 1222	2354 ± 1259
C-section	13 (68%)	51 (62%)
Sex (male - %)	11 (58%)	44 (54%)
Cord pH	6.94 ± 0.25	7.13 ± 0.17**
Cord Gas (base excess) (mEq)	-16.5 ± 9.7	-7.8 ± 6.5**
pH @ 1h of birth	6.91 ± 0.23	7.22 ± 0.12**
Base deficit @ 1h (mEq)	-22.2 ± 7.4	-9.0 ± 5.7**
Apgar Score - 1min	0 (1)	1 (0)**
Apgar Score - 5min	1 (1.75)	5 (4)**
Apgar Score - 10min	2 (3)	7 (3)**

Data expressed as mean ± SD; **p<0.0001 vs Volume Group (unpaired t test)

Characteristics Relating to Ventilation and Chest Compressions in the Two Resuscitation Groups

Characteristics	Volume Group (n=19)	No Volume Group (n=82)
BMV (Y/N)	11 (58%)	70 (85%)*
ETT intubation (Y/N)	19 (100%)	62 (76%)*
Chest Compressions (Y/N)	18 (95%)	17 (21%)
ET Epinephrine (Y/N)	16 (84%)	5 (6%)**
Dose of ET Epi (Median)	2 (1)	1 (0)
IV Epinephrine (Y/N)	14 (80%)	1 (1.2%)**
Dose of IV Epi (Median)	2.5 (2)	0
Admission Hematocrit	46.3 ± 9.3	46.4 ± 7.4
Admission BGT	73 ± 56	80 ± 42
Inotropes	2/9 (22%)	5 (6%)
Death	11 (58%)	13 (16%)**
Hematocrit (24h)	44.5 ± 8.8	44.5 ± 7.7

Data expressed as mean ± SD; *p<0.05 vs Volume Group (Fisher's Exact test); **p<0.0001 vs Volume Group (Fisher's Exact test); BMV – bag mask ventilation, ETT – endotracheal tube, Epi – epinephrine, IV – intravenous, BGT – blood glucose test

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Abstract: 286

Challenges to Transitioning Youth with Special Health Care Needs from Pediatric to Adult Care: A Survey of Pediatric Providers

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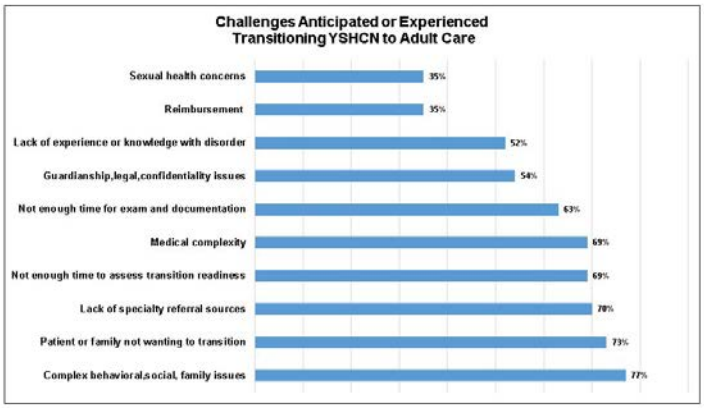
Background Nationally, 750,000 youth with special health care needs (YSHCN) transition from pediatric to adult care each year. Despite established guidelines for effective transitions of care, studies show that fewer than half of YSHCN receive a cohesive transition process. A better understanding of the challenges faced by pediatric providers could help increase the adoption of transitions of care guidelines.
Objective To identify real and anticipated challenges faced by primary care pediatric providers in transitioning YSHCN to adult care.
Design/Methods In December 2017, we invited 39 pediatric providers in a 11 practice healthcare network serving urban inner city and suburban populations to complete an anonymous survey. The 17 item questionnaire was adapted from several sources including Got Transitions.org and the Policy Lab Evidence to Action Brief 2017 from Children's Hospital of Philadelphia. The survey focused on processes of transition of care, challenges to the transition process - both anticipated and experienced, and knowledge of billing practices for transitions of care office visits.
Results The response rate was 74%. 82% of respondents were pediatricians, 18% were pediatric nurse practitioners. 64% had been in practice for 11 years or more. None of the providers reported their practice had a system or process for transitioning YSHCN. 78% of respondents reported difficulty finding adult primary care providers to care for their YSHCN patients. All providers reported YSHCN were not well prepared to transition from their practice to adult care. Only 7% of providers felt confident families with YSHCN transitioning to adult care would receive all needed services. 93% of providers had no knowledge of billing codes for transitions of care visits. The most common transition challenges included: not enough time, complexity of family and social issues, lack of specialty referral sources, and patient or family not wanting to transition (see Table).
Conclusion(s) Pediatric providers anticipate and experience multiple challenges when transitioning YSHCN to adult primary care. These challenges may preclude pediatric providers from integrating transitions of care recommendations into their practices. Successful transition programs will need to consider innovative approaches to overcome challenges and help pediatric providers adopt transitions of care guidelines.



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Abstract: 287

The inflammatory modulator High-mobility group box protein 1 is post-transcriptionally regulated during the life cycle of the oncovirus Epstein-Barr virus

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Background High-mobility group box protein 1 (HMGB1) is a ubiquitous, highly-conserved, protein with multiple functions depending on its subcellular location. In the nucleus, it is a non-histone DNA chaperone involved in transcriptional regulation while in the cytosolic or extracellular compartment it is a key modulator of the inflammatory response. HMGB1 is also elevated in an array of medical conditions and has been shown to promote tumor metastasis. In the perinatal period, it is elevated in tracheal aspirates of neonates with bronchopulmonary dysplasia, amniotic fluid of mothers in preterm labor, animals with LPS-induced cecal perforations and in sepsis. Despite its well-described role in mediating inflammation, the regulation of HMGB1 itself is poorly understood.
Objective To determine HMGB1 is regulated during the transition from latency to the pro-inflammatory lytic phase of the tumor-causing herpesvirus Epstein-Barr virus (EBV).
Design/Methods Flow cytometry, western blots and q RT PCR were utilized to elucidate role of HMGB1 during lytic activation Bromouridine sequencing was performed to determine levels of nascent HMGB1 transcription on activation of lytic cycle.
Results We found that both HMGB1 message and protein levels were higher in lytic B cells. Also, at the single cell level, more than 50% of lytic B cells compared to latently-infected cells, had higher levels of HMGB1 protein, whether in culture or isolated from patients with infectious mononucleosis who are naturally infected with EBV. To understand the regulation of HMGB1 message, we isolated nascent RNA following incorporation of Bromouridine and subjected it to sequencing and PCR (Bru-Seq and Bru-PCR), we found that HMGB1 RNA synthesis decreased when cells transited from latency to the lytic phase.
Conclusion(s) Contrary to our expectation, we found that HMGB1 RNA synthesis decreased when cells transited from latency to the lytic phase suggesting that HMGB1 is regulated at the post-transcriptional level, likely through increased stabilization of message

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Abstract: 288

Snapshot Study: A Day in the Life of Children with Chronic Critical Illness

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Background Survival has improved for children with extreme prematurity, genetic syndromes, congenital heart disease and other chronic diseases. Consequently, an increasing number of pediatric patients have complex medical needs. Many of these children become chronically critically ill (CCI), with multiorgan system dysfunction, frequent and prolonged hospitalizations, and reliance on advanced technologic support. Specifics regarding the experiences of CCI children within the medical system have not been reported.
Objective To describe and characterize the hospital burden of CCI children. We hope this will serve as an early step to enable clinicians, policymakers, and other stakeholders to better serve the care needs of these highly specialized pediatric patients.
Design/Methods Six participating U.S. tertiary care hospitals performed a prospective “snapshot” chart review on 5/17/17 utilizing a standardized data collection form. Children were identified using recently proposed criteria defining CCI: 1) hospitalization in the

NICU at ≥44 weeks PMA, any other pediatric ICU >14 consecutive days or ≥ 2 hospital admissions within the last 12 months, AND 2) current technology dependence or multiple vital organ system involvement. The primary outcome was descriptors of the scope of CCI across centers. Secondary outcome variables included length of stay, number of procedures, medication and technology requirements. Data were analyzed using descriptive statistics.

Results 385 children with CCI were hospitalized across 6 participating centers. Demographic characteristics are shown in Table 1. Hospitalization burden is described in Table 2. The majority (93%) of CCI children were technology-dependent; respiratory support (47%), central lines (48%), and nutritional support devices (67.5%) were most commonly utilized. Diagnoses involving >1 organ system were present in 81%; 31% were diagnosed with conditions involving 5-6 organ systems. 58% were admitted to the ICU for at least part of their hospital stay and 55% required mechanical ventilation. A median of 9 medications were prescribed on Snapshot day (range 0-33). Palliative care team involvement was reported in 12% of CCI children.

Conclusion(s) This snapshot across 6 tertiary care centers quantifies the at-risk population and identifies significant hospitalization, procedural, technology, and care needs of CCI children. Baseline data will be utilized for future research aimed at reducing these burdens, supporting patients, and improving quality of life for CCI children and their families.

Table 1: Demographics

CCI Patient Demographics	Institution 1 N=60	Institution 2 N=51	Institution 3 N=57	Institution 4 N=98	Institution 5 N=95	Institution 6 N=24	Total N=385
Female Male	24 (40%) 36 (60%)	24 (47%) 27 (53%)	21 (37%) 36 (63%)	51 (52%) 47 (48%)	41 (43%) 54 (57%)	8 (33%) 16 (67%)	169 (44%) 216 (56%)
White Black Asian Hispanic Other Not recorded	31(52%) 17 (28%) 2 (3%) 7 (12%) 2 (3%) 1 (2%)	20 (39%) 25 (49%) 1 (2%) 0 1 (2%) 4 (8%)	32 (56%) 4 (7%) 2 (4%) 6 (11%) 7 (12%) 6 (11%)	56 (57%) 6 (6%) 8 (8%) 18 (18%) 6 (6%) 4 (4%)	19 (20%) 37 (39%) 4 (4%) 17 (18%) 4 (4%) 14 (15%)	4 (17%) 17 (71%) 0 2 (8%) 0 1 (4%)	162 (42%) 106 (28%) 17 (4%) 50 (13%) 20 (5%) 30 (8%)
Age <12 months 1-5 years 6-10 years 11-15 years >16 years	25 (42%) 15 (25%) 9 (15%) 7 (12%) 4 (7%)	20 (39%) 16 (31%) 3 (6%) 5 (10%) 7 (14%)	27 (47%) 12 (21%) 3 (5%) 4 (7%) 11 (19%)	25 (26%) 27 (28%) 10 (11%) 19 (19%) 17 (17%)	29 (31%) 26 (27%) 14 (15%) 15 (16%) 11 (12%)	8 (33%) 6 (25%) 6 (25%) 3 (13%) 1 (4%)	134 (35%) 102 (27%) 45 (12%) 53 (14%) 51 (13%)
Gestational age at birth (weeks)a	35 (25, 41)	31 (23, 39)	33 (23, 40)	35 (24,39)	35 (24,40)	26 (24, 29)	33 (23, 41)
PMA on SNAPSHOT day (weeks)b	50 (45, 55)	48 (45, 74)	47 (45,60)	47 (45, 56)	46 (45, 49)	46 (45, 54)	47 (45, 74)
Admitted from Home Clinic ED L&D OR Other hospital or Rehab Other(c)	20 (33%) 3 (5%) 16 (27%) 12 (20%) 1 (2%) 8 (13%) 0	3 (6%) 6 (12%) 28 (55%) 6 (12%) 2 (4%) 6 (12%) 0	10 (18%) 10 (18%) 11 (19%) 12 (21%) 1 (2%) 11 (19%) 2 (4%)	37 (38%) 8 (8%) 24 (25%) 0 8 (8%) 19 (19%) 2 (2%)	32 (34%) 10 (11%) 32 (34%) 0 5 (5%) 15 (16%) 1 (1%)	2 (8%) 2 (8%) 11 (46%) 2 (8%) 2 (8%) 5 (21%) 0	104 (27%) 39 (10%) 122 (32%) 32 (8%) 19 (5%) 64 (17%) 5 (1%)
Admitted to NICU PICU	14 (23%) 15 (25%)	11 (22%) 18 (35%)	17 (30%) 5 (9%)	6 (6%) 21 (21%)	5 (5%) 21 (22%)	3 (13%) 16 (67%)	56 (15%) 96 (25%)

Cardiac ICU	0	3 (6%)	4 (7%)	7 (7%)	12(13%)	0	26 (7%)
Medical floor	30 (50%)	18 (35%)	19 (33%)	57 (58%)	49 (52%)	5 (21%)	178
Surgical floor	0	1 (2%)	0	7 (7%)	5 (5%)	0	(46%)
Other(d)	1 (2%)	0	12 (21%)	0	3 (3%)	0	13 (3%)
							16 (4%)

Data are displayed as frequency (%) or median (range); a=Infants that have never been home, b=NICU infants only, c=Other includes dialysis or chronic ventilator facility, Ronald MacDonald House, d=Other includes bone marrow transplant unit, operating room

Table 2: Hospitalization Burden for CCI Patients (N=385)

#Admissions in last 12 months	-
1	98 (26%)
2	104 (27%)
3	57 (15%)
4	39 (10%)
5-6	42 (11%)
7+	45 (12%)
Range	1-26
Readmission within 30 days of prior hospitalization	143 (37%)
Current hospitalization planned	118 (31%)
Hospital length of stay on SNAPSHOT day (days)	-
1-7	150 (39.0%)
8-14	61 (15.8%)
15-21	26 (6.8%)
22-28	22 (5.7%)
29-60	36 (9.4%)
61-90	18 (4.7%)
91+	72 (18.7%)
Range	1-4,653
Any time in ICU this admission	224 (58%)
Any time on mechanical ventilation this admission	212 (55%)
Number of procedures this admission	-
0	186 (48%)
1-3	112 (29%)
4-6	38 (10%)
7+	49 (13%)
Range	0-68
Number of surgeries this admission	-
0	210 (55%)
1-3	129 (34%)
4-6	31 (8%)
7+	15 (4%)
Range	0-24

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Abstract: 289

Applicability of systemic inflammatory response syndrome (SIRS) and severe sepsis definitions to late onset infections in a quaternary NICU

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Background Sepsis is a significant cause of morbidity and mortality. Despite its prevalence and unique presentation, criteria for SIRS and severe sepsis have not been developed in infants. As a result, definitions are often adapted from those established for older pediatric patients. There are no studies examining the performance of these definitions in infants with late onset infections.
Objective To characterize patients with late onset infections in a Level 4 NICU meeting criteria for SIRS and severe sepsis as defined by the 2005 International Pediatric Sepsis Consensus Conference (IPSCC) guidelines.
Design/Methods Retrospective chart review of all patients admitted to the Level 4 NICU at the Children's Hospital of Philadelphia between 1/1/16 and 12/31/16 who underwent sepsis evaluations (SEs) with subsequent positive blood cultures. Data were collected to determine whether patients met SIRS or severe sepsis criteria as defined by the IPSCC. Analysis included summary descriptive and chi-square statistics.
Results The cohort included 40 SEs in 33 infants (Table 1). 23 (58%) met criteria for SIRS and 11 (28 %) had severe sepsis. 4 (10%) did not meet the criteria for SIRS but subsequently developed organ dysfunction. Tachycardia and abnormal white blood cell counts were the most common SIRS criteria (Table 2). In patients with severe sepsis, respiratory dysfunction was most common (90%), followed by cardiovascular (45%), hematologic (18%), and renal (9%) dysfunction. Patients ≥ 37 weeks corrected gestational age were not more likely to meet SIRS or severe sepsis criteria compared to those < 37 weeks corrected gestational age. SIRS and severe sepsis occurred more frequently in patients with gram negative bacteremia and gram positive bacteremia excluding coagulase negative Staphylococcus (CoNS) compared to infants with CoNS bacteremia, fungemia, or polymicrobial infections, but these differences were not statistically significant (Table 1). There were 3 (7.5%) infection-related deaths, all of whom met criteria for SIRS and severe sepsis.
Conclusion(s) Almost half the patients with late onset infections did not meet criteria for SIRS in our cohort and fewer met severe sepsis criteria as defined by the IPSCC. Notably, a proportion of those who did not meet SIRS criteria subsequently developed organ dysfunction. Definitions of sepsis and sepsis syndromes specific to neonates and infants require refinement as the pathophysiology may differ in these populations.

Table 1. Patient demographics and culture results

Demographics at birth (patient level, n=33)			
Sex	Male 61% (n=20) Female 39% (n=13)		
Gestational age	Median: 32 weeks 6 days IQR: 26 weeks 2 days – 35 weeks 2 days		
Demographics at time of evaluation (event level, n=40)			
Day of life	Median: 54 days IQR: 31 days – 153 days		
Corrected gestational age	Median: 41 weeks 2 days IQR: 37 weeks 5 days – 50 weeks 1 day		
Central line present	95% (n=38)		
Causative organisms (event level, n=40)			
	Prevalence	Frequency within organism	
		SIRS	Severe Sepsis
Gram negative	35% (n=14)	64% (n=9)	36% (n=5)
Coagulase negative Staphylococcus (CoNS)	33% (n=13)	46% (n=6)	23% (n=3)
Gram positive (excluding CoNS)	20% (n=8)	75% (n=6)	38% (n=3)
Other (polymicrobial, fungemia)	12% (n=5)	40% (n=2)	0% (n=0)

Table 2 In patients meeting SIRS definition (n=23), percentage meeting each criterion

Criterion	Frequency
Core temperature > 38.5°C or < 36°C	30% (n=7)
T > 38.5°C	26% (n=6)
T < 36°C	4% (n=1)
Abnormal heart rate for age	91% (n=21)
Tachycardia	87% (n=20)
Bradycardia	4% (n=1)
Leukocytosis or leukopenia for age OR bandemia > 10%	83% (n=19)
Leukocytosis for age	52% (n=12)
Leukopenia for age	9% (n=2)
Bandemia > 10%	9% (n=2)
Leukocytosis for age AND bandemia > 10%	4% (n=1)
Leukopenia for age AND bandemia > 10%	9% (n=2)
RR > 2 SD above normal for age or mechanical ventilation for acute process	43% (n=10)

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Abstract: 290

Predictors of Hypoglycemia in Infants of Mothers with Pre-Gestational Diabetes

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Background Studies have shown 18-48% of infants of diabetic mothers are at risk for neonatal hypoglycemia. Less is known about maternal and neonatal risk factors which may enhance the risk for hypoglycemia.

Objective To identify predictors of hypoglycemia in infants of mothers with pre-gestational diabetes.

Design/Methods We conducted a retrospective cohort study at an academic medical center serving a low income, urban, minority community. We included all stable, singleton infants, > 36 weeks gestational age (GA), born to mothers with pre-gestational diabetes between 2013 and 2015. Blood sugars were monitored after the first feed, every 2-3 hours prior to feeding until 4 normal blood sugars were obtained and at 24 hours of life. Independent variables were demographics, gestational weight gain, mean HbA1C, duration of diabetes, type of diabetes, infant GA, birth weight(BW) and small or large for GA. Outcome measure was neonatal hypoglycemia defined as < 45mg/dL after 4 hours of life which persisted after feeding.

Results The cohort included 52 mothers- infant dyads: 53% were black, 75% received public insurance, mean maternal age was 30 years, 81% had Type 2 diabetes, mean GA was 38 weeks and mean BW 3300 grams. One in 5 infants (10/52, 19%) had blood sugars < 45 mg/dL and of these, 8 required IV fluids. In univariate analysis, higher maternal gestational weight gain, longer duration of diabetes and infant being small or large for gestational age were all associated with neonatal hypoglycemia ($p < 0.05$). In a multivariate regression model, including gestational weight gain, type of diabetes, mean HbA1C, duration of diabetes and small or large for gestational age, no definite predictors were identified.

Conclusion(s) We did not identify any specific risk factors for hypoglycemia in infants of mothers with pre-gestational diabetes. The standard practice of screening and monitoring for hypoglycemia should be applied to all infants of mothers with pre-gestational diabetes. Additional studies with larger samples may identify risk factors.

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Abstract: 291

Reducing Communication Failures by Adapting I-PASS to the Neonatal Intensive Care Unit (NICU)

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Background Handoffs are a critical aspect of communication between medical providers. Over half of sentinel events involve handoff failures. NICU patients are at increased risk for communication failures due to complexity and prolonged length of stay. Communication failures in this population can be detrimental to patient safety. Furthermore, research on NICU handoffs is lacking.

Objective Our SMART aim was to decrease the rate of foreseeable but not communicated escalation of care events during shift-change handoff by 50% by December 2017.
Design/Methods Observational time series was conducted at a Level IV NICU between 12/2016-12/2017. Our inter-professional team of residents, fellows, physician assistants, nurse practitioners (NNP), and attendings had been trained with our NICU adapted I-PASS handoff curriculum (NICU I-PASS) since October 2015. A series of interventions were implemented to improve anticipation of escalation of care and adherence to I-PASS mnemonic amongst medical providers. The accuracy of illness severity, contingency plans in high risk infants, number and description of escalation of care events were collected by the receiver (fellow/NNP) at the end of night shift. These events were identified by the receiver as foreseeable or not foreseeable. Monthly rates of perceived accuracy of illness severity and foreseeable but not communicated events were displayed using P charts. Established rules for detecting special cause were applied. Figure 1 highlights aims, key drivers and interventions
Results There was special cause improvement in the rate of foreseeable but not communicated escalation of care events per handoff by 71.8% from 32% to 9% with 8 consecutive points below the mean (Figure 2). Although there was no special cause variation, the monthly rate of accuracy of illness severity improved from 88% to 97%.
Conclusion(s) We surpassed our goal of decreasing communication failures in our NICU by reducing the number of foreseeable but not communicated escalation of care events with improved adherence to key elements of the I-PASS mnemonic (illness severity and contingency planning). Targeted interventions included the use of NICU I-PASS, enhanced discussion of contingency planning during rounds, monthly NICU I-PASS education for rotating trainees, and handoff observations with feedback. The use of NICU I-PASS reduces communication failures for the night team when caring for this high risk population. This may have significant implications for on-call preparedness and ultimately patient safety.

Figure 1. Key Driver Diagram

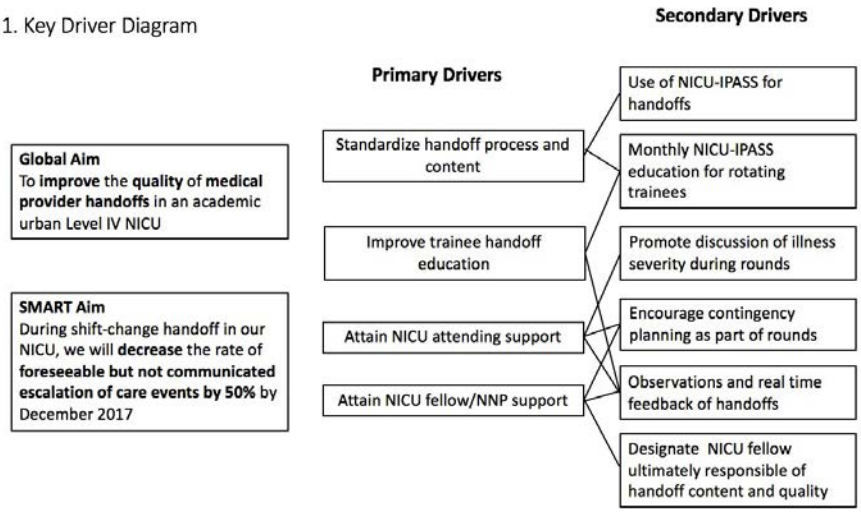
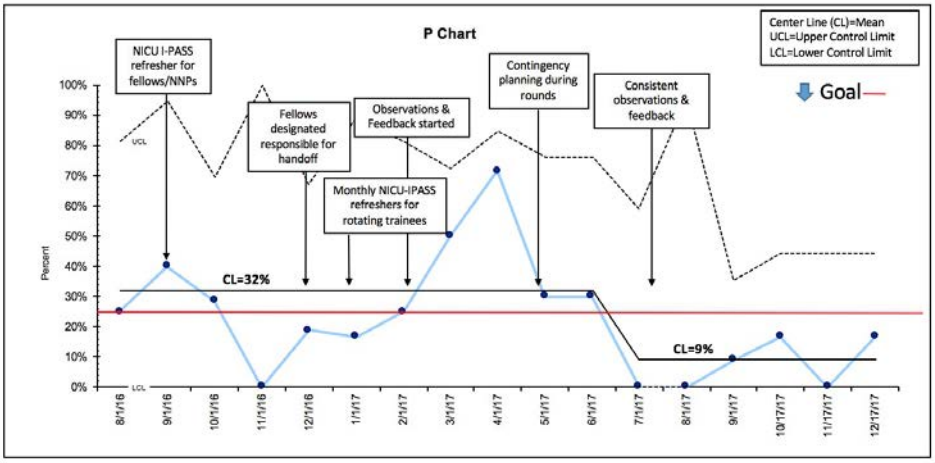


Figure 2. Percent of foreseeable but not communicated escalation of care events per handoff



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Abstract: 292
Enhancing the Identification and Management of Early Hypoglycemia in High-Risk Neonates: Quality-Improvement Initiative
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Background Recent data suggests that even blood glucose (BG) <45mg/dl is associated with an increased risk for neurocognitive (NC) deficits at follow-up (Kaiser, 2015). Factors that increase propensity for NC deficits are unclear and include degree of hypoglycemia, clinical signs & underlying etiology, i.e. high-risk infants (HR; small for gestational age, infant of a diabetic mother, large for gestational age & late preterm infants). The AAP recommendations for HR infants is to feed within an hour and obtain a BG within 30 min post-feed. For BG < 25mg/dl, IV glucose bolus is indicated and for a BG 25-40mg/dl, either an enteral feed or IVF is indicated, but ultimately the presence of clinical signs dictates management.
Objective This QI initiative has been undertaken with two goals: 1.To determine adherence to AAP recommendations as it relates to timing of initial feed, time of 1st BG, clinical sign documentation and management strategies in the HR population. 2. To determine the impact of nurse education initiatives on the identification and management of infants at HR for hypoglycemia.
Design/Methods Pre-intervention cohort comprised of 120 HR neonates ≥ 35 wks with hypoglycemia (BG<45mg/dl) that were admitted in 2015-2016. Data retrospectively examined included time to 1st feed, time to initial BG measurement, lowest BG, associated signs and management. Nursing teaching modules and in-service sessions were then undergone to educate the nursing staff from July-Sept 2017. Post-intervention cohort comprised of 33 HR neonates ≥ 35 wks admitted Sept 2017-Dec 2017.
Results Pre-and post-intervention the mean BG nadir was 31.2 ± 7.1 mg/dL vs. 33.7 ± 6.7 mg/dL (p=0.03). 60% of infants were not being fed within the recommended 1st hr from birth as compared to only 47% of the infants post-intervention (p=0.01). Pre-and post-intervention, the time to 1st BG was 2.2 ± 4.2h vs. 1 ± 0.25h (p=0.0006). Pre-intervention and post-intervention the time to physical exam documentation was 3.4 ± 3.1h vs 2.2 ± 2.4h post-intervention (p=0.006). Infants were more likely to be treated with IVF post-intervention at a higher BG than pre-intervention (p=0.08).*
Conclusion(s) This phase 1 QI initiative demonstrated a significant increased adherence to AAP recommendations by improving the number of infants being fed within the 1st hour of life, a quicker BG screen after birth and neurologic exams being documented to determine the safety of enterally feeding.

	Pre-intervention (n=120)	Post Intervention (n=33)	p-value
Mean BG Nadir (mg/dL)	31.2 ± 7.1	33.7 ± 6.7	p=0.03
% of Feeds Within 1 hr	40%	53%	p=0.01
Time to 1st BG (hr)	2.2 ± 4.2	1 ± 0.25	p=0.0006
Time to PE (hr)	3.4 ± 3.1	2.2 ± 2.4	p=0.006

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Abstract: 293
Understanding the Social Determinants of Health for Latino Children with Special Health Care Needs through a Community Health Worker Program
Marguerite Costich[1], Patricia Peretz[2], Jaimee Davis[2], Melissa Stockwell[1], Luz Adriana Matiz-Zanoni[1]
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Background Children with special health care needs (CSHCN) account for nearly 20% of children in the United States. Social determinants of health significantly impact health outcomes, and those from underserved communities have unmet social and economic needs. Little work has been done to characterize the unmet social and economic needs of Latino CSHCN. The SKATE (Special Kids Achieving Their Everything) community health worker (CHW) program was developed in 2015 and serves predominantly Latino, publicly-insured, inner-city CSHCN. It was designed to empower caregivers of CSHCN to manage complex health needs and to address those social determinants of health that impede health improvement.
Objective The objectives of this study are to describe the demographic characteristics and social determinants of CSHCN in a CHW program.
Design/Methods CSHCN are referred to SKATE from 4 medical center-affiliated community health clinics in Northern Manhattan. Demographic data, social determinant needs such as access to food and housing, and measures of family distress and depression were obtained from questionnaires completed by CHWs with families at intake. Validated measures such as the PHQ-2 and distress thermometer were used when available.
Results A total of n=102 families of CSHCN were enrolled from July 2016 to October 2017. On self report, the median number of specialists seen by an individual CSHCN was 4 (IQR 2-5) and median number of medications was 1 (IQR 0-3). Ninety percent of families identified as Hispanic and 55% reported Spanish as the only spoken language at home. Eighty percent of CSHCN were enrolled in Medicaid and 44% received SSI. Of those enrolled, 45% had a caregiver with less than a high school education, 24% reported difficulty accessing medications, 37% reported food insecurity, and 21% reported housing insecurity. Nineteen percent of caregivers had a positive depression screen and 7% had a positive domestic violence screen. Nearly 30% of families reported a score of

7 or more out of 10 on a distress thermometer at baseline. The median number of social referrals for programs such as GED classes and employment training made per family was 2 (IQR 1-3).
Conclusion(s) There are significant unmet social and economic needs of Latino CSHCN. The data support the use of a CHW program to identify and address social determinants of health in order to help families be better able to manage their children's conditions.
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Abstract: 294
Helping Children with Autism Spectrum Disorders to Understand their Diagnosis: Assessing the Role of Physicians
Bridget Kiely, Andrew Adesman, Alyson Gutman
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Background The American Academy of Pediatrics recommends that children with disabilities be provided with developmentally appropriate information about their medical conditions. Although the social deficits associated with autism spectrum disorders (ASDs) may complicate the communication of information to children with this condition, physicians – in collaboration with parents and other professionals – are uniquely qualified to educate affected children and adolescents about their ASD diagnosis. However, it is not known to what extent physicians directly address the ASD diagnosis in their discussions with children who have this condition.
Objective To assess, based on parent report, the percent of children with ASDs who receive information about their ASD diagnosis from a physician, and to evaluate the perceived benefit of these discussions.
Design/Methods Parents of individuals with ASDs (ages 8-25) were recruited via outreach to ASD advocacy and support groups across the US. Participants completed a detailed online questionnaire that assessed their experiences with disclosing the ASD diagnosis to their affected child and the child's receipt of information about ASDs from other sources, including physicians. Chi-square tests were used to compare parental experiences with primary care physicians (PCPs) and medical specialists (developmental pediatricians, psychiatrists, and neurologists).
Results Of the 117 parents who completed the questionnaire, 51 (44%) reported that ≥1 physician had spoken to their child about ASD (31 PCPs; 54 specialists). Most discussions were initiated when the child was 6-9 (39%) or 10-12 (34%) years old. When parents rated their overall satisfaction, on a scale of 0-100, with the physician's discussion, the mean level of satisfaction was 73 for PCPs, 63 for developmental pediatricians, 60 for neurologists, and 67 for psychiatrists. Most parents reported the doctors presented "helpful and appropriate" information (PCPs: 74%, specialists: 70%, p=.71) and used language that was understandable for their child (PCPs: 81%; specialists: 69%, p=.22).
Conclusion(s) Although the majority of physician-child discussions about ASD were reported to be beneficial to the child, the finding that they occurred in less than half of all children in this sample is troubling. PCPs and medical specialists have the potential to play a vital role in educating children with ASDs about their condition and should take greater initiative in this regard.

Table 1: Parental impressions of physician's discussions regarding the diagnosis of ASD with their children

Impression	PCPs (n=31)	Developmental Pediatricians (n=14)	Neurologists (n=11)	Psychiatrists (n=29)
Conversation was too short or rushed	32 %	42 %	27 %	21 %
MD was knowledgeable about ASD	74 %	93%	64 %	82 %
MD used language that was understandable	81 %	64 %	72%	69%
MD provided information that was helpful and appropriate	74 %	78 %	54 %	72 %

Response categories were not mutually exclusive; parents were permitted to report their perceptions of multiple physician-child interactions.

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Abstract: 295
Effect of delayed cord clamping on the incidence of transient tachypnea of the newborn in term neonates.
Alexander Cestari[2], Lauren Anderson[3], Andre Munzer[4], Stanley Swaby[4], Prabhakar Kocherlakota[1]
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Background
Delayed cord clamping (DCC) is associated with significant benefits including decreased need for blood transfusion, lower incidence

of intraventricular hemorrhage and necrotizing enterocolitis in preterm neonates; however advantages of DCC in term neonates have not been known, apart from improved iron stores. This study is undertaken to study the effect of DCC on the incidence of transient tachypnea of the Newborn (TTN) in term neonates born after scheduled elective cesarean delivery (SECD).

Objective

To identify the incidence of TTN in term infants born by SECD with DCC for at least 30 seconds after birth and compared to term infants born by SECD with immediate cord clamping (ICC).

Design/Methods

A prospective study was undertaken for all term infants born by SECD under spinal/epidural anesthesia in St.Lukes Cornwall Hospital, Newburgh, NY from Jan 2017 to Dec 2017. Neonates who required or were suspected of requiring resuscitation were not included in this study. Infants born before 37 weeks of gestation, cesarean section done under general anesthesia, multiple gestations, infants with congenital anomalies and intrauterine growth restriction were excluded. DCC was implemented at the description of the attending Obstetrician. A diagnosis of TTN requires an infant with respiratory distress with radiological confirmation, and required NICU admission for respiratory support. Apgar scores, umbilical arterial cord blood gasses (UACBG), bilirubin at 48h, number of infants with TTN requiring NICU admission and total number of infants requiring NICU care were analyzed. Appropriate statistical tests were applied. A P value <0.05 was considered significant.

Results

There were 45 infants in DCC group and 78 infants in ICC group. There was no difference with regards to gestation, gender, indication for section or birth weight, between the two groups. (Table 1) There were no difference of pH, PCO2 and Base deficit, Apgar scores at 1 and 5 minutes, and Bilirubin at 48h of life. TTN requiring NICU admission and management was 4.4% (2/45) in DCC and 8.8% (7/78) in ICC group. (Table 2)

Conclusion(s)

1. No difference in UACBG and Apgar scores between DCC and ICC
2. No difference in bilirubin levels at 48h between DCC and ICC
3. No difference on the incidence of TTN in infants with DCC. However incidence of TTN is 4.4% in the DCC group and 8.9% in the ICC group, (p=ns), a larger prospective study may show the benefits of DCC in Term neonates born by SECD.

Table 1: Demographic characteristics of neonates

	DCC (45)	ICC (78)	P value
Birth weight (g)	3,421 ± 413	3,386 ± 441	NS
Gestation (weeks)	39 ± 0.73	38.9 ± 0.78	NS
Gender Boys Girls	25 (55.56%) 20 (44.44%)	34 (43.59%) 44 (56.41%)	NS
Indication: Primary Repeat	10 (22.22%) 35 (77.78%)	28 (35.9%) 50 (64.1%)	NS

Table 2: Comparison of DCC with ICC

	DCC (45)	ICC (78)	P value
Apgar score: Median score @ 1 minute Median score @ 5 minutes Score <6 @1 minute (n) Score <8 @ 5 minutes (n)	 9 9 0 0	 9 9 2 0	 NS NS NS NS
pH: Mean pH < 7.25 pH 7.25-7.4 pH >7.4	7.24±0.07 20 24 0	7.25±1.17 29 44 0	NS NS NS NS
PCO2 (mm of Hg)	59 ± 9.5	58 ± 12.6	NS
Base deficit	-3.4 ± 2.86	-3.02 ± 2.63	NS
Bilirubin (mg)	7.2 ± 2.24	8.01 ± 2.41	NS

NICU admissions	3 (6.67%)	11 (14.1%)	NS
Total	2 (4.44%)	7 (8.97%)	NS
TTN			

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Abstract: 296

Use of continuous positive airway pressure may decrease the need for positive pressure ventilation in term neonates during neonatal resuscitation.

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Background

T-piece resuscitator is more often used in neonatal resuscitation as it provides continuous positive airways pressure (CPAP) as well as positive pressure ventilation (PPV). Advantages of T-piece resuscitator include less mechanical trauma, less complications and less need for intubation. Whether CPAP itself decreases the need for PPV in neonates requiring resuscitation of term neonates has not been studied.

Objective

To study whether the use of CPAP with T-piece resuscitator decreases the need for PPV in term infants during neonatal resuscitation.

Design/Methods .

This retrospective study compared term neonates resuscitated before and after the introduction of T-piece resuscitator (Neopuff) in neonatal resuscitation in St. Luke's Cornwall hospital, Newburgh, NY. Records of all consecutive singleton deliveries above 39 weeks from Jan 2016 to Dec 2017 (when T-Piece was used) were compared with Jan 2010 to Jan 2011 (when T-piece was not used). Scheduled term cesarean deliveries (STCD) include all planned, cesarean sections deliveries above 39 weeks of gestation. Emergency term cesarean deliveries (ETCD) include all deliveries above 39 weeks which are not planned, including emergency sections. . All cesarean sections were attended by pediatrician or neonatologist. Apgar scores @1 and 51minutes; need for CPAP and need for PPV and intubation were compared among all groups. Maternal and neonatal factors responsible for the requirement of resuscitation in STCD and ETCD were analyzed. Appropriate statistical tests were applied. A P value <0.05 was considered significant.

Results

There were 181 in STCD and 212 in ETCD in the control group and 147 in STCD and 164 in ETCD in the study group. There was no difference with regards to birth weight, gestation, gender, presentation or anesthesia between control and study groups in STCD. Gender, indication for cesarean section, and anesthesia were different between control and study groups in ETCD. (Table 1) There was no difference with regards to Apgar scores, or PPV in STCD or ETCD before or after the introduction of T-piece in neonatal resuscitation. 9.5% of STCD and 10.7% of ETCD in the study received CPAP through T-piece during neonatal resuscitation in addition to PPV. (Table 2)

Conclusion(s)

1. There were differences between the study and control groups in ETCD
2. There was increased use of CPAP after the introduction of T-piece in the study group
3. The use of CPAP has not decreased the need for PPV in term neonates

Table 1: Demographic characteristics of neonates in all groups

	Control groups (2010-2011)		Study groups (2016-2017)	
	STCD (181)	ETCD (212)	STCD (147)	ETCD (164)
Birth weight (g)	3475 ± 529	3580 ± 504	3454 ± 458	3451 ± 477
Gestation (weeks)	39 ± 0.5	39.8 ± 0.8	39 ± 0.5	39.6 ± 0.7
Gender: Boys Girls	90 91	129 83	72 75	78* 82
Indication: Primary Repeat	36 145	180 32	67 80	113* 47
Presentation: Vertex Breech	158 23	202 10	126 21	159 5

Anesthesia: Spinal Epidural General	176 3 2	135 66 11	140 5 2	85* 73 2

*p<0.05

Table 2: Results in control and study groups

	Control group (2010-2011)		Study group (2016-2017)	
	STCD (181)	ETCD (212)	STCD (147)	ETCD (164)
Apgar < 5 @ 1 minute	1 (0.5%)	19 (8.9%)	2 (1.3%)	8 (4.8%)
Apgar < 7 @ 5 minutes	0	3 (1.4%)	0	1 (0.6%)
CPAP (with T-piece)	-	-	14 (9.5%)	18 (10.7%)
PPV (with or without T-piece)	8 (4.4%)	26 (12.2%)	8 (5.4%)	13 (7.9%)

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Abstract: 297

Neurodevelopmental Outcomes in Patients with Congenital Heart Disease

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Background The incidence of congenital heart disease (CHD) occurs in 8 in 1000 live births. There has been a reduction in the mortality of patients born with CHD due to advances in treatment and management which has allowed for outcomes assessment and identification of long term morbidities. The neurodevelopmental outcomes of children with CHD include delays in gross motor development, mild cognitive impairment, and impulsive behavior. Identified risk factors for poor developmental outcomes in the CHD population include poor growth, low birth weight, genetic syndromes, and longer duration of cardiopulmonary bypass.
Objective To characterize the developmental outcomes at ages 6 and 12 months of infants with CHD who were admitted to the Congenital Cardiovascular Care Unit (CCVCU) at New York University Langone Medical Center (NYULMC), as assessed by the Bayley Scales of Infant and Toddler Development- III (BSID-III).
Design/Methods A retrospective chart review of infants with CHD admitted to the CCVCU at NYULMC from August 1, 2013 – January 31, 2017 and underwent neurodevelopmental evaluation at 6 and/or 12 months of age using the BSID-III. Patient data including demographics, prenatal, hospital and surgical course data were collected. We excluded patients with genetic syndromes and patients who did not have cardiothoracic surgery. We divided the cohort into groups based on STAT mortality categories and compared groups within each domain of the BSID-III using one-way ANOVA (SPSS). A secondary outcome assessed was the association between patient race and BSID-III scores.
Results 64 patients met inclusion criteria. See Table 1 for population demographics. There was no statistically significant difference in BSID-III scale scores in any of the assessed developmental domains at ages 6 or 12 months based on the patients' STAT Mortality Categories. There were statistically significant increased BSID-III scale scores in receptive language [p=0.012] and expressive language [p=0.033] at age 6 months when comparing Caucasian infants to Asian infants.
Conclusion(s) In a single center cohort of infants with CHD, there was no significant association between a patient's STAT mortality category and neurodevelopmental outcome as assessed by the BSID-III at ages 6 months or 12 months. Patients who identified as Asian had statistically significant lower BSID-III scale scores in receptive and expressive language at 6 months. There was no significant association between patient race and neurodevelopmental outcome as assessed by the BSID-III at 12 months.

Characteristics of Patients Followed by NYU NCCP

Patient Demographics	Number of Patients at 6 months (n)	Number of Patients at 12 months (n)
Gestational Age		
Preterm	3	3

Early Term	16	13
Term	30	31
Gender		
Male	31	28
Female	18	19
Race		
Caucasian	18	21
African American	5	7
Hispanic	11	9
Asian	6	4
Other	9	6
STAT Mortality Categories		
1	7	8
2	9	8
3	9	7
4	21	18
5	3	3

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Abstract: 298

PARENTAL SUPPORT OF YOUTH SEEKING GENDER-AFFIRMING TREATMENT - ASSOCIATION WITH SOCIOECONOMIC STATUS: PRELIMINARY FINDINGS

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Background Transgender and gender non-conforming (TGNC) youth experience elevated rates of severe mental health problems (e.g., depression, suicidality). Emerging studies suggest that family support is integral to the wellbeing of LGBTQ youth and novel interdisciplinary medical treatment approaches have thus sought to enhance parental support. Despite these promising interventions, little is known about the demographic and clinical factors related to parental support of TGNC youth. The present study sought to explore potential differences in parental support across demographic groups within a sample of TGNC youth.

Objective

Design/Methods Among 68 patients (46 transmales,14 transfemales, 8 nonbinary) attending an interdisciplinary clinic for gender nonconforming youth, 36 consenting families (47% non-Hispanic White, 11% Other, 42% Did not disclose; 42% Private Insurance, 19% Medicaid, 42% did not disclose) completed questionnaires measuring youth- and parent-reported parental support (range of scores: youth-report=21-105; parent-report=18-90). Not all patients completed all questions. Separate t-tests were conducted to analyze differences in levels of parental support across race (operationalized as non-Hispanic White vs. non-White) and socioeconomic status (operationalized as private vs. Medicaid insurance).

Results Families with private insurance exhibited significantly higher levels of parent-rated parental support compared to those with Medicaid ($M = 84.9$ vs. 78.0, $p = .01$). No other significant differences were noted in support between white vs. non-white races and between SES and youth-reported parental support.

Conclusion(s) We observed significantly greater levels of parent-rated parental support in families with greater socioeconomic privilege (with private insurance serving as a surrogate marker of SES), while racial differences were not noted to be related to parental support. However, these preliminary findings should be interpreted with caution due to the small sample size and potentially unbalanced socioeconomic and racial demographics of patients attending our clinic. Further research is necessary to corroborate and expand these results and to identify specific factors contributing to these observed differences.

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Abstract: 299

Modeling Antibiotic Resistant Organisms (AROs) in the Neonatal Intensive Care Unit (NICU): An Agent-Based Application

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Background Infections with AROs such as methicillin-resistant Staphylococcus aureus (MRSA), vancomycin-resistant enterococci (VRE), and gram negative rods (MDR-GNR) resistant to third generation cephalosporins have increased substantially among infants hospitalized in NICUs in the past two decades. Implementing appropriate infection control policies can help prevent transmission, however, the most effective infection control strategies for AROs in the NICU population are unclear. In 2013, the surveillance strategy of our NICU was changed from sampling all infants transported to our NICUs to one that would capture only infants transported at ≥7 days after birth, creating a cohort of infants with unknown colonization status who could act as reservoirs for transmission of AROs to the general NICU population.
Objective To examine the potential effect of this policy change, we developed an agent-based model comprised of infants and healthcare workers (HCWs) interacting with the physical space of a hypothetical NICU.
Design/Methods The model was parameterized based on historical data from our 60 bed, tertiary care NICU. Among infants, individual health states included: susceptible to colonization/infection, colonized, or infected with an ARO. HCWs could be susceptible to colonization/infection or colonized with an ARO. We tested two colonization probabilities: 17/1000 admissions, representing the actual historical colonization rate with any ARO from 2004-2010 in infants transported at < 7 days of life vs 65/1000 admissions, representing a "worst case scenario," the colonization rate of any ARO in all transferred infants in 2010.
Results In 100 simulations designed to occur over a 3 month period, where 17/1000 infants were colonized, 9 simulations resulted in successful secondary transmission and 1 simulation resulted in an infected infant. By comparison, in 100 simulations where 65/1000 infants were colonized, 12 simulations resulted in secondary transmission, and 3 included an infected infant.
Conclusion(s) Agent-based models may simulate transmission dynamics of AROs in a NICU environment, permitting testing of hypothetical infection control strategies in a safe manner.

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Abstract: 300

Improving Documentation of Fluid Intake in Infants < 1500 g in the First 7 Days

Mariana R. Brewer[1], Shahana Perveen[1], Elfriede Wallace[1], Joanne Casatelli[1], Anne Salice[1], Joanna Beachy[2], Regina Spinazzola[1], Barry Weinberger[1]

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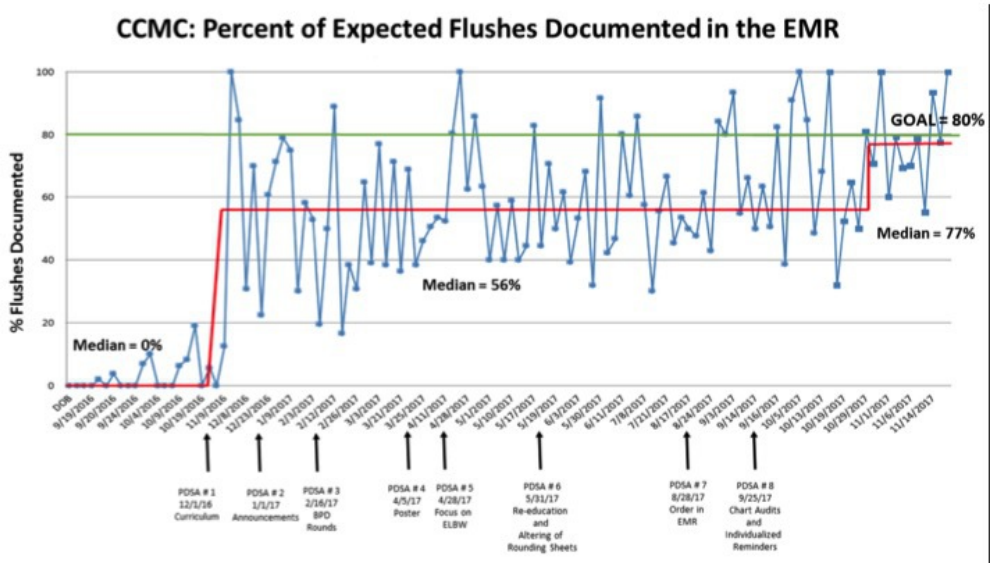
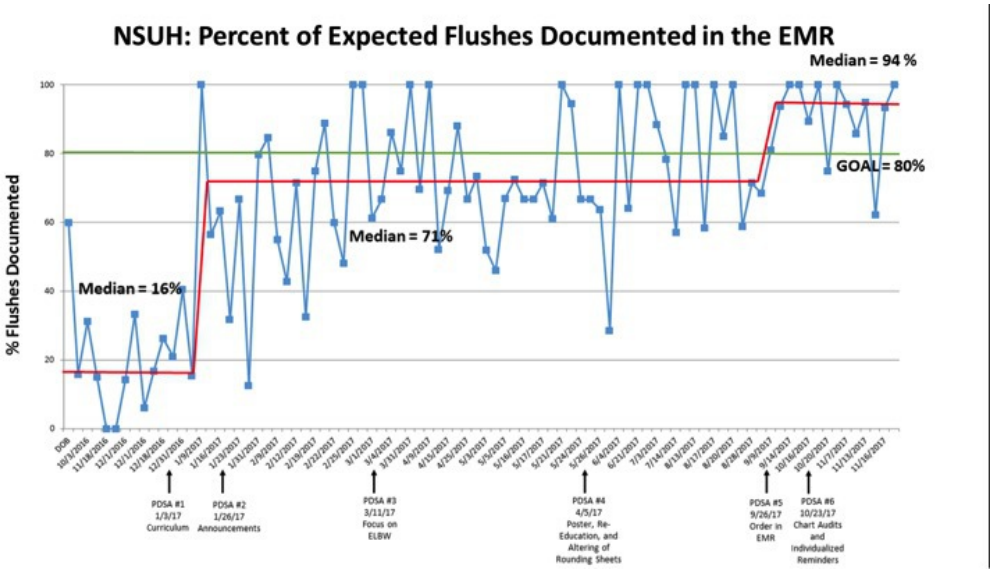
Background High fluid intake in the first week is associated with increased incidence of bronchopulmonary dysplasia (BPD) in premature infants. Although conservative fluid management is the general practice in our NICUs, we found that < 20% of IV flushes for line maintenance and medication administration were recorded. These omissions may amount to significant additional fluids beyond targeted intakes.
Objective The aim of this project was to improve documentation of IV flush administration for infants < 1500g and < 32 weeks gestational age during their first 7 days.
Design/Methods Cohen (CCMC) and North Shore (NSUH) are regional perinatal centers (> 300 VLBW infants annually) that comprise an academic teaching program with neonatologists, fellows, nurse practitioners (NNP), nurses, and pediatric residents, for a total number needed to influence (NNI) of >350. An interdisciplinary “BPD Prevention Team” conducted 8 Plan-Do-Study-Act (PDSA) cycles at CCMC and 6 cycles at NSUH. Baseline assessment included review of the medical record for 2 months before the interventions. “Expected” fluid intake volumes were calculated from the number and average volume of IV flushes. The “% documented” fluid intakes were calculated as “recorded/expected” x 100. Specific PDSA cycles included: nursing curriculum on fluid documentation, announcements at daily briefs, BPD rounds by Nurse Champions with incentives, poster displays, bedside rounds on infants ≤ 1000 g by NNP Champions, re-education of fellows and NNPs, altering of rounding sheets, placement of an order in the EMR, and chart audits with individualized reminders.
Results From Oct 2016-Nov 2017, documentation increased from a median of 16% to 94% at NSUH and from 0% to 77% at CCMC. All interventions were associated with improvement or maintenance of fluid documentation. Nursing curriculum, chart audits, and individualized reminders were most effective at improving performance. For infants with birth weight ≤ 1000 g, IV flushes added a median of 35-45 mL/kg to targeted fluid volumes on days 1-3, cumulatively.
Conclusion(s) Cycles of change implemented by a BPD Prevention Team improved documentation of flush volumes. Additional work is needed to achieve > 80% documentation at CCMC. Differences between the sites are likely related to barriers presented by higher patient census and NNI at CCMC. Better documentation of flushes will enable clinicians to adjust maintenance fluids to achieve evidence-based fluid restriction targets in the 1st week.





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Abstract: 301

Relationship between antibiotic exposure and growth velocity in premature infants

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Background Epidemiologic studies suggest that antibiotic exposure during the first six months of life, in combination with other factors, may contribute to childhood adiposity and risk for obesity later in life. Prematurity is also associated with an increased risk of childhood obesity and metabolic syndrome in adulthood, particularly among individuals born at a low birth weight. However, the effects of early antibiotic administration on growth in premature infants remain poorly understood.

Objective Our goal was to characterize the relationship between duration of antibiotic administration during the first week of life and subsequent growth velocity. We hypothesized that a longer duration of antibiotics would be associated with a higher growth velocity.

Design/Methods This was a retrospective study comparing the in-hospital growth of infants born between 30 and 32 6/7 weeks gestational age admitted to the Montefiore Weiler and Wakefield Neonatal Intensive Care Units between January 2009 and December 2015. Antibiotic duration during the first week of life was classified as no antibiotics, < 5 days of antibiotics, or ≥ 5 days of antibiotics. Differences between discharge and birth weight Z-scores were compared between the three groups using ANOVA.

Results In this cohort, 87% of infants (n=373) received antibiotics during the first week of life with 16% of infants (n=69) completing a ≥ 5-day course. Infants treated with a ≥ 5- day antibiotic course had a lower gestational age, lower APGAR scores, longer duration and more invasive respiratory support, longer duration of total parenteral nutrition, and delayed initiation of enteral feeding compared to infants treated with a < 5-day course of antibiotics or no antibiotics ($p<0.05$). Infants with ≥ 5-day course also had higher Z-scores for weight on admission and discharge than those with a < 5-day course and those without antibiotic administration ($p<0.05$). However, Z-score differences for weight between admission and discharge were not significantly different between the antibiotic exposure groups

(p=0.64).
Conclusion(s) In this cohort of premature infants, early antibiotic exposure was not associated with an increase in growth velocity between birth and discharge. However, our study is limited by its retrospective nature, unbalanced sample size between the antibiotic exposure groups, and lack of follow-up data after hospital discharge.

Table 1. Neonatal growth and illness severity measures

	No abx first week (N=58)	<5d Abx (N=304)	≥5d Abx (N=69)	p-value
BW z-score, Mean (SD)	-0.52 (0.83)	-0.24 (0.75)	-0.09 (0.83)	0.0060
Discharge weight z-score, Mean (SD)	-1.19 (0.77)	-0.93 (0.79)	-0.83 (0.73)	0.0243
Weight z score difference, Mean (SD)	-0.67 (0.41)	-0.69 (0.49)	-0.75 (0.56)	0.6385
Birth HC (cm), Mean (SD)	28.26 (1.77)	28.79 (1.85)	28.38 (1.78)	0.0587
Discharge HC (cm), Mean (SD)	31.73 (1.31)	31.95 (2.41)	32.13 (1.91)	0.6078
Birth length (cm), Mean (SD)	40.68 (2.56)	41.30 (2.92)	40.95 (2.55)	0.2563
Discharge length (cm), Mean (SD)	44.13 (2.68)	45.35 (2.75)	45.00 (2.80)	0.0101
LOS (days), Mean (SD)	32.79 (11.72)	35.16 (14.64)	39.46 (16.50)	0.0277
Duration of mechanical ventilation (days) , Mean (SD)	0.09 (0.47)	0.21 (0.82)	1.36 (4.18)	<0.0001
Duration NIV (days), Mean (SD)	0.07 (0.41)	0.12 (0.72)	0.68 (4.50)	0.0726
Duration CPAP (days), Mean (SD)	6.31 (6.70)	5.59 (7.34)	8.52 (9.17)	0.0154
APGAR scores at 1 min, Mean (SD)	7.50 (1.60)	7.28 (1.69)	6.51 (2.07)	0.0018
APGAR score at 5 min, Mean (SD)	8.57 (0.73)	8.46 (0.74)	8.12 (1.11)	0.0021
Total TPN days, Mean (SD)	8.74 (7.97)	9.31 (7.86)	11.90 (5.67)	0.0237
Day of life for start of enteral feeds, Mean (SD)	1.55 (0.68)	1.47 (0.95)	2.51 (2.58)	<0.0001

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Abstract: 302
Can Mozart Improve Weight Gain and Development of Feeding Skills in Premature Infants?
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Background The Mozart Effect describes improved IQ test performance in college students after exposure to Mozart's music. This phenomenon has also been applied to the neonate. Exposure to music has resulted in reduction in energy expenditure, improved oxygen saturations, and improved sucking behaviors in healthy preterm infants.
Objective To assess the effect of Mozart's music on time to regain birth weight (BW) and development of oral feeding skills in babies born >28 and <32 weeks of gestation.
Design/Methods Neonates between 28 and 31 completed weeks gestation were randomized within 72hrs after birth to receive Mozart's double piano sonata K448 (study) or routine care with a blank music player (control). Infants on high frequency ventilation or with congenital anomalies were excluded. Infants were exposed to the music player twice per day in between cares for a total of 14 days. Infants were exposed to no more than 35 dB above the ambient noise already found in the isolette as per AAP sound exposure recommendations. Infants in both groups were not exposed to any other music for the duration of the study. The primary outcome was time to regain birth weight. The secondary outcome was time to achievement of full oral feeding skills once the infants reached 33 weeks gestation. This was assessed by a speech therapist blinded to the intervention using an objective oral feeding assessment tool. We hypothesized that exposure to Mozart's sonata will decrease time to regain BW and improve overall feeding skills. A total of 32 newborns were needed to detect a 3-day difference in time to regain BW with 80% power and α=0.05.
Results Thirty-five infants were enrolled: 20 in the study group and 15 in the control group. There were no significant differences between the two groups with respect to BW, gestational age, age at the time of enrollment, or number of missed sessions. There were

no differences in mean time to regain BW or time to achieve full oral feeds between the two groups (Table).
Conclusion(s) Exposure to Mozart's double piano sonata for 14 days after birth did not significantly improve time to regain BW or time to achievement of full oral feedings in very premature infants. It is possible that the duration of music exposure was not sufficient to have a physiologic effect on growth and oral feeding skills. In addition, unaccounted confounding variables, such as illness severity, may have affected the results. Future studies may benefit from longer music exposure times.

Results

Outcome	Study Group	Control Group	P Value
Mean Time to Regain BW (days)	10.3 +/- 2.8	11.1 +/- 3.6	0.472
Mean Time to Achieve Full PO Feeds (days)	22.2 +/- 10.9	21 +/- 13.2	0.809

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Abstract: 303
Association of hypernatremia in preterm infants with neonatal morbidities and long-term neurodevelopment.
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Background Hyponatremia and hypernatremia frequently occur in preterm neonates. However, there is limited literature describing the relationship between dysnatremias and neurodevelopmental outcomes.
Objective To evaluate the relationship between serum sodium levels in preterm infants and subsequent neurodevelopmental outcomes.
Design/Methods This retrospective chart review included infants born ≤32 weeks gestational age admitted to the neonatal intensive care unit (NICU) at New York University (NYU) Medical Center or Bellevue Hospital from April 1, 2014 to June 30, 2016 with 18-month neurodevelopmental follow-up data through NYU's Neonatal Comprehensive Care Program. For each infant, we recorded the highest, lowest and average serum sodium (Na) at 1 week of life, 1 month of life and for the whole admission. Neurodevelopmental outcomes at 18 months corrected age were determined by the Bayley Scales of Infant and Toddler Development (Bayley-III). Associations between Na values and individual components of the Bayley-III were calculated by Pearson's correlation coefficients. Associations between hypernatremia, defined as the highest Na during admission >145mmol/L, and select neonatal morbidities were tested by Pearson's chi-squared analysis.
Results Of 223 infants, 209 met eligibility criteria. The mean birthweight was 1208g (SD=387g) and the mean gestational age was 28.9 weeks (SD=2.4 weeks). A significant negative correlation was found between 18 month Bayley fine motor scaled scores and the highest Na during the first week (r=-0.330, P=0.013), the first month (r=-0.386, P=0.003), and whole admission (r = -0.395, P=0.003). No significant association was found between the lowest or average Na and neurodevelopmental outcomes. Having an Na >145 during admission was also significantly associated with higher frequency of grade II-IV intraventricular hemorrhage (IVH) (P=0.028), respiratory distress syndrome (RDS) (P=0.048) and chronic lung disease (CLD) (P=0.007).
Conclusion(s) Hypernatremia during the first week, first month, and total admission were significantly associated with poorer fine motor development in preterm infants at 18-months. This adverse effect on fine motor development may be related to the sensitivity of the cerebellum to extreme electrolyte disturbances. Alternatively, the effect may be mediated by other morbidities associated with hypernatremia. We found high sodium during admission to be significantly associated with grade II-IV IVH, RDS, and CLD, known risk factors for neurodevelopmental delay.

Table 1. Demographic and clinical characteristics of preterm infants included in final analysis

Characteristic	-
Infants, n (%)	209 (100)
Birth weight, mean (standard deviation), grams	1208 (387)
Gestational age, mean (standard deviation), weeks	28.9 (2.4)
Gender, n (%) Male Female	- 119 (56.9) 90 (43.1)
1st week serum sodium, mean (standard deviation), mmol/L Highest (Range 134-158) Lowest (Range 117-144) Average (Range 132-147)	- 145 (4.13) 134 (4.9) 140 (3.3)

1st month serum sodium, mean (standard deviation), mmol/L Highest (Range 139-176) Lowest (Range 117-144) Average (Range 132-147)	- 146 (4.65) 133 (5.02) 139 (2.71)
Total admission serum sodium, mean (standard deviation), mmol/L Highest (Range 139-176) Lowest (Range 117-144) Average (Range 132-147)	- 146 (4.9) 132 (5.46) 139 (2.76)
Intrauterine growth restriction, n (%)	30 (14.4)
Multiple gestation pregnancy, n (%)	64 (30.6)
Preterm labor, n (%)	106 (50.7)
Caesarean section, n (%)	151 (72.2)
Vaginal delivery, n (%)	57 (27.3)
Sepsis, n (%)	97 (55.9)
Necrotizing enterocolitis, n (%)	9 (4.3)
Patent ductus arteriosus, n (%)	58 (27.8)
Persistent pulmonary hypertension, n (%)	12 (5.7)
Respiratory distress syndrome, n (%)	186 (89.4)
Significant IVH (Grade II-IV) on ultrasound, n (%)	19 (14.3)
Chronic lung disease, n (%)	48 (23)

Table 2. Associations between highest serum sodium and 18-month neurodevelopmental outcomes

	Pearson's r	P
Highest serum sodium, first week of life	-	-
Bayley cognitive scaled score Bayley receptive language scaled score Bayley expressive language scaled score Bayley fine motor scaled score Bayley gross motor scaled score	-0.113 0.156 -0.214 -0.330 -0.043	0.409 0.250 0.114 0.013 0.754
Highest serum sodium, first month of life	-	-
Bayley receptive language scaled score Bayley expressive language scaled score Bayley fine motor scaled score Bayley gross motor scaled score	0.011 -0.257 0.-386 -0.103	0.934 0.056 0.003 0.451
Highest serum sodium, total admission	-	-
Bayley cognitive scaled score Bayley receptive language scaled score Bayley expressive language scaled score Bayley fine motor scaled score Bayley gross motor scaled score	-0.235 0.003 -0.253 -0.395 0.092	0.081 0.983 0.060 0.003 0.501

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Abstract: 304

Extra Vigilance by Co-signing is an Effective Strategy to Decrease Medication Administration Errors.

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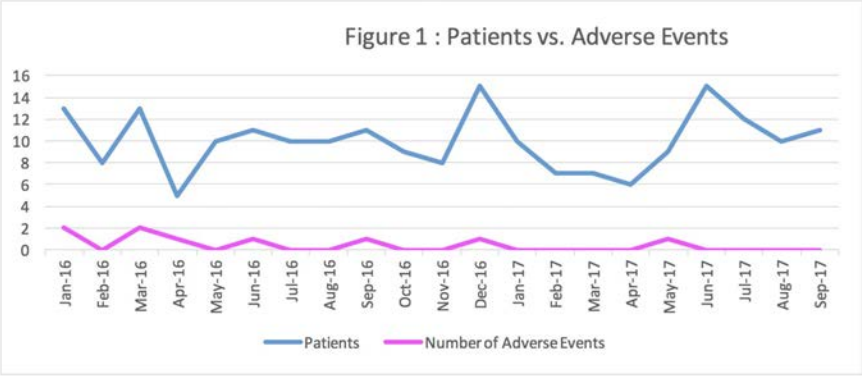
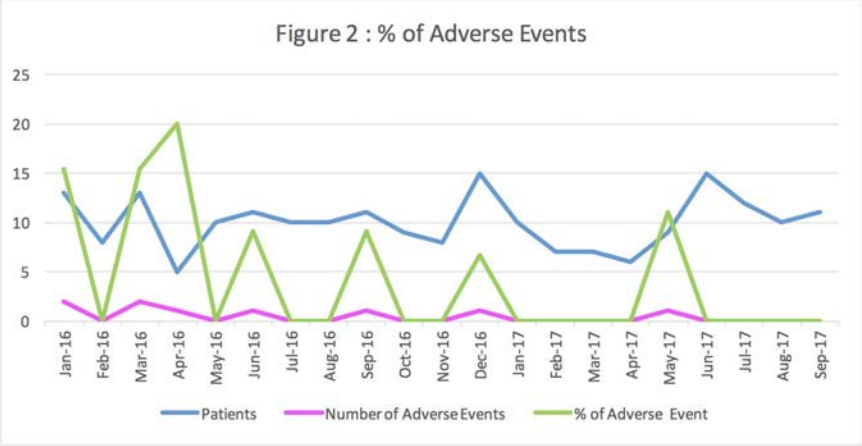
Background Medication administration errors are not uncommon to see in hospital settings. Some of them we come across are administering wrong medication dose, to wrong patient, at a wrong time or interval. Patient safety and delivering compassionate care is of utmost importance. Currently there are many existing quality measures in developed countries like United States and many parts of the world were medication orders are electronically placed, and the system accepts medication orders written by physicians only after no known allergies is accepted. Pharmacist delivers medication to the patient's nurse after the safety checks. The patient's nurse administers the medication, after verbally witnessed by a second nurse, and documents electronically between the care time. Verbal verification can lead to errors in a busy unit, during change of shifts, and in circumstances when there is inadequate staff.
Objective To decrease the incidence of medication administration errors by 20% in 6 months by extra vigilance just prior to medication administration.
Design/Methods Extra vigilance for patient safety just prior to medication administration can be an effective strategy in decreasing the medication administration errors. Frontline people are the nurses in the unit. Patient's nurse performs the patient safety checks before delivering the medication to patient. The verification includes the details of medication being administered, for right patient name, medical record number, dosage, route of administration and interval. A second nurse verifies the information is correct and co-signs just prior to administration.
Results Data collection on medication administration error incident reports were collected retrospectively for 6 months prior to intervention and 6 months prospectively post intervention. Data is plotted with time on x-axis and medication errors on y-axis on a run chart. Percent decrease is calculated by comparing the incidence of the events before and after the intervention. The average medication administration adverse events calculated for 6 months pre- intervention was 2.63% and average events post-intervention was 1.59%. Percent decrease medication error adverse events in 6 months was 39.56%. The data was calculated and plotted as run charts using Microsoft Excel.
Conclusion(s) Co-signing is an effective strategy in decreasing medication errors. Patient safety checks by two nurses prior to delivering the medication has shown a significant reduction in medication administration errors.





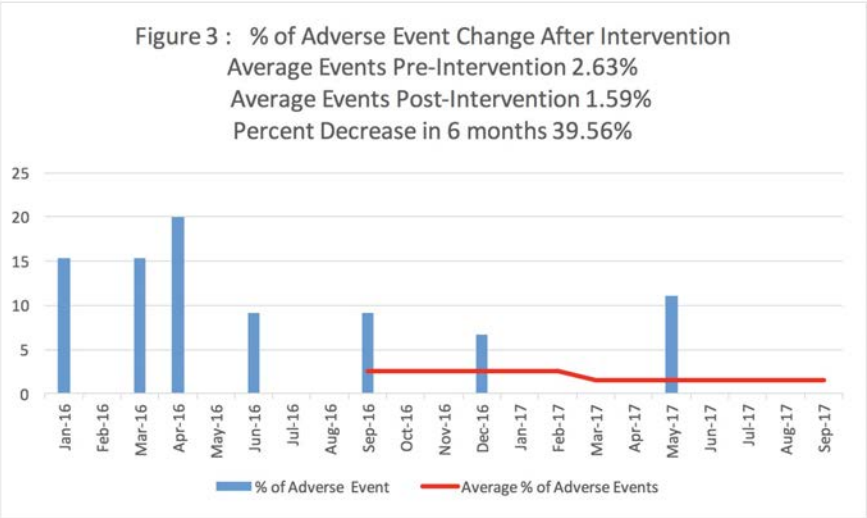


Table 1

Month	Patients	Number of Adverse Events	% of Adverse Event	Average of % Adverse Events
16-Jan	13	2	15.38	-
16-Feb	8	0	-	-
16-Mar	13	2	15.38	-
16-Apr	5	1	20	-
16-May	10	0	-	-
16-Jun	11	1	9.09	-
16-Jul	10	0	-	-
16-Aug	10	0	-	-
16-Sep	11	1	9.09	2.63
16-Oct	9	0	-	2.63
16-Nov	8	0	-	2.63
16-Dec	15	1	6.67	2.63
17-Jan	10	0	-	2.63
17-Feb	7	0	-	2.63
17-Mar *	7	0	-	1.59
17-Apr	6	0	-	1.59
17-May	9	1	11.11	1.59
17-Jun	15	0	-	1.59
17-Jul	12	0	-	1.59
17-Aug	10	0	-	1.59
17-Sep	11	0	-	1.59

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Abstract: 305

NUTRITION STRATEGIES FOR EVALUATING POSTNATAL GROWTH FAILURE IN PRETERM BABIES

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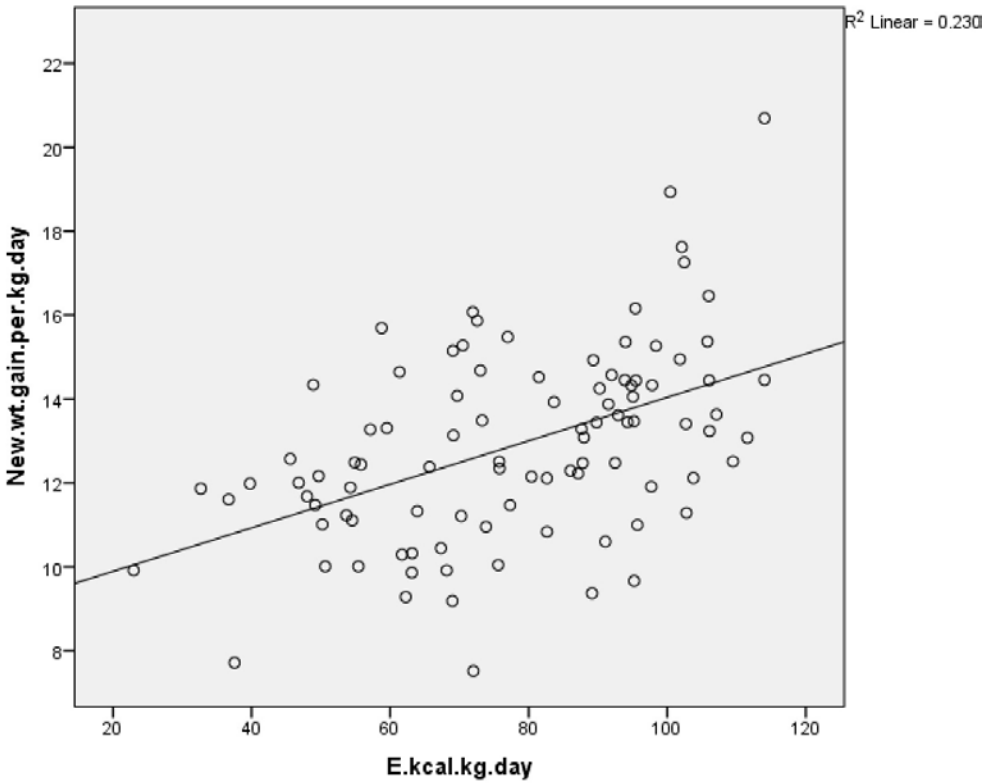
Background Postnatal growth failure (PNGF) in preterm (PT) infants has been shown to impact long term morbidity. Current post-natal care and nutritional support in PT infants is unable to match the in-utero environment for optimal growth. The ideal growth velocity (GV) would simulate intrauterine GV at an optimal range. Maximizing GV during the NICU stay by adequate nutrition to prevent PNGF and avoiding the need for catch-up growth later, is a priority for all neonatal clinicians. Very early human milk fortification may improve early protein (Prt) intake in PT infants without increasing the frequency of adverse events.
Objective To identify nutritional strategies that optimize GV and their role in the incidence of PNGF.
Design/Methods A retrospective analysis was conducted on all infants born at ≤32 weeks gestation and/or birth weight (Wt) < 1500 grams from January 2014 - June 2017. Daily Wt gain throughout the NICU stay was utilized to compute GV. Parenteral (Pn) and Enteral (En) intake of carbohydrate, fat, Prt, and calories(kcal); number of days on Pn nutrition; and number of days to reach total En feeds were observed. Pearson's correlation coefficient was used to examine the relationship between the GV and observed nutritional supplementation. Subsequently, logistic regression analysis was done on: percentage time spent on En feeds until post menstrual age of 40 weeks, birth Wt, En Prt, En fat, En kcal, Pn Prt, Pn fat intake and total Pn kcal. Minimal fetal Wt accretion rate 14 grams per kg per day (gm/kg/day) was used to define two groups for comparison: Group 1 (GV <14 gm/kg/day) and Group 2 (GV ≥ 14 gm/kg/day). Baseline characteristics of both the groups were comparable (Table 1).
Results There was a positive correlation between En nutritional support and GV while duration of Pn nutrition and days to reach En full feed had negative correlation with GV ($p<0.001$, table 2). Based on regression analysis, increment of 10 kcal/kg/day in En caloric intake results in increment of GV by approximately 1 gm/kg/day ($p=0.025$)(Figure 1). Group 2 received higher En and lesser Pn supplementation compared to Group 1. Group 2 had significantly less Wt percentile change from birth to discharge ($p <0.001$) (Table 1).
Conclusion(s) To ensure optimal postnatal GV, the En supplementation and percentage time spent on En nutrition should be more than Parenteral. Increase in En calories directly influences the GV. Ensuring GV with optimized En caloric intake may reduce the discharge Wt percentile regression seen in PT infants.



Correlation between Enteral caloric intake(kcal/kg/day) and Growth Velocity (net weight gain gm/kg/day)

Table 1: Baseline characteristics, anthropometric parameters, and nutritional intake (n=96)

Variables	Group 1 (n=61; 64%)	Group 2 (n=35; 36%)	p-value

Baseline characteristics			
Birth weight (g), mean±SD	1139±325	1087±266	0.430
APGAR at 5 min, mean±SD	7.7±1.6	8.2 ±1.0	0.113
ANID, n (%)	9 (15%)	2 (6%)	0.181
Anthropometric parameters			
* Average GV (gm/kg/day)	11.6±1.4	15.4±1.4	<0.001
Wt centile at birth	53.4±26.4	23.8±21.9	<0.001
Wt centile at discharge,	15.5±16.4	12.7±11.5	0.383
Wt centile change from birth to discharge	-38.0±22.1	-11.1±15.4	<0.001
SGA at birth, n (%)	4 (7%)	15 (43%)	<0.001
IUGR at birth, n (%)	4 (7%)	10 (29%)	0.003
Discharge weight < 10th percentile, n (%)	30 (49%)	17 (49%)	0.954
Nutritional support details			
*Days on Parenteral nutrition	26.0±17.6	12.3±11.8	<0.001
*Percentage time spent on Parenteral nutrition	0.31±0.18	0.16±0.14	<0.001
*Days to reaching full feed	30.8±19.9	15.3±11.3	<0.001
*Enteral protein, g/kg/day	2.28±0.75	2.82±0.55	<0.001
*Enteral fat, g/kg/day	4.12±1.26	5.05±0.95	<0.001
*Enteral carbohydrates, g/kg/day	7.48±2.25	9.29±1.68	<0.001
*Enteral total calories, kcal/kg/day	71.5±21.1	89.1±16.2	<0.001
*Parenteral protein, g/kg/day	3.08±0.96	2.63±1.43	0.107
*Parenteral fat, g/kg/day	2.42±0.76	1.96±1.09	0.034
*Parenteral carbohydrates, g/kg/day	9.48±3.10	9.28±6.07	0.860
*Parenteral total calories, kcal/kg/day	63.0±19.9	49.8±28.1	0.018
*Enteral and parenteral calories, kcal/kg/day	99.7±8	105.8±7.4	<0.001

* All data are expressed as mean±SD unless specified Abbreviations: n=number, SD=standard deviation, IUGR = intrauterine growth retardation, SGA = small for gestational age, ANID: = acute neonatal intestinal disease, g = gram, wt = weight.

Table 2: Correlation between GV (gram/kg/day) and nutritional support during NICU stay, and logistic regression model for the effect of nutritional support on the weight gain. (n=96)

Correlation between GV (gram/kg/d) and nutritional support		
Nutritional support details	R2	P value
* Percentage time spent on Parenteral nutrition	-0.45	<0.001
* Days to full feed fractional to days to 40 weeks	-0.48	<0.001
* Enteral protein, g/kg/day	0.43	<0.001
* Enteral fat, g/kg/day	0.43	<0.001
* Enteral carbohydrates, g/kg/day	0.47	<0.001
* Enteral total calories, kcal/kg/day	0.48	<0.001
* Parenteral protein, g/kg/day	-0.17	0.094
* Parenteral fat, g/kg/day	-0.24	0.017

* Parenteral carbohydrates, g/kg/day			-0.05	0.591
* Parenteral total calories, kcal/kg/day			-0.26	0.010
* Enteral and parenteral calories, kcal/kg/day			0.51	<0.001
Logistic regression model for the effect of nutritional support on the weight gain				
Variable	Degree of change	OR	95% CI	p-value
Percentage time spent to achieve full enteral feeds	0.52	-0.06	-0.09 to -0.03	<0.001
Birth weight, grams	-4.90	-0.04	-0.05 to -0.02	<0.001
* Enteral protein, g/kg/day	0.02	0.07	-2.15 to 2.29	0.951
* Enteral fat, g/kg/day	-0.90	-1.67	-3.61 to 0.26	0.090
* Enteral total calories, kcal/kg/day	1.06	0.11	0.01 to 0.21	0.025*
* Parenteral protein, g/kg/day	0.29	0.56	-0.22 to 1.36	0.160
* Parenteral fat, g/kg/day	-0.48	-1.20	-2.55 to 0.14	0.080
* Parenteral total calories, kcal/kg/day	0.24	0.02	-0.04 to 0.08	0.475

* Note: all variables are averages of values during days of hospital stay

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Abstract: 306

Community Acquired Urinary Tract Infection in Children Caused by Extended Spectrum beta-lactamase Producing Pathogens: Study of Demographics and Outcome Based on Empiric Cephalosporin Therapy

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Background Extended spectrum beta-lactamase (ESBL) producing bacteria such as Escherichia coli (E. coli) are increasingly implicated in pediatric community acquired urinary tract infections (UTIs). The antibiotic of choice for an ESBL-producing infection is a carbapenem. However, carbapenems require parenteral administration leading to longer hospital stays. At our institution, all children diagnosed with UTI on urinalysis are empirically started on ceftriaxone, irrespective of this increasing incidence of ESBL infections.
Objective We aim to study demographics of patients with ESBL UTI, including zip codes and ethnicities. We seek to study clinical and microbiological responses to empiric ceftriaxone in children with ESBL UTIs.
Design/Methods A retrospective chart review was conducted for patients aged 0 days up to 19 years who presented to NYU Winthrop Hospital from June 1st, 2013 to June 30th, 2017 with a urine culture positive for ESBL producing E. coli. Outcomes for this group were compared to a group with non-ESBL UTIs.
Results Forty-two patients were identified with urine culture positive for ESBL producing E. coli, of which 88% (n=37) denied receiving antibiotics in the 3 months prior to hospitalization. None were hospitalized in 1 month prior and none reported a history of urinary tract anomalies. Twenty-nine patients met AAP criteria for UTI (urine culture >50,000 CFU/ml and pyuria ≥ 5 cells /mm^3 on urinalysis) (Table 1).

With respect to zip codes, 35% (n=10) of study patients were from the 11550 zip code (Hempstead, NY) compared to 16% of total pediatric admissions from January 2017 to November 2017 from the same zip code (p=0.0058 by chi-square).
Conclusion(s) All children had improvement in fever curve on empiric ceftriaxone despite the growth of ESBL organism on urine cultures. The time to defervesence significantly differed between groups, with ESBL E. coli infected patients having longer fever duration. Majority (83%) of repeat urine cultures in cases of ESBL UTI prior to switch to carbapenems were sterile. We observed higher incidence of ESBL UTI in Hispanic patients and clustering to a single zip code (11550) when compared to overall hospital admissions.

Table 1: Demographic and clinical comparison of ESBL versus non-ESBL groups

	ESBL	Non-ESBL
Demographic		
# of patients with E. coli urinary tract infection	29	27

# of male patients	3 (10%)	7 (26%)
Median age (years)	1.67	1.1
# of Hispanic patients	16 (55%)	16 (59%)
# of patients from 11550 zip code	10 (35%)	5 (19%)
Clinical response to ceftriaxone		
# of patients started on empiric ceftriaxone	21	23
Average days of treatment	2.47 (2-3)	2.2 (1-3)
Average fever height	102.6	102.5
Average days of fever	2.06 (0.67-4.0)	1.25 (0.25-3.0)
Repeat negative urine culture prior to switch to carbapenem		
	5 (83%)*	None available

*Repeat urine culture prior to switch to carbapenem was available in only 6 patients.

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Abstract: 307

Interventions After Failure of the Infant Car Seat Challenge: National Survey of NICUs

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Background Infants born premature (<37 weeks gestational age, GA) and low birth weight (<2.5kg, LBW) are at significant risk of breathing difficulties when placed in their car safety seat. The infant car seat challenge (ICSC), or period of observation before discharge to monitor for episodes of apnea, bradycardia and desaturation, is one of the most common tests performed on neonates in the United States. However, minimal evidence exists to guide clinicians on failure criteria, duration, and follow-up. Appropriate next steps after failed ICSC remains controversial and include repeating ICSC vs. discharge in car bed vs. further evaluation/prolonged admission. No studies specifically address rates of each potential intervention performed by NICUs across the nation.
Objective Our objective was to perform a national survey to identify which inclusion criteria, failure criteria, and most importantly what follow up is occurring after failed ICSCs in NICUs across the nation.
Design/Methods We performed a telephone survey of randomly selected Level II and III NICUs including academic and community centers representing each region of the US. We obtained information on whether they perform ICSCs, whether they have an official protocol, inclusion criteria, failure criteria, follow up of failed ICSC including repeat testing, prolonged admission, and/or discharge in a car bed.
Results We attempted to contact 237 NICUs, of whom 47% were academic centers. We obtained data on ICSC from 168 centers (71%). Of these, 164 (97.6%) do perform some form of ICSC. We found that after an infant fails, 97% will perform repeat ICSC. Of these, 56% allow 2 repeat ICSCs, 24% allow up to 3 repeat ICSCs, and 20% allow 4 or more repeat ICSCs prior to attempting car beds. Up to 75% of centers will consider discharge in a car bed, but only 70% of these require car bed test prior to discharge home. The majority of ICSC durations met AAP recommended minimum of 90 minutes (85%), while 15% performed shorter/modified ICSCs. Most common failure criteria included: oxygen desaturation <90% for >10 seconds, heart rate <80 for >10 seconds, apnea >20 seconds.
Conclusion(s) This is the first study of its kind to evaluate national practices related to ICSC performance and follow up in a large number of NICUs. There is a significant lack of standardization in testing protocols and what interventions should be applied post-failure. However, it appears a vast majority perform ICSCs, and will repeat ICSCs prior to attempting discharge in car beds.

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Abstract: 308

Identifying Attitudes, Knowledge Gaps, and Barriers to Providing Neonatal Palliative Care in a Level IV NICU

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Background A significant number of newborns are affected by life-limiting or life-threatening conditions, many due to congenital malformations and extreme prematurity. Despite advances in the medical care of these critically ill newborns, a number of these infants ultimately do not survive. Providing comfort as well as end-of-life care is essential in the care of these infants. Currently, there are no neonatal palliative care guidelines within our neonatal intensive care unit (NICU). A multidisciplinary neonatal palliative care committee was established to assess our center's need for neonatal palliative care guidelines as well as to identify gaps in knowledge and barriers to implementation of neonatal palliative care.
Objective To assess current attitudes, knowledge gaps, and barriers to providing neonatal palliative care within our level IV, 54 bed

NICU.
Design/Methods An adapted Neonatal Palliative Care Attitude Scale (NiPCAS) was distributed electronically to all NICU medical and nursing staff. The anonymous survey consisted of 31 questions with answers in the form of a Likert scale.
Results The overall response rate was 63% with a total of 165 surveys completed. The majority of respondents agree that palliative care is important in the NICU and have experience providing palliative care to infants. Survey results reveal discrepancies in how respondents define and implement palliative care. Barriers to palliative care practices include differences in beliefs between members of the care team, feeling that families are not informed of palliative care options, not having enough support or time to meet the needs of dying babies or their families, and the absence of unit guidelines to assist in the delivery of palliative care within our unit. Additionally, palliative care education is deemed necessary in neonatal nursing and medical education (98%) but only 39% of respondents have received education on supporting and communicating with parents of dying children.
Conclusion(s) The majority of respondents agree that providing neonatal palliative care is important in the NICU environment. Many differences in attitudes about palliative care as well as barriers to its implementation were identified. Understanding these attitudes towards palliative care and identifying these barriers will inform future efforts to improve the education and implementation of palliative care guidelines in our NICU.

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Abstract: 309

Correlation of Vitamin D Deficiency with Asthma in Pediatric Population in Eastern India

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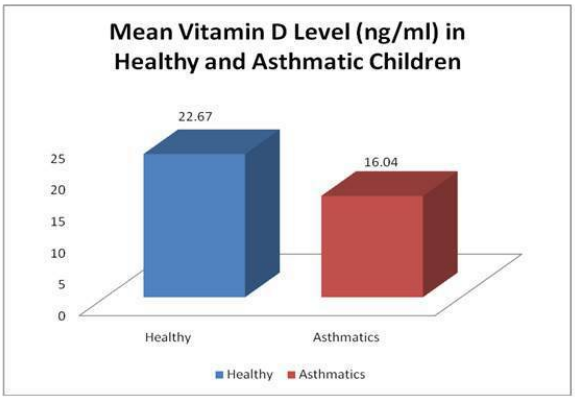
Background There is no consensus on optimum vitamin D levels for non musculoskeletal health. Vitamin D deficiency was recently defined as levels < 20 ng/ml .[1] It has been evident that vitamin D stimulates alveolar type II cells's DNA synthesis and surfactant production [2] and regulates alveolarisation[3] Several experimental and human studies suggested the protective role of vitamin D on asthma morbidity by preventing viral infection and steroid responsiveness which favours the inverse association between vitamin D status and severe asthma exacerbation in children.
Objective 1.To determine the incidence of vitamin D deficiency in Indian children with clinically proven asthma as compared to healthy controls.
2. To study the association of vitamin D deficiency with the clinical correlates of asthma
Design/Methods Inclusion Criteria: Children 1 to 14 years of age with clinically proven asthma as classified according to GINA guidelines.
Exclusion Criteria: Children with co- existing rickets, renal diseases or on Vitamin D supplements or steroids
Case Control Prospective study over 1 year with 100 patients diagnosed as asthma. Analysis of serum 25(OH) D (ng/ml) levels was done by electrochemiluminiscence method. The Mann–Whitney U test was used for computing group differences. Categorical data was analyzed using Fisher's exact test. Spearman's rank correlation analysis was used to test for correlations between variables
Results This study was carried out with 100 asthma patients as cases and 36 healthy patients as controls. Out of the cases, there were 20 patients in 1 to 5 years group and 80 in 5 to 14 years. .The serum 25 OH (D) levels were determined in both groups of patients. Vitamin D level was found to be significantly decreased in asthmatic children (16.04 ng/ml ± 3.2) as compared with the control group (22.67 ng/ml ±8.9) ($p< 0.001$;). We did not find a correlation between asthma severity and vitamin D deficiency (p value=0.28). This difference could be attributed to the fact that most of our patients had controlled and partially controlled asthma
Conclusion(s) There is growing appreciation of the likely importance of vitamin D as a pleiotropic mediator that contributes to pulmonary health. This is the only study available which looks at the Eastern Indian population. In future vitamin D can become involved in the treatment of asthma. Limitation of our study was that we didnt have enough cases with uncontrolled asthma so we didnt find a significant correlation between the severity of asthma and the level of Vit D Deficiency.

Image 1: Comparison of Vitamin D Levels in Asthmatics and Healthy Children



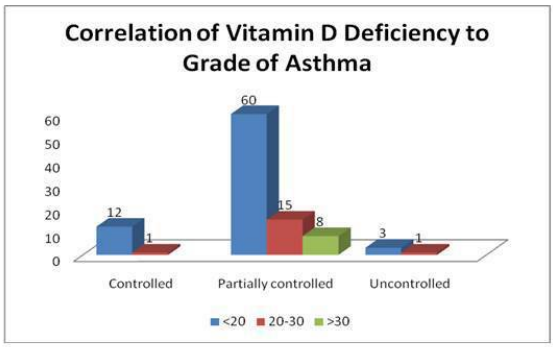


Image 2: Correlation of Vitamin D Deficiency to Grade of Asthma

Table 1 Comparison of Vitamin D levels between Asthmatics and Healthy Children

Serum Vitamin D levels	Controls	Cases
Mean Vitamin D levels in (ng/ml)	22.67	16.02

Table 2 Showing correlation of Vitamin D Deficiency to Grade of Asthma

Grade of Asthma	<20 (Deficiency)	20-30 (Insufficiency)	>30 (Sufficiency)	Total
Controlled	12	1	nil	13
Partially controlled	60	15	8	83
Uncontrolled	3	1	nil	4

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Abstract: 310

Identifying Waste in the NICU MRI Process

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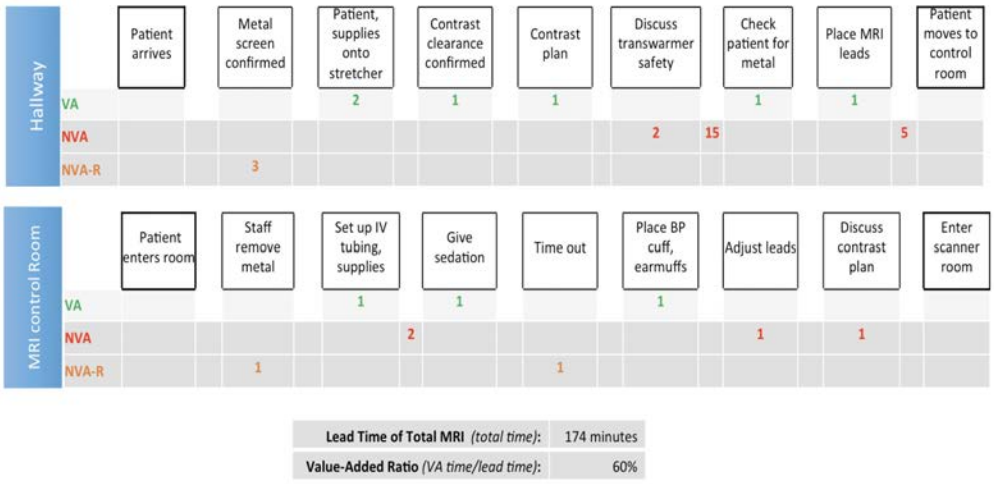
Background Magnetic resonance imaging (MRI) is a valuable diagnostic tool in neonatal intensive care units (NICU). Acquiring a neonatal MRI is a complex process that includes relocation of critically ill neonates out of the NICU, evaluation for ferromagnetic materials, and planning for patient immobilization/sedation. This complicated process involves multiple providers and departments. Lean Methodology (LM) is a philosophy focusing on value by improving processes to reduce waste and eliminate inefficiencies.
Objective To utilize LM principals to identify waste in our current MRI process.
Design/Methods The CHOP NICU is a 98-bed level IV NICU with a range of respiratory support requirements and diagnoses. On average we perform 30 MRIs monthly. The MRI suite is one floor above the NICU. In-house transports are routinely performed by a bedside nurse and front line clinician.
A cross-functional quality improvement team of key stakeholders was assembled. Data collection consisted of direct observations of the current process (Gemba Walk). (Table 2) Current state and assessment of waste (Muda) were evaluated by swim lane process maps broken down by location (NICU, Hallway, MRI Control Room, MRI Scanner). Value stream mapping was utilized to quantify value-added (VA) and non-value added (NVA) waste. (Fig 1) Data collected were patient time off unit, duration of scan, provider roles/activities, and location where the steps occurred.
Results 7 patient observations were performed from 8/17-10/17. Median time off unit was 108 minutes and median active scan time was 46 minutes. MRI excursion characteristics are described in Table 1. Current state analysis demonstrated that average total process time was 130±55 minutes. The Value Added Ratio (VAR) for these studies was 0.5±0.13 indicating that 50% of our current MRI process is not effectively spent. 6% of our process includes NVA-Regulatory tasks related to safety and patient care. Thus, 44% of the process consists of waste - NVA tasks. (Fig 2) Common factors contributing to waste included: frequent transitions, frequent unwrapping of the infant, difficulty obtaining vitals, and staff unfamiliar with the process.
Conclusion(s) Our process for acquiring neonatal MRIs is complex and nearly half of the time off unit is NVA, consuming resources and increasing risk unnecessarily. Improvements of a complicated process require collaboration and teamwork across multiple departments. Future work will utilize LM to increase efficiency. Specifically, we aim to perform kaizen events focusing on standard work to decrease variation (Mura) and waste.



Current state Value Stream Map from a focused portion of Study #4

Significant NVA activity was noted in the hallway and MRI control room across all trips representing activities to target for Kaizen events.

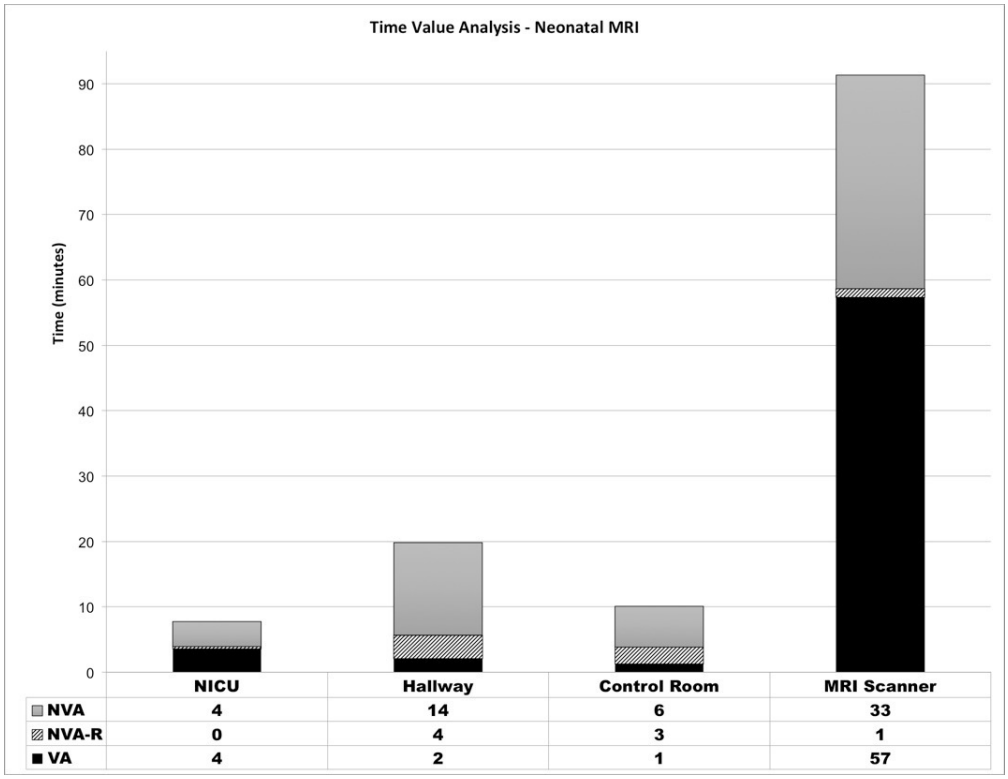


Fig 2 Time Value Analysis of Neonatal MRI Excursions
VA, NVA, and NVA-R activities by location averaged for all excursions.

MRI Excursions Observed

Study Number	Patient Sedated (Y/N)	Imaging Type	Respiratory Support	NICU Staff Present	Total Time off Floor
1	Y	MR Spine	Tracheostomy	FLC*, Nurse, Orienting Nurse, RT*	91 mins
2	Y	MR Abdomen + contrast	HFNC*	NICU Fellow, Nurse, Nursing Student, NICU Attending	119 mins
3	Y	MR Brain & Spine	Intubated	FLC, Nurse, Nursing Student, RT	160 mins
4	Y	MR Brain, MR Abd/Pelvis + contrast	None	NICU Fellow, Nurse	174 mins
5	Y	MR Brain & Spine	Tracheostomy	FLC, Nurse, Orienting Nurse, RT	230 mins
6	N	MR Brain & Spine	None	Nurse	73 mins
7	N	MR Brain + contrast	None	Nurse, Orienting Nurse	66 mins

* HFNC = High flow nasal cannula, FLC = Front Line Clinician, RT = Respiratory Therapist

SIPOC Chart

Suppliers	Input	Process	Output	Customer
NICU Nurse	Patient prep in NICU Fax Metal Screen	Monitor patient, move patient physically, administer meds, provide clinical context	Patient clinically stable and normothermic	Patient MRI Tech FLC

	form Draw up meds			
{Respiratory Therapist}	Patient prep in NICU Switch to transportable equipment	Transport ventilator, O2 or iNO tanks, set up vent in scanner, suction	Patient clinically stable	Patient FLC
MRI Technician	Prepare scan protocol Metal Screen form Contrast form	Ensure no metal enters scanner, position patient, place coil, run scan, confirm scan with radiologist	Complete MRI study No metal in scanner Adequate images	Patient Radiologist NICU Attending
MRI Nurse	Patient transitions/flow Provide MRI leads, BP cuff, pulse ox	Assist with moving patient/supplies, set up MRI patient monitor	Patient clinically stable & normothermic Timely flow	Patient
{Front Line Clinician}	Sedation consent Order medications Begin to sedate	Monitor patient, maintain adequate sedation, adjust respiratory support	Adequately sedated patient Stable Patient Completed study	Patient NICU Attending

{ } = not required for all studies

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Abstract: 311

A Quality Improvement Initiative to Improve Prenatal Counseling for Neonatal Abstinence Syndrome (NAS): Bringing Attention to the Primary Conversation

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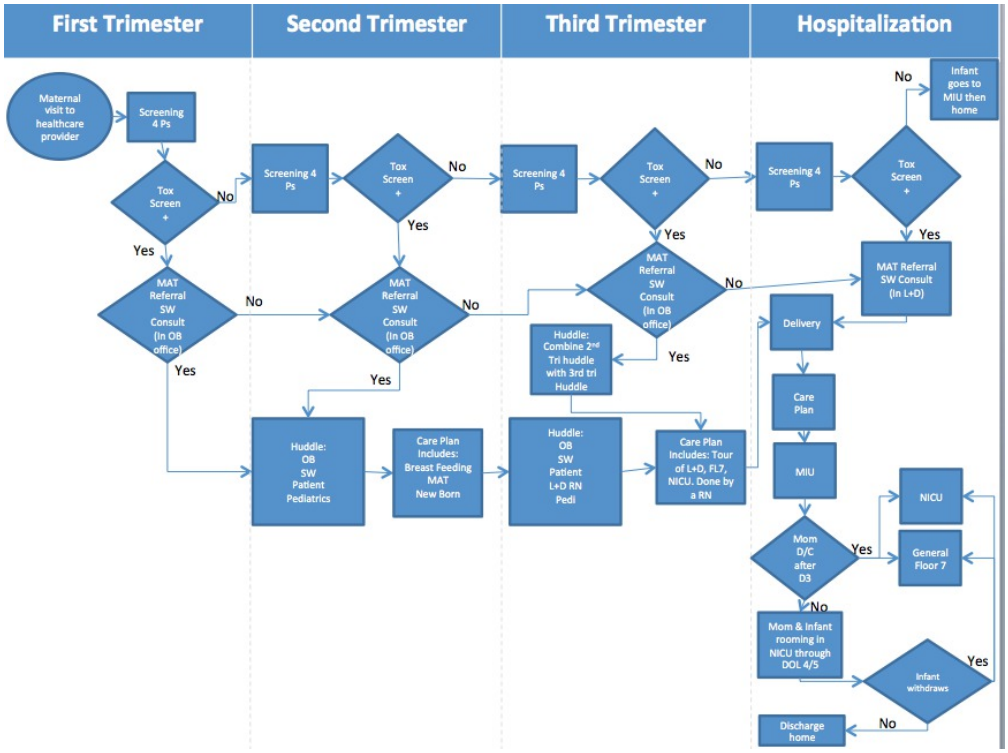
Background Within the setting of the opioid epidemic the incidence of NAS continues to increase. Prenatal counseling is a key component of high risk mother-infant care, as it sets the foundation for preliminary information sharing, introduces families to social resources, establishes family centered care, and may contribute to decreasing the stigma of a challenging medical course.

Objective The aim of this project was to provide standardized perinatal education to 20% of mothers with in-utero substance exposure by the time they were admitted to Labor and Delivery from March 2017 to December 2017.

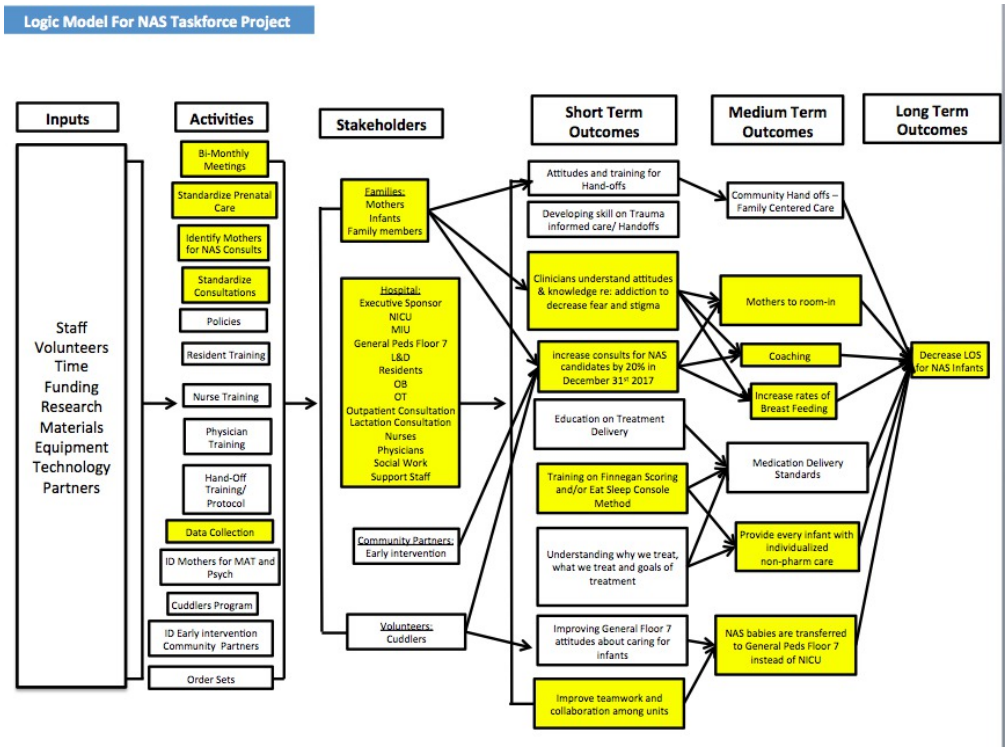
Design/Methods As part of a statewide neonatal quality initiative (NeoQIC) to improve care of infants and families affected by NAS, a multidisciplinary team was established in March 2017 with aim to improve the frequency of prenatal consultations dedicated to NAS in our hospital. Process maps and logic models established the workflow of the project, improving the structured approach to integrating consultation into the maternal admission process. Neonatology team members completed the consultations with emphasis on NAS symptoms, non-pharmacologic and pharmacologic interventions, and the role of family centered care.

Results Forty-three at risk mother-infant dyads were admitted to Labor and Delivery in the setting of prenatal opioid exposure within our proposed timeframe. In 2016, there was no standard tracking model of mother-infant dyads from the perspective of NAS. With establishment of improved communication between medical providers and social work, prenatal consultation was completed in a total of 12/43 cases, resulting in 28% of mother-infant dyads receiving prenatal education from pediatric providers. Specifically in comparing 2016 to 2017, there was a difference trending towards significance in provision of consultations administered at ≥ 35 weeks gestation (p=0.073).

Conclusion(s) Overall, our efforts resulted in an increase of prenatal consultation of all mothers with in-utero opioid exposure by greater than 20% of our initial expectation in less than one year. The establishment of this project has resulted in further solidification of our NAS taskforce and standardization of the NAS consult process. Our next project will increase the aim goal to 75% consultation within Labor and Delivery, the Maternal Infant Unit, as well as the Ob-Gyn outpatient clinic, while further evaluating the impact of consultation on length of stay, decision to breastfeed, and rooming in.



NAS Process Map



NAS Logic Model

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Abstract: 312

Outcomes in Unplanned Out-of-Hospital Term and Late Preterm Deliveries at University Hospital in Newark, NJ

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Background Increased rates of hypoglycemia, polycythemia, convulsions and death have been reported among premature infants born in rural areas outside of the hospital. Few papers have identified the modifiable risk factors and morbidities associated with term and late preterm extramural deliveries born in urban neighborhoods.
Objective To determine the rates of morbidities in unplanned out of hospital delivery of term and late preterm infants and associated risk factors in University Hospital in Newark, NJ.
Design/Methods This is a retrospective cohort study of term and late preterm unintentional out of hospital deliveries, which presented to University Hospital between 01/2011 and 12/2016. Environmental, maternal and neonatal risk factors and outcomes were extracted from medical record. Logistic regression was performed to determine factors associated with NICU admissions.
Results 117 infants with gestational ages between 34-40 weeks and a mean birth weight (BW) of 3005 +/- 500 grams were included for analysis. Of the 117 infants, 73 (62%) did not have adequate prenatal care (< 8 visits) and 11 (6%) infants were exposed to illicit drugs. Mothers of 24 (21%) infants had presented with contractions and were discharged within 24 hours of delivery. Initial temperature on arrival to the emergency room was documented in 102 (87%) infants. Median temperature was 96.6°F (interquartile range 95-97.7°F); 61/102 (59%) of infants were moderately (<96.8°F) or severely (<89.6°F) hypothermic. 78 (66%) infants had complete blood counts measured. Polycythemia (hematocrit >65) was documented in 13/78 (16%) of those infants; anemia (hematocrit <45) was noted in 8/78 (11%) infants. Hypoglycemia (<45 mg/dL) was documented in 25 (21%) infants.

26 (22%) were admitted to the NICU. Higher BW and higher initial temperature were associated with decreased odds of NICU admission (BW: OR 0.21 95%CI 0.11-0.88; Temp: OR 0.75 95%CI 0.56-0.99). No association between NICU admission and distance from hospital, adequacy of prenatal care, initial hematocrit, gestational age or initial glucose was seen.
Conclusion(s) In term and late preterm infants unintentionally born outside of University Hospital, inadequate prenatal care and maternal hospital visit within 24 hours of delivery was common. Abnormal hematocrit, hypothermia and hypoglycemia are common morbidities. Higher BW and higher initial temperature decreased the odds of NICU admission. Efforts should be made to ensure adequate thermoregulation in prehospital and ambulance environment.

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Abstract: 313

Factors Associated with Delayed Recognition of Sepsis in a Quaternary NICU

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Background Late-onset sepsis causes significant morbidity and mortality in neonatal intensive care units (NICUs). Delays in sepsis recognition persist, with diagnosis difficult and often based on nonspecific clinical findings. Prompt recognition of sepsis is necessary for timely initiation of treatment, a crucial step in improving overall prognosis.
Objective Determine which signs and symptoms commonly precede initiation of sepsis evaluations. Assess frequency of delayed sepsis evaluations and investigate contributory patient factors.
Design/Methods Retrospective chart review of all patients admitted to the Level 4 NICU at the Children's Hospital of Philadelphia between 1/1 and 12/31/2016 who underwent sepsis evaluations (SEs) with subsequent positive blood cultures. Data collection included demographics and clinical/laboratory findings within 12 hours of sepsis evaluation. Analysis included summary descriptive and chi-square statistics.
Results The cohort included 40 SEs in 33 infants. Seven clinical signs were most often noted preceding SE, most commonly respiratory (65%) and heart rate changes (63%) (mean 2.75 signs/infant) (Table 1). "Screening" laboratory testing, sent in 19 (48%) instances, influenced SE initiation in 79% of those infants. SIRS (systemic inflammatory response syndrome) criteria were met at the time of SE in 23 (58%) instances. Delayed recognition (SIRS criteria met for ≥3 hours prior to SE) occurred in 12 instances (including 50% Gram negative, 25% coagulase-negative Staphylococcus, 25% other Gram positive); those infants had more symptoms (mean 3.5 symptoms/infant) and had screening labs performed more frequently (9 instances, 75%) than the overall cohort (Table 2). Delayed recognition events progressed to severe sepsis with organ dysfunction in 6 infants (50%), though no significant relationship existed between delayed recognition and organ dysfunction (p=0.285). Review of cases of delayed recognition identified recurring themes: delayed action upon low-grade or true fevers in setting of central lines and sustained tachycardia or agitation.
Conclusion(s) Delayed recognition of SIRS (>3 hours) occurred commonly (30%) prior to sepsis evaluations. This may underestimate the true incidence of delays, as not all sepsis episodes met SIRS criteria. Delays may reflect the challenge of interpreting non-specific symptomatology in complex underlying conditions, causing provider uncertainty. The increased frequency of screening in these patients likely reflects attempts to more objectively assess for presence of infection.

Table 1. Frequency of vital sign abnormalities and symptoms in NICU patients undergoing sepsis evaluations

Sign/symptom	Number of patients (Fr equency)
Respiratory change (tachypnea, desaturation, increase in level of support)	26 (65%)

Heart rate change (tachycardia, bradycardia)	25 (63%)
Temperature instability	15 (38%)
Increased apnea/bradycardia events	13 (33%)
Change in activity level (agitation, lethargy)	12 (30%)
Feeding intolerance (emesis, abdominal distention)	11 (28%)
Blood pressure change	7 (18%)

Table 2. Characteristics associated with delayed recognition of SIRS criteria prior to initiation of sepsis evaluation in 12 patients

Demographics	
Gender	42% M, 58% F
Gestational age at birth (median)	29 2/7 weeks (range 24 0/7 – 39 3/7 wk)
Corrected gestational age at SE (median)	44 5/7 weeks (range 27 0/7 – 62 1/7 wk)
Birth weight (median)	1538 grams (range 450 – 3780g)
Presenting symptoms	Number of infants
Heart rate change (tachycardia or bradycardia)	10
Respiratory change	9
Change in activity level	7
Feeding intolerance	6
Temperature instability	5
Change in blood pressure	3
Organism	
Gram-positive cocci	4 (Enterococcus faecalis, n=2; methicillin-sensitive Staphylococcus aureus, n=2)
Gram-negative rods	6 (Escherichia coli, n=4; Klebsiella pneumoniae, n=2)
Coagulase-negative Staphylococcus (CoNS)	3
Screening laboratory findings (n=9)	
Leukocytosis	5
Band count >10%	1
CRP >1.5mg/dL	5
Underlying medical/surgical conditions	
Intestinal pathology (NEC, gastroschisis, short bowel syndrome)	7
Chronic lung disease	6
Congenital anomalies or complex multisystem disease	5
Trisomy 21	2
Lymphatic malformations	2
Congenital diaphragmatic hernia	1
Multisystem organ failure at time of SE	1

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Abstract: 314

Allopregnanolone levels in the human neonate

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Background Allopregnanolone (ALLO) is a progesterone derivative made by the placenta, and later the brain, that may be neuroprotective in compromised pregnancies. ALLO is a GABA receptor agonist that modulates neuronal excitability. Animal studies have shown ALLO levels to rise in late gestation, reaching a maximum near term. Little is known regarding the normal levels of ALLO or related steroids in the human neonate, and how these levels compare across a range of gestational ages.

Objective Characterize ALLO levels at delivery and in the first days of life in a prospectively collected neonatal cohort, 24 weeks gestation age (wga) to term, using liquid-chromatography-tandem mass spectrometry (LC-MS/MS). Secondary objective: to compare levels of additional steroids in these samples to define changes in steroid pathways across gestation.

Design/Methods A patient cohort was selected from a repository of prospectively collected blood and demographic data. Inclusion criteria: 200ul of cord blood or serum obtained within the first 36 hours of life. Exclusion criteria: known genetic anomaly or multiple birth. Blood levels of 27 steroids were measured via LC-MS/MS (NIH West Coast Metabolomics, at UC Davis). Newborn steroid levels were assessed across gestation, in association with known steroid pathways and with regard to demographic data.

Results 61 preterm samples (24-36 6/7 wga) were identified and matched by race, sex, small for gestation status (SGA<10%), mode of delivery and maternal demographics to 61 term samples for a 122 patient cohort. Gestational age distribution is shown in figure 1. ALLO increased during the second trimester, peaked at late preterm gestation then fell near term, table 1. There was no significant difference in median ALLO levels when comparing race, sex, mode of delivery or SGA status. Complications of pregnancy (gestational diabetes, hypertension) tended to correlate with lower ALLO levels, although this result did not reach significance (diabetes: 8.8 vs 14, p=0.3; hypertension: 11.2 vs 14, p=0.09). When patterns of multiple steroids were compared, there was a striking convergence to the mean at 36 weeks gestation suggesting a physiological alteration in placental function requiring further investigations.

Conclusion(s) Birth ALLO levels in human neonates peak between 32-36 weeks gestation, a trajectory consistent with previously demonstrated expression patterns in animals. Examination of multiple steroids in linked pathways points to a potential shift in fetal steroid exposure near-term.

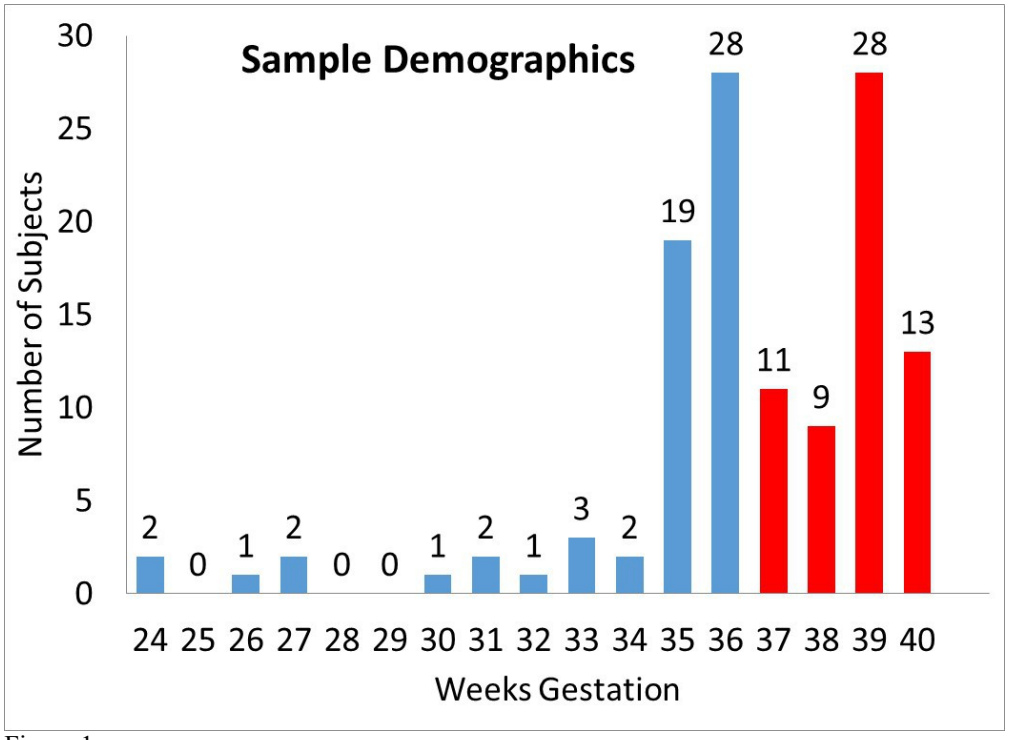

Figure 1

Steroids by WGA Group

Variable	WGA Group <32 (n=8)	WGA Group 33-36 (n=53)	WGA Group >36 (n=61)	p
allo pregnanolone median(IQR) (n=95)	12.2 (2.9-14.6)	13.4 (6.8-37)	13 (6.6-22.1)	0.547
cortisol median(IQR) (n=122)	38.4 (6.4-58.9)	46.3 (26.6-87)	98.3 (61.2-156.1)	<0.001
estrone median(IQR) (n=110)	28.4 (10.9-34.6)	32.3 (13.3-90.5)	68.5 (44.4-125.7)	<0.001
17 Hydroxyprogesterone median(IQR) (n=122)	18.1 (7.3-22.4)	8.2 (3.7-52.3)	51.4 (35.5-73.2)	<0.001
dihydroprogesterone median(IQR) (n=118)	33.1 (5.7-62.7)	38.5 (11.2-111.8)	69.4 (51.4-106.8)	0.001
progesterone median(IQR) (n=122)	116.8 (21.2-164)	648.5 (31.5-1683.5)	1257.6 (935.1-1797)	0.001
17 OH pregnenolone median(IQR) (n=51)	42.4 (22.6-99.9)	58.6 (36-80.7)	25.8 (21.6-37.4)	0.015
androstenedione median(IQR) (n=122)	4.3 (1.4-5.8)	2.1 (1.3-2.6)	2.4 (1.7-3.5)	0.112
pregnenolone median(IQR) (n=120)	62 (21.4-208.5)	145.9 (25.2-327)	179.2 (91.6-297.4)	0.117

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Abstract: 315

Using highly reliable process measures to reduce Central Line Associated Blood Stream Infections (CLABSI) in the Neonatal Intensive Care Unit (NICU): A Quality improvement project from the Hospital's Performance Improvement Science Program

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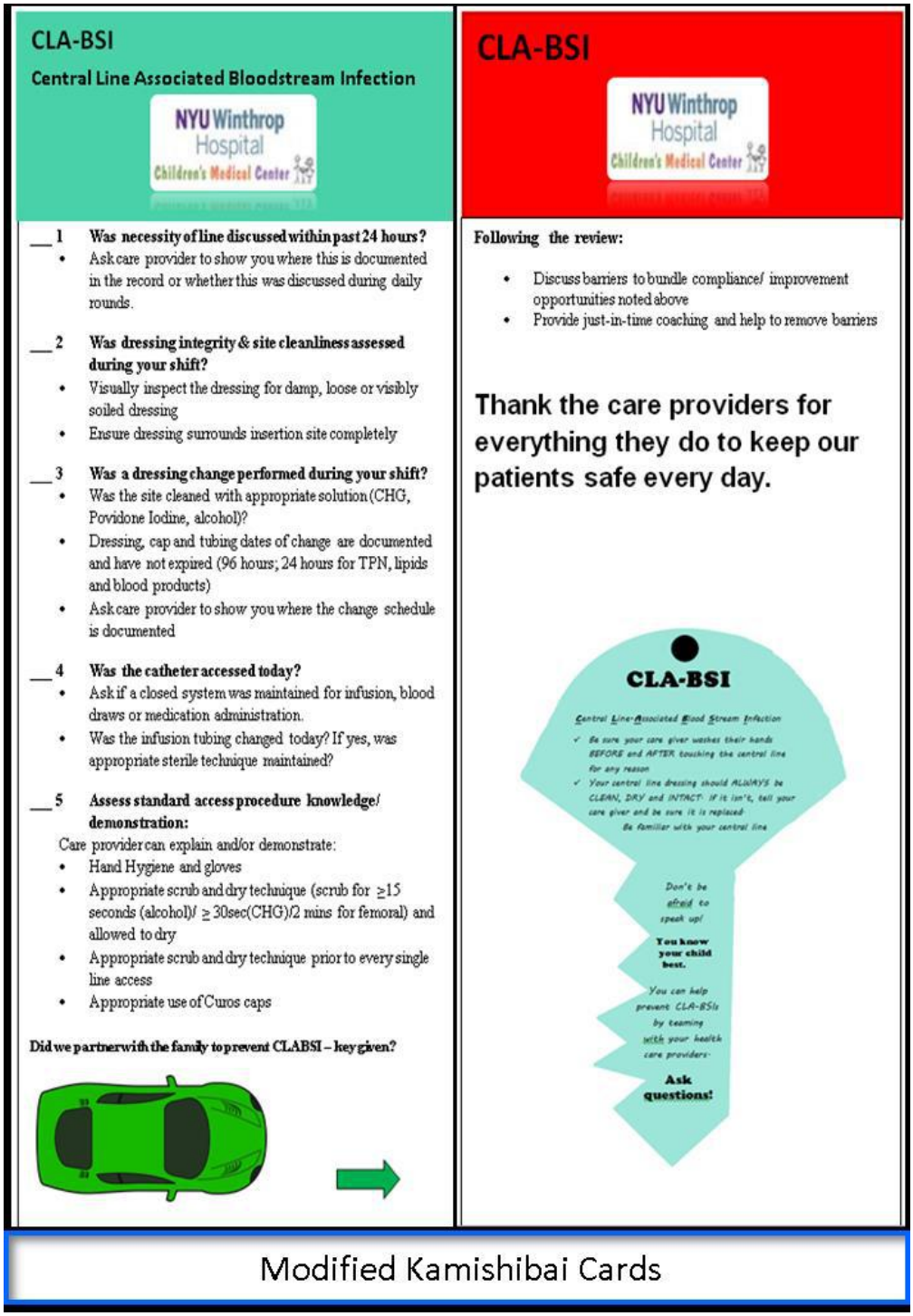
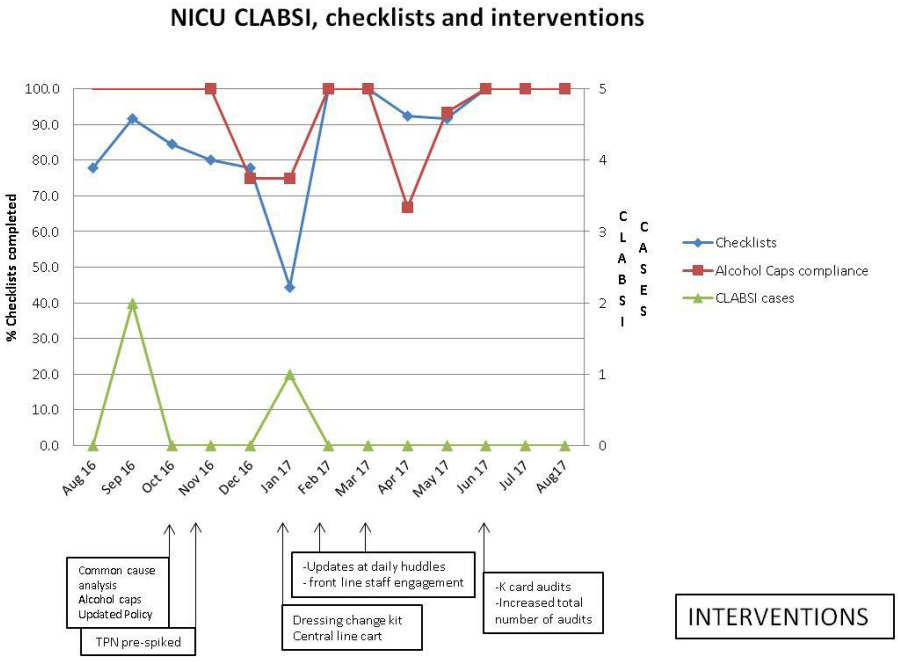
Background CLABSI is one of the largest contributors for morbidity and mortality in the NICUs worldwide and for increase in health care spending costing billions of dollars yearly. Despite multiple interventions in place to standardize processes for central line insertion and maintenance, new infections continue to occur. Due to an increase in CLABSI in our NICU during September 2016, this QI project was initiated under the Hospital's Performance Improvement Science program.
Objective Our global aim was to reduce CLABSI rate to <1/1000line days, with stretch goal of 0. The Smart aim was to increase compliance to maintenance bundles to >95% from baseline of 89% by June 2017.
Design/Methods A multidisciplinary common cause analysis was conducted in September 2016 reviewing all Blood stream infections including CLABSI. A process map was drawn and Pareto chart was utilized to summarize high risk points and high yield interventions along with a Key driver diagram. Multiple interventions were done using series of PDSA cycles starting October 2016. Structural interventions included new central line procedure carts (for all supplies and as working space), new standardized dressing change kits and alcohol caps at every potential access point on the central lines. Process interventions included updated central line policy & procedures, pre-spiked TPN bags, standardized tubing and fluid change schedule, standardized PICC dressing securement, staff training and mandatory two person dressing change. Environmental care processes were also standardized including cleaning of isolettes, workstations and carts, as well as focused audits for each of the interventions. Front line staff engagement was increased using education. Modified Kamishibai card audits were used for all directly observed CLABSI audits (Fig 1), involving bedside interview with frontline staff followed by focused education. A core team was trained to conduct audits using videos and demonstration.
Results CLABSI rate was 1.18/1000 central line days with 1 CLABSI in Jan 2017. Process compliance initially improved but was not sustained. Since K-card audits were started, compliance has been consistently >95% (Fig 2).
Conclusion(s) To conclude, although we did not meet our goal, our CLABSI rate was reduced and compliance to process measures improved, especially after increasing front line staff engagement with K-card audits.



Modified Kamishibai Card used for K-card audits



Central line maintenance bundle compliance imroved to >95% after starting K-card audits.

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Abstract: 316

Improving Neonatal Follow-Up: A Quality Improvement Project

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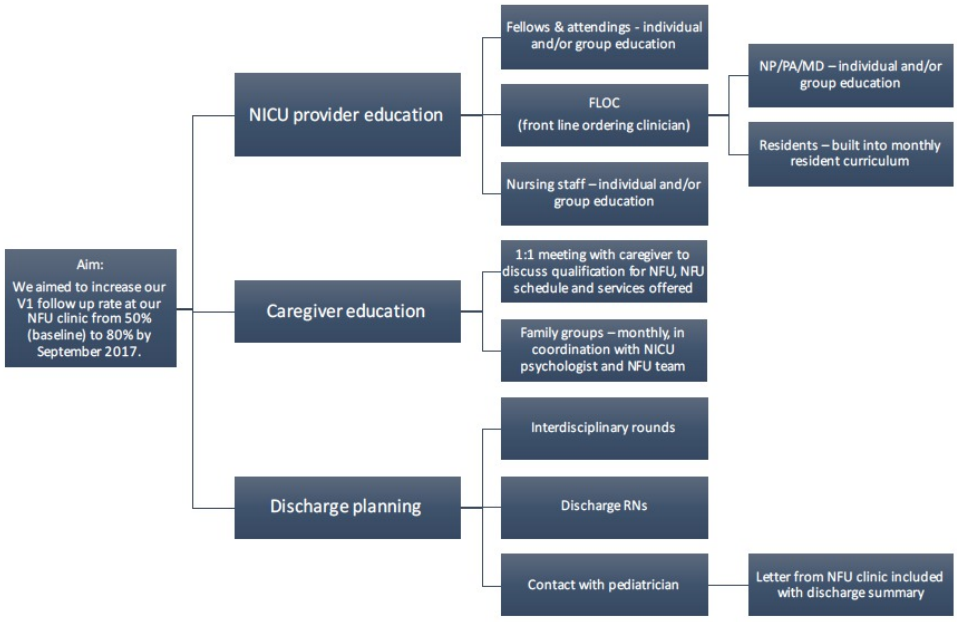
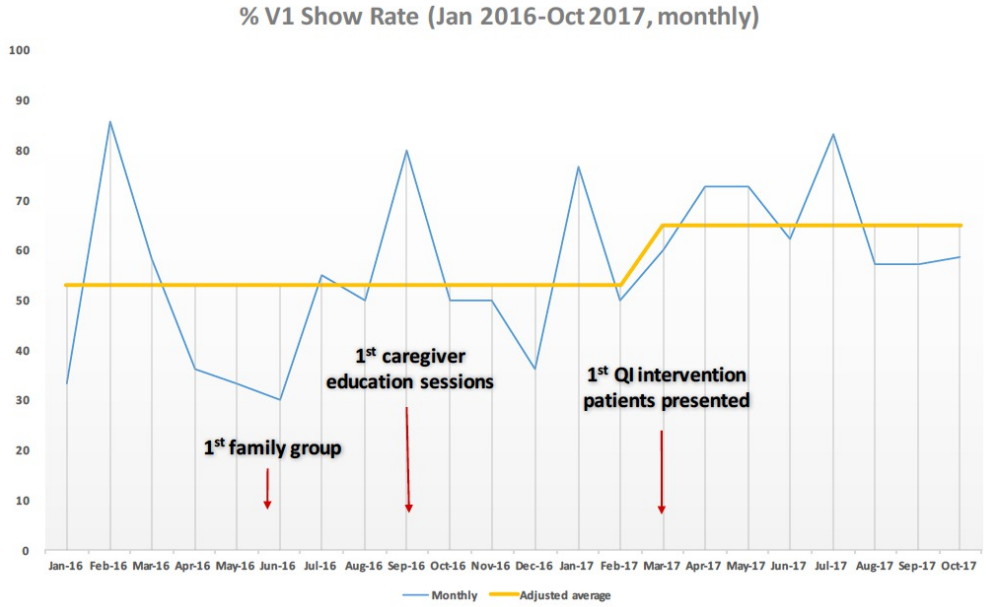
Background Neonatal follow up (NFU) clinics play a vital role in the care of preterm infants surviving with complex medical needs. Despite their inherent value, many clinics report poor compliance with follow up visits. Preterm infants followed with difficulty have higher rates of disability and lower IQ scores, even after adjustment of perinatal and sociodemographic variables. Nonattendance leads to less access to required ancillary services and underreporting of developmental outcomes of high-risk infants. Therefore, it is important to implement strategies earlier during an infant's stay in the NICU to provide optimal transition to outpatient follow up.
Objective We aimed to improve show rate at the NFU clinic affiliated with our Level IV NICU from 50% to 80% at the initial 6-month adjusted age visit (V1) for qualifying preterm infants through implementation of a multilevel education bundle between August 2016 and September 2017. This project is unique in the field of quality improvement because of the long-term nature of the primary outcome.
Design/Methods The IHI Model for Improvement was used as a framework for this project. Baseline assessment included review of our prior V1 show rates, and an analysis of baseline workflow for scheduling appointments and reminders. A streamlined education and workflow bundle was designed.

Participants included NICU physicians, physician extenders, registered nurses, and caregivers of qualifying preterm patients admitted to the NICU. The major components of our bundle included provider education, discharge planning and caregiver education. A tracking system was developed to identify qualifying patients to streamline the education process.
Results The run chart displays V1 show rates before and after the initial intervention in August 2016. Process measure results demonstrate that 98% of qualifying patients received appointments at discharge. 70% of caregivers received information packets, and 64% received 1:1 education about neonatal follow-up. 76% of the families who received caregiver education presented for their V1 appointment, compared to 54% of families who did not receive 1:1 education. Rapid cycle analyses have identified areas in the discharge planning and provider education that are being targeted to further improve practices.
Conclusion(s) Implementation of a tracking system and multidimensional education bundle is feasible and can improve NFU clinic show rates and workflow. Results may inform centers regarding the staffing required to optimize education, outreach, and follow up of this high risk population.





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Abstract: 317

Older than you think: An epidemiologic analysis of opioid overdoses in Connecticut

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Background In 2015, unintentional drug overdose was the leading cause of injury death across the nation. Opioids, both illicit and pharmaceutical, have been the main drivers behind the issue, representing 69.0% of the unintentional drug overdose deaths in 2016 in the US. Persons aged 24 and under represent a vulnerable population that warrants careful consideration within the context of the current opioid crisis.

Objective The purpose of this study is to describe the epidemiology of unintentional opioid-related overdose deaths occurring in Connecticut in 2016 among persons aged 24 and under.

Design/Methods This study used detailed data from the Connecticut Violent Death Reporting System to examine unintentional opioid overdose fatalities aged 24 and under in Connecticut in 2016. Sociodemographic data, contextual characteristics, and toxicology information were described in total and by age group.

Results Sixty-two cases of unintentional opioid-related overdose among fatalities aged 24 and under were identified, representing

7.2% of the 867 total unintentional opioid-related overdose deaths in Connecticut in 2016. The majority of these fatalities were 22 to 24 years of age (71.0%). There were no deaths among persons under 16 years of age. Most deaths were among males (72.6%) and white, non-Hispanics (83.9%). Most persons had resided in non-rural towns (85.5%) and overdosed most often in their own or someone else's home (82.2%). Heroin (66.1%) and suspected illicit fentanyl/fentanyl analogs (56.5%) were the main types of opioids causing the deaths, while pharmaceutical opioid analgesics were much less commonly noted to be the cause of death (12.9%). A history of any substance abuse was present in 88.7% of fatalities, a history of any opioid abuse in 51.6% and a history of heroin abuse in 46.8%.
Conclusion(s) Persons aged 24 and under represent a small percentage of all unintentional opioid-related overdose deaths in Connecticut. Prevention programs, intervention activities and policies targeting this age group should focus on the demographic and geographic characteristics, and history of substance use.

Demographic and Contextual Characteristics of Unintentional Opioid-Related Overdose Deaths 24 Years of Age and Under, Connecticut, 2016

Characteristics	All deaths 24 years and under n (%)	0–15 years n (%)	16–18 years n (%)	19–21 years n (%)	22–24 years n (%)
Total	62 (100.0)	0 (0.0)	5 (8.1)	13 (21.0)	44 (71.0)
Male	45 (72.6)	–	3 (60.0)	6 (46.2)	36 (81.8)
Female	17 (27.4)	–	2 (40.0)	7 (53.8)	8 (18.2)
White, non-Hispanic	52 (83.9)	–	5 (100.0)	11 (84.6)	36 (81.8)
Black, non-Hispanic	3 (4.8)	–	0 (0.0)	1 (7.7)	2 (4.6)
Hispanic	6 (9.7)	–	0 (0.0)	0 (0.0)	6 (13.6)
Other, non-Hispanic	1 (1.6)	–	0 (0.0)	1 (7.7)	0 (0.0)
Rural town of residence	5 (8.1)	–	1 (20.0)	0 (0.0)	4 (9.1)
Non-rural town of residence	53 (85.5)	–	4 (80.0)	11 (84.6)	38 (86.4)
Unknown/missing town of residence rural status	4 (6.5)	–	0 (0.0)	2 (15.4)	2 (4.5)
Overdosed at victim's own home	40 (64.5)	–	2 (40.0)	7 (53.8)	31 (70.5)
Overdosed at other house, apartment	11 (17.7)	–	1 (20.0)	5 (38.5)	5 (11.4)
Overdosed at some other location	11 (17.7)	–	2 (40.0)	1 (7.7)	8 (18.2)
Heroin-involved death	41 (66.1)	–	1 (20.0)	9 (69.2)	31 (70.5)
Fentanyl/fentanyl analog-involved death	35 (56.5)	–	4 (80.0)	7 (53.8)	24 (54.5)
Any pharmaceutical opioid-involved death	8 (12.9)	–	1 (20.0)	1 (7.7)	6 (13.6)
History of alcohol abuse	5 (8.1)	–	0 (0.0)	0 (0.0)	5 (11.4)
History of any substance abuse[a]	55 (88.7)	–	5 (100.0)	13 (100.0)	37 (84.1)
History of any opioid abuse	32 (51.6)	–	1 (20.0)	7 (53.8)	24 (54.5)
History of prescription opioid abuse	3 (4.8)	–	0 (0.0)	1 (7.7)	2 (4.5)
History of heroin abuse	29 (46.8)	–	1 (20.0)	7 (53.8)	21 (47.7)

[a]Excludes alcohol abuse.

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Abstract: 318
A paradigm shift for severe neonatal chylothorax: postnatal lymphatic imaging and interventions
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Background Congenital chylothorax is notoriously difficult to treat and associated with high morbidity and mortality. A thoracoamniotic (TA) shunt may be placed in-utero with the goal of decreasing the accumulation of intra-thoracic lymphatic fluid and thereby preventing pulmonary hypoplasia and hydrops fetalis. Despite TA shunt placement, infants with neonatal chylothorax are at high risk of severe complications. We have pioneered the use of magnetic resonance lymphangiogram (MRL) in this vulnerable population to establish diagnosis and direct therapy. One such therapy for infants with pulmonary lymphatic perfusion syndrome (PLPS) is intranodal Lipiodol injection. This oil-based contrast agent causes sclerosis of abnormal lymphatic channels. Alternatively, for patients with central lymphatic flow disorder (CLFD), lymphovenous anastomosis (LVA) may be the treatment of choice.
Objective To characterize the clinical course for infants born with neonatal chylothorax and outcomes after prenatal TA shunt placement, postnatal MRL and targeted intervention.
Design/Methods Infants with chylothorax treated with intrauterine TA shunt placement and born in the Special Delivery Unit at the Children's Hospital of Philadelphia between January 2016 and December 2017 were included. Infant characteristics and outcomes were compared to historical controls.
Results Seven infants met the inclusion criteria. The gestational age at birth and birthweight were 36 1/7 weeks ± 1 week and 2964 ± 4 grams (mean ± SD), respectively. MRL revealed the underlying cause for chylothorax was PLPS in 6 infants. This information was pivotal in deciding to treat five infants with Lipiodol injections. One infant had minimal symptoms and thus did not need interventions after birth. The seventh infant was found to have CLFD and underwent a successful lymphovenous anastomosis (Table 1). All 7 infants survived to hospital discharge. Preliminary comparisons with historical controls suggest this targeted approach decreases mortality and shortens hospital stay.
Conclusion(s) The use of MRL to establish an underlying cause and target treatment for this challenging disorder represents a paradigm shift. Although this approach suggests significantly better morbidity and mortality in a population with limited therapeutic options, this approach requires further investigation.

Demographics and Clinical Characteristics

Patient	Gestational age (weeks)	Birth weight (grams)	Sex	Number of TA shunts	Diagnosis (MRL findings)	Intervention	Chest tube duration after intervention (days)	Length of hospitalization (days)
1	34 3/7	2600	Male	2	PLPS	Lipiodol	13	34
2	34 6/7	2690	Female	1	PLPS	Lipiodol	60	113
3	37 3/7	3100	Male	1	PLPS	Lipiodol	N/A	14
4	38 6/7	3660	Female	2	PLPS	Lipiodol	10	34
5	36 1/7	2740	Female	1	PLPS	Lipiodol	7	27
6	38	2750	Female	3	PLPS	N/A	N/A	5
7	33 5/7	3205	Male	1	CLFD	LVA	N/A	91

TA - thoracoamniotic MRL - magnetic resonance lymphangiogram PLPS - pulmonary lymphatic perfusion syndrome CLFD - central lymphatic flow disorder LVA - lymphovenous anastomosis

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Abstract: 319

The association of delivery of the posterior arm during shoulder dystocia with neonatal humeral fractures and brachial plexus injury

Meesha Sharma[1], David L. Schutzman[1], Stacey Gold[2], Chase White[2], Jay Goldberg[2], Daniel Hirsch[1]

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Background Shoulder dystocia during delivery can cause severe morbidity in neonates. In 2011, our hospital instituted a policy that delivery of the posterior arm be the first maneuver used to relieve a shoulder dystocia. Many patients deliver already in the McRoberts' position. Delivery of the posterior arm has an increased risk of causing neonatal humeral fractures.
Objective To identify whether delivery of the posterior arm as the initial maneuver during a vaginal delivery complicated by shoulder dystocia is associated with an increased rate of humeral fractures and to determine whether adoption of this practice is associated with

a reduction in brachial plexus injuries.
Design/Methods All term and late-preterm singleton vaginal deliveries complicated by shoulder dystocia were identified in the electronic medical record system at our institution between 2004-2017. Deliveries between 2004-2010 were considered pre-intervention and 2011-2017 post-intervention. Outcomes included humeral fractures and brachial plexus injuries among these deliveries. Chi-square tests and Fisher's exact tests were used to test for significance.
Results From 2004-2010, the rate of deliveries complicated by shoulder dystocia was 18 per 1,000 live births (n=244). Between 2011-2017, the rate of shoulder dystocia was significantly greater, 34 per 1,000 live births (n=487) ($p<0.001$). After institution of the posterior arm delivery policy, the rate of humeral fractures associated with shoulder dystocia significantly increased from 0 to 4.5% ($p=0.001$). However, the rate of brachial plexus injuries (BPI) among newborns diagnosed with shoulder dystocia significantly decreased from 24% to 7% ($p<0.001$). From 2004-2010 there were six settled malpractice claims of shoulder dystocia with BPI. Since 2010, there have been no claims or settlements for shoulder dystocia or BPI.
Conclusion(s) A policy of delivery of the posterior arm as the initial maneuver for shoulder dystocia was associated with an increased rate of humeral fractures. However, a reduction in BPI may outweigh the morbidity caused by a humeral fracture.

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Abstract: 320

Is Guidance from Healthcare Professionals Associated with Increased Use of Wandering Prevention Measures by Parents of Children with Autism Spectrum Disorders?

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Pediatrics, Steven & Alexandra Cohen Children's Medical Center of New York, Lake Success, New York, United States

Background Wandering threatens the safety of children with autism spectrum disorders (ASDs). A 2017 article in the AAP News magazine emphasized the need for pediatricians to help prevent wandering by providing anticipatory guidance about elopement to the parents of children with ASDs[1]. However, it is not known whether parents who receive guidance from a healthcare professional (HCP) about wandering are more likely to implement wandering prevention measures (WPM) for their child with ASD.
Objective To determine, in a large national sample, whether receipt of guidance about wandering from an HCP is associated with WPM use among parents of children with ASDs.
Design/Methods 1613 US parents of children with ASDs ages 4-18 completed a comprehensive questionnaire about their child's wandering history and their use of numerous WPM. Receipt of professional guidance was assessed based on a question that asked respondents whether, and from whom, they had received "guidance about the risks associated with wandering or measures used to address your child's wandering behavior." Chi-square tests were performed to compare use of WPM between those who indicated that they had received guidance from an HCP (a pediatrician, primary care physician, developmental pediatrician, neurologist, psychiatrist, or psychologist) and those who had not received guidance from any of these sources.
Results 20% of respondents had received guidance about wandering risks and/or prevention from an HCP. Parents who reported having received guidance from an HCP were significantly more likely to use a variety of WPM (Table 1), including electronic tracking devices (31.5% vs. 21.9%; $p<.001$); physical barriers such as fences, window bars, and additional locks ($p<.001$ for all); and behavioral interventions such as visual prompts and social stories ($p<.001$). Those who had received guidance from an HCP were also more likely to report that they had an emergency contact or family wandering plan in place (52.8% vs 25.9%; $p<.001$) and to have previously requested changes to their child's IEP to address wandering concerns (73.0% vs. 46.0%; $p<.001$).
Conclusion(s) In this large, national sample of families with a child with ASD, receipt of guidance from an HCP about wandering was associated with greater parental use of a range of preventive measures. Pediatricians play a vital role in preventing elopement in the ASD population through parental education and advocacy.

[1]Hyman, S. AAP News. December 12, 2017.

Table 1. Wandering Prevention or Response Measures: Comparison of Use by Parents of Children with ASD who Did or Did Not Receive Guidance about Wandering from a Healthcare Professional (HCP)

Wandering Prevention or Response Measure	No HCP Guidance	HCP Guidance	p-value
Electronic tracking devices	21.9%	31.5%	<.001*
Gates	26.0%	29.0%	0.280
Additional door locks	62.4%	74.5%	<.001*
Window bars or locks	21.7%	33.7%	<.001*
Door alarms, chimes or bells	45.0%	61.3%	<.001*
Physical fencing	25.0%	34.9%	<.001*
Security system (e.g. burglar alarm, camera)	23.2%	27.0%	0.146
Tent around child's bed	3.5%	5.7%	0.071
Child harnesses	11.8%	18.9%	0.001*
Visual prompts such as STOP signs	28.6%	40.6%	<.001*
Social stories	26.6%	44.3%	<.001*
ID cards or bracelets	31.7%	42.5%	<.001*
Temporary ID tattoos	5.5%	6.3%	0.312
Noise-cancelling headphones	16.5%	31.1%	<.001*
Swimming lessons	33.6%	37.4%	0.197
Wandering response Plan	25.9%	52.8%	<.001*
Requested changes to IEP	46.0%	73.0%	<.001*

* denotes statistical significance at p<.01

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Abstract: 321

Parental Practices for Informing Children and Young Adults with Autism Spectrum Disorders about their Diagnosis

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Background Informing and educating youth with autism spectrum disorders (ASDs) about their diagnosis has a number of potential benefits. However, the extent to which parents discuss the ASD diagnosis with their affected children is not well-characterized, since prior research on this subject has been limited to qualitative, interview-based studies. Larger, systematic studies of parental practices for disclosing the ASD diagnosis to their children are needed.
Objective To systematically assess if and when parents of children with ASDs discuss the ASD diagnosis with their affected children, and to explicitly characterize parental experiences with diagnostic disclosure.
Design/Methods Parents of individuals with ASDs (ages 8-25) – recruited via outreach to ASD advocacy and support groups across the US – completed a detailed online questionnaire. Respondents reported whether they and/or any other person had ever told the child that he or she had ASD. Additional questions assessed parental motivations, practices, and use of informational resources during the diagnostic disclosure process.
Results 117 parents completed the questionnaire. The mean child age was 14; 21% had intellectual disability (ID); 26% were female. The majority of parents (78%) reported they had personally discussed the ASD diagnosis with their child, most of whom (57%) first initiated the discussion when their child was <10 years of age. Among the parents of children with comorbid ID, 63% had discussed the diagnosis with their child, compared to 87% of those without ID (chi square p=.005). The most commonly-cited reason for disclosing the diagnosis was a desire to help the child understand why he or she was different from peers (98%). Most parents (85%) used one or more informational resources, including books (66%) or social stories (45%) to help their child understand their condition. The majority had multiple conversations with their child about the diagnosis in which they discussed a range of topics, including how ASD affects the child's weaknesses (97%) and strengths (94%), and other people with ASD that the child knows personally (74%).
Conclusion(s) Parents of children with ASD would benefit from guidance regarding when and how to share diagnostic information. This represents the largest study to date of parental diagnostic disclosure in this population. Research characterizing parental practices for disclosing the ASD diagnosis may help guide the development of evidence-based resources to support other families in the future.

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Abstract: 322

Multicenter Simulation Boot Camp for Senior Neonatal-Perinatal Medicine Fellows Increases Confidence and Job Preparedness Through High Acuity-Low Frequency Simulation Scenarios.

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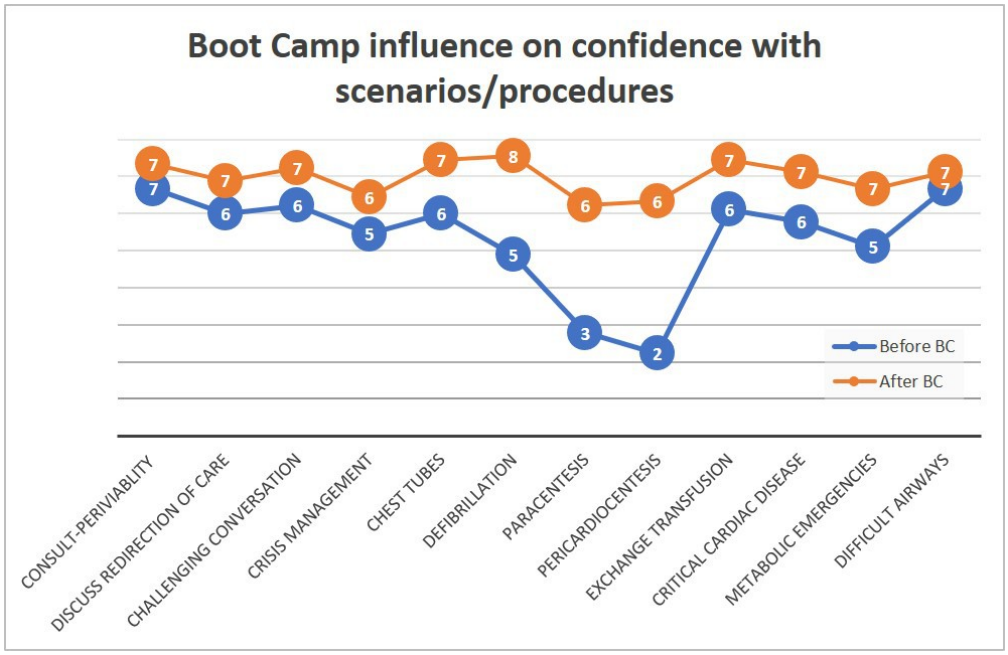
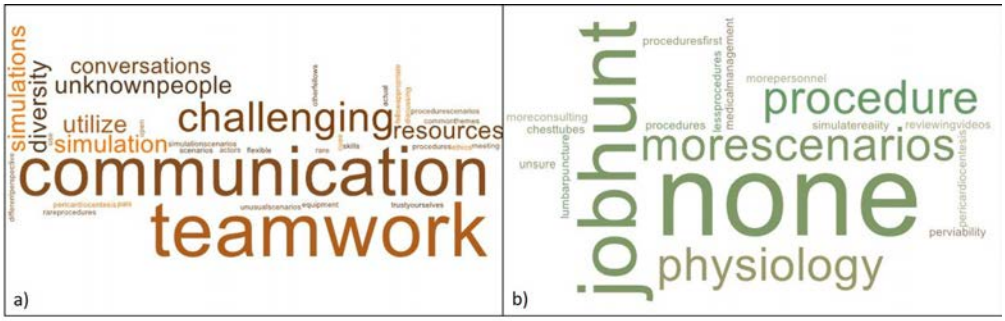
Background The current clinical environment coupled with other fellowship commitments limits the exposure of neonatal perinatal medicine (NPM) fellows to high acuity cases, high-risk procedures and difficult conversations, which they will encounter at some point in their career. There is growing popularity of pre- fellowship simulation "Boot Camps" focusing on basic resuscitation skills and common neonatal cases. There is a need for senior fellow simulation boot camp that focus on; high acuity- low frequency scenarios, high risk procedures and difficult conversations.
Objective Create an innovative advanced simulation based educational experience for 2nd and 3rd year NPM fellows to increase confidence in handling difficult conversations, high-risk procedures, crisis management and high acuity neonatal scenarios; and thus enhance job preparedness.

Design/Methods We conducted a multicenter one-day Boot camp (BC) for 2nd and 3rd year NPM fellows (table 1: agenda). Pre-and post-boot camp surveys were distributed to the participants to assess impact on confidence in areas addressed by the case scenarios. An evaluation form elicited feedback, specifically for areas of improvement and overall experience. This study was IRB approved and completion of the surveys and feedback was optional. Descriptive statistics and word clouds were used to summarize survey and feedback results. Study IRB approved.

Results 10 fellows participated in the boot camp from 4 different regional programs. Pre-and Post BC survey of confidence with various scenarios is shown in image 1. There was a general increase in confidence with all scenarios and procedures, and a greater increase in procedure based scenarios. Image 2 depicts the participant feedback post BC; a) Things learnt/best part of BC b) Changes for future BC. Immediate feedback post BC results were encouraging overall (table 2).

Conclusion(s) Overall the NPM senior fellow boot camp increased confidence in all targeted areas, especially procedures/procedure based scenarios, with pericardiocentesis showing the greatest improvement. Evaluations indicated that it helped with job preparedness by increasing skill level and confidence in managing challenging cases. In addition, the scenarios were videotaped and are currently under review to assess skill and performance improvement as the day progressed. We plan to continue the yearly BC and aim to increase participations from all AAP district I NPM fellowship programs.





Senior Neonatal-Perinatal Medicine Fellow Boot Camp

Time	Agenda/Scenario
7:45 am - 8:15 am	Introductions, Orientation to Sim models and plan of the day.
8:15 am - 9:10 am	MegaCode- Hyperkalemia crisis in NICU Case 1- HIE w/Hyperkalemia Case 2- short gut w/hyperkalemia Case 3- premie w/hyperkalemia
9:15 am - 11:30 am	Case Scenarios (3 scenarios-45 mins each) 1- Pericardial tamponade (premie with NEC) 2- Hypoplastic Left Heart Failure in Crisis

	(line malfunction) 3- Periviable Birth 22+ weeks (mainly counseling)
11:30 am - 11:45 am	Break
11:45 am - 1: 15 pm	Skill Stations (4 stations) 1-Chest tube 2-Defibrillation 3-Pericardiocentesis/Paracentesis 4- Exchange Transfusion
1:15 pm - 2:00 pm	Lunch and open forum discussing job hunt process.
2:00 pm - 4:00 pm	Case Scenarios (3 scenarios- 40 min each) 4-Trisomy 18- term infant with large VSD in failure- to operate or not to operate (counseling only) 5-PALS case- V tach in pt with viral myocarditis 6-Tracheal atresia with TE cleft/fistula
4:00 pm - 4: 15 pm	Feedback and wrap up

Feedback Post Boot Camp

Feedback Scale 1 to 5 (disagree to agree)	Mean	Std. Dev.
Content informative and interesting	5.0	0.0
Faculty supportive and facilitated learning	4.9	0.2
Bootcamp created a sense of teamwork	5.0	0.0
Simulation will enhance learning	5.0	0.0
Apply skills learnt today	4.9	0.2
Boot camp helped my confidence level	4.8	0.3
Boot camp helped with job preparedness	4.7	0.5

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Abstract: 323

Description of a single center cohort of humeral fractures at birth

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Background Humeral fractures at birth are a rare complication. In the literature, incidence ranges between 0.09 and 0.2 per 1000 live births. In January 2011, our institution implemented a new protocol that delivery of the posterior arm be the first maneuver used to relieve a shoulder dystocia.

Objective To describe a single center cohort of humeral fractures at birth, including their incidence, radiographic features and clinical characteristics.
Design/Methods Retrospective chart review of all live born infants from January 2005 through November 2017 in a hospital serving a low-income urban minority community. To identify cases, radiology and electronic medical record databases were searched and cross-referenced. All cases with a clinical diagnosis of humeral fracture at birth were confirmed radiographically. Imaging was reviewed by a radiologist and fracture characteristics including location, displacement and angulation were recorded.
Results At delivery, 30 neonates were diagnosed with a unilateral humeral fracture. The overall incidence of humeral fractures was 0.82 per 1000 births. Between 2005 and 2010, the incidence of humeral fractures was 0.12 per 1000 births (initial incidence). From 2011-November 2017, after the institution of the new shoulder dystocia protocol, the incidence increased to 1.4 per 1000 births. Cases had a mean birth weight of 3511 grams, 95% CI [3273, 3749] and a mean gestational age of 38.3 weeks, 95% CI [37.4, 39.3]. All neonates were 35-41 weeks gestation except one. 83% were delivered vaginally. In 88% of these subjects, vaginal delivery was complicated by shoulder dystocia. Only 23% who experienced shoulder dystocia at the time of vaginal delivery, were large-for-gestational age. Radiographically, 25 (83%) fractures were displaced and/or angulated, one (3%) was comminuted and 29 (97%) were mid-shaft. In the remaining case, the fracture was in the proximal metaphysis.
Conclusion(s) The initial incidence of humeral fractures at birth in our institution was consistent with that reported in literature, but after 2010 increased tenfold. It appears that use of the posterior arm as the initial maneuver to relieve a shoulder dystocia was associated with a significant rise in the rate of humeral fractures. Interestingly, 17% of the humeral fractures were diagnosed in neonates delivered via cesarean section. In our cohort, the vast majority of humeral fractures at birth were mid-shaft and most were displaced and/or angulated.

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Abstract: 324

Suppressed plasmablast responses in febrile infants, including children with Kawasaki disease.

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Background Kawasaki disease (KD), the leading cause of acquired heart disease in children, primarily affects infants and toddlers. Investigations on immune responses during KD are hampered by a limited understanding of normal immune responses in these ages. It's well known that infants have poorer vaccine responses and difficulty with maintaining prolonged serum immunity, but there are few studies on human infants detailing immune deficiencies. Plasmablasts are a transitional form of B cells that lead to long-term plasma cells, and their levels rise in the peripheral blood after exposure to a foreign antigen. In adults, these responses are both temporally and functionally well characterized. To date, there have been few studies on plasmablasts in the predominant age range of KD.
Objective To explore plasmablast responses in the predominant age range of KD presentation.
Design/Methods Children presenting to an urban pediatric emergency room undergoing laboratory evaluation, who had concern of KD or had fever and symptoms overlapping those of KD, were recruited. Peripheral blood mononuclear cells were isolated and evaluated utilizing flow cytometry with specific B cell markers from 18 KD subjects and 69 febrile controls.
Results Plasmablast numbers and temporal formation are similar between infectious disease controls and KD subjects. In both groups, infants have diminished plasmablast responses compared to older children. Using deep sequencing, Immunoglobluin variable gene usage and sequences will be compared (young versus older and KD versus controls).
Conclusion(s) In this single-time point survey, infants have a blunted peripheral plasmablast response. Overall, similar plasmablast responses in KD and controls support an infectious disease relationship to KD. Future time-course studies of plasmablasts in infants are warranted as this phenomenon may contribute to observed immune responses in this age group.

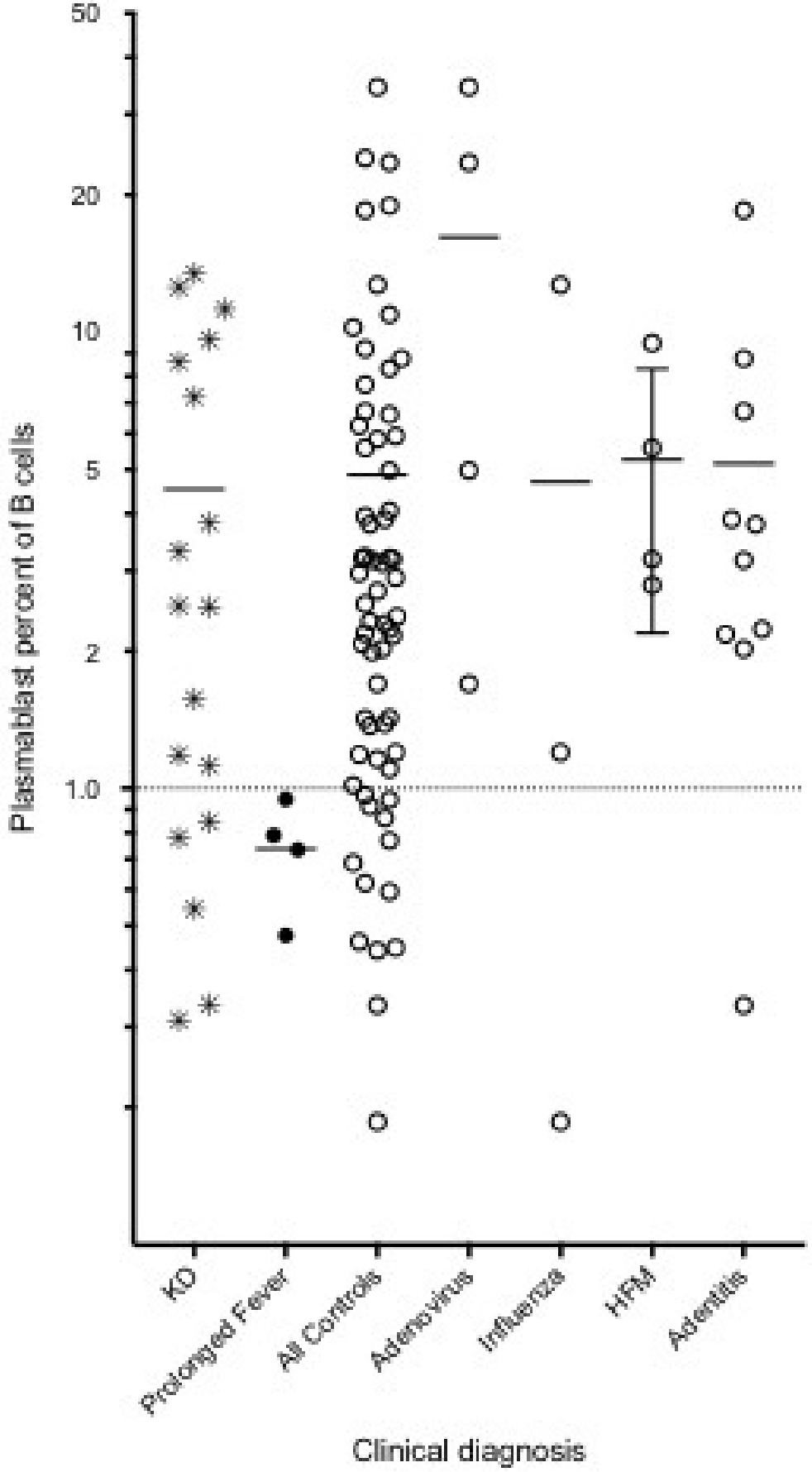

Figure 1: Plasmablast comparison between different clinical diagnoses

Plasmablast levels, as a percentage of overall B cell number, were compared between children with KD (star), prolonged fever (closed

circle), and all controls (open circles). Mean values are marked by horizontal dash. Four subsets of all controls that qualified as specific diagnoses are also graphed (Adenovirus, Influenza, Hand-foot-and-mouth (HFM) and Adenitis).

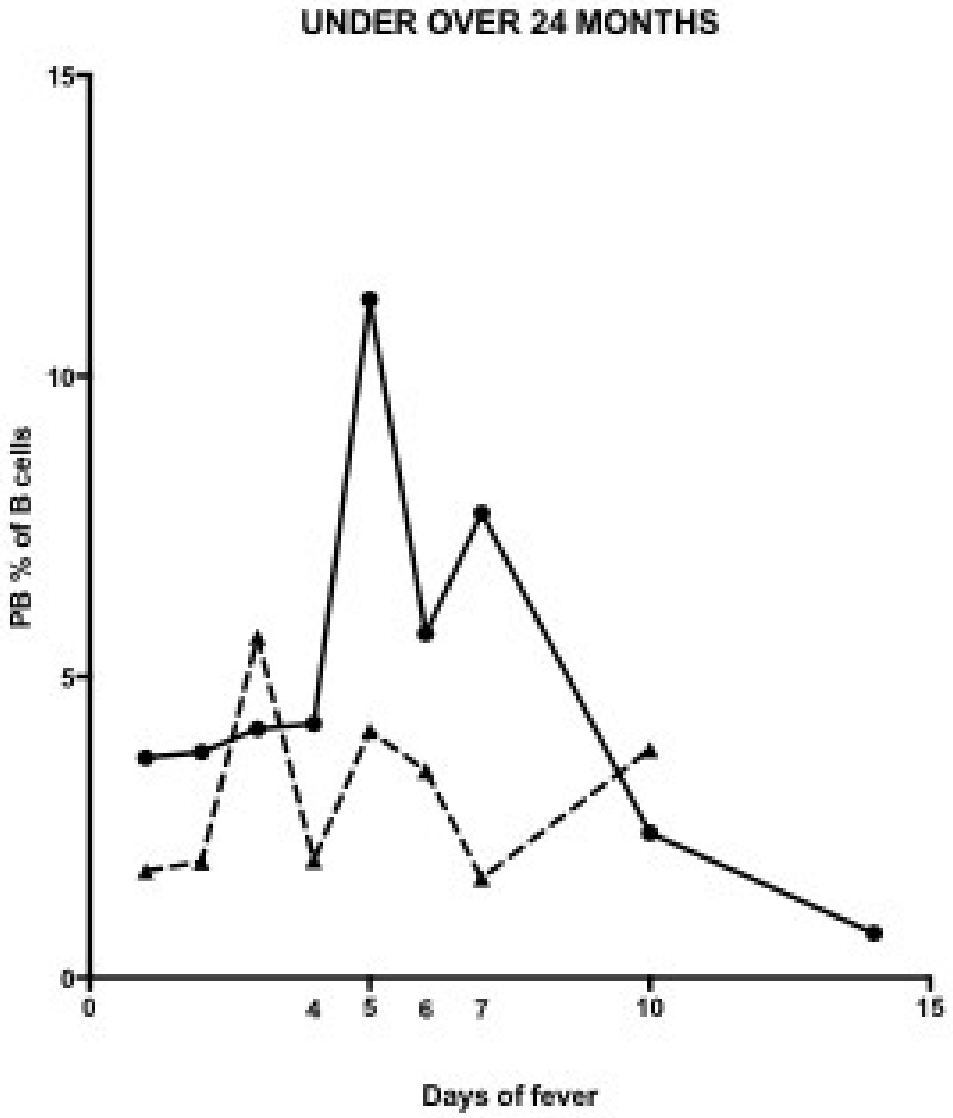

Figure 2: Plasmablast level and temporal pattern relative to age of subject. Mean values for plasmablast percentage of B cells by day of fever for those 24 months and under (long dashed line) compared to subjects over 24 months of age (solid line).

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Abstract: 325

The Edge of Viability: Does Skin Epithelium Tell More of a Story than Gestational Age (GA)?

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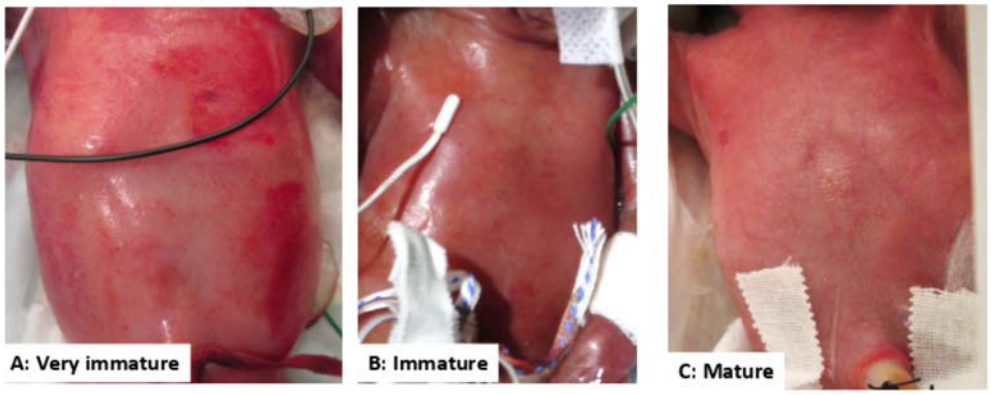
Background GA is the standard by which viability counseling is founded yet GA is limited by the accuracy of 1st trimester ultrasounds and the fact that functional organ maturation is neither linear nor directly time-dependent. Since epithelial cell functions (lungs, GI, skin, renal, neuro, retinal) are key determinants of successful adaptation to the extrauterine world, we sought to determine the extent that visual assessment of skin maturity was a predictor of clinical outcomes. Rather than solely by gestational age, our “trial of therapy” approach to a clinician’s resuscitative efforts is based in part upon an imprecise assessment of the probability of survival as interpreted by physical appearance and responsiveness to resuscitation.

Objective We sought to determine whether visual assessment of skin maturation by clinicians is a better predictor of survival and morbidity than gestational age in extremely preterm neonates.

Design/Methods A pilot study (Sep’16-Dec’17) was conducted where these 3 images of varying stages of skin maturity from neonates less than or equal to 28 weeks gestation were obtained within the first 24 h after birth and shown blinded to clinicians who were asked to match 15 subsequent patient images to these standards.

Results 15 professionals (5 attendings, 5 fellows, 3 nurse practitioners, 3 nurses and 2 RTs) were surveyed. GA of neonates was 24 ± 1; 23-27 wks (x±sd; min-max) with birth weight (BW) 734 ± 159; 440-950g where LOS was 174 ± 10; 161-193d; 2 subjects died: 24 wks, 480g, 166d & 25 wks, 910 g,177d). In ≥ 80% of testing, medical staff correctly categorized whether infants were ≥ or < 25 weeks as determined by OB estimates; BW was not a confounder as infant size did not correlate with skin classification indicating minimal subject bias in matching images. 16% of neonates < 24 weeks were classified as "mature" skin that might otherwise have been allowed to die based on GA while 20% of
cases were classified as extremely immature who were > 25 wks.
Conclusion(s) Visual assessment of the skin was a strong predictor for GA but not BW. Clinician staging of epithelial cell maturation may serve as an ancillary index of subsequent organ function. Future work will determine whether hospital co-morbidities can be predicted by the level of skin maturity (LaGamma et al. Acta Paediatrica, 2016;105:1252-4)



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Abstract: 326
Do antenatal steroids benefit all late preterm gestations?
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Pediatrics, Einstein medical center, Philadelphia, Pennsylvania, United States

Background Late preterm infants (LPTI) are at greater risk for morbidities compared to term infants. Evidence suggests antenatal steroids (AS) decrease the risk of neonatal respiratory and non-respiratory complications in LPTI. There is concern regarding this administration due to the paucity of data on long term adverse effects in the LPTI with in utero exposure to exogenous steroids.
Objective To assess the impact of AS on respiratory and other neonatal outcomes in LPTI.
Design/Methods Retrospective chart review of mothers and their infants born at 34 0/7 to 36 6/7 weeks gestational age (WGA) between June 2016 and July 2017 in an academic center with a level IIIB NICU serving a low-income minority community. Steroids were administered to women at high risk for late preterm delivery, with either spontaneous rupture of membranes or labor with intact membranes, or those in whom delivery was expected by induction or C-section in no less than 24 hours and no more than 7 days. Exclusion criteria for steroid administration were pregestational diabetes, chorioamnionitis and non-reassuring fetal heart rate. Infants with severe congenital defects or with neonatal abstinence syndrome were excluded.
Results 179 mother-infant dyads met inclusion criteria. 77 (43%) received steroids. Baseline characteristics of mothers and infant treatment groups were similar. 113 (62.8%) infants were 36 WGA, 38 (21.1%) were 35 WGA and 28 (15.6%) were 34 WGA. 57% of 34 WGA infants received AS versus 43% and 40% of 35 and 36 WGA infants respectively. AS exposure did not significantly affect respiratory outcomes for LPTI in total and in subgroup analysis by WGA. Length of hospital stay (LOS) was significantly shorter in 34 WGA infants in AS group, p=0.007. Statistical significance was detected between AS administration and neonatal hypoglycemia, p=0.046. Although not statistically significant, infants in the steroid group were more likely to receive phototherapy, p=0.07.
Conclusion(s) In our study, only 34 WGA infants benefited from AS exposure through shorter hospitalization. It did not significantly affect respiratory outcomes, but as in previous studies, was associated with neonatal hypoglycemia. There was a higher tendency for requiring phototherapy with AS. Since 36 WGA infants were well represented in our study, we can conclude that there were no respiratory and non-respiratory outcomes benefit in this group. Additional studies with larger sample size are needed to weigh the risk-benefits for AS exposure at all late preterm gestations.

Figure 1. Study Population receiving steroids by Gestational Age

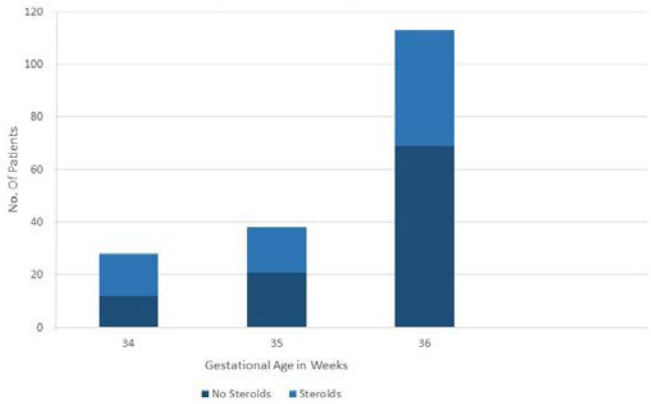
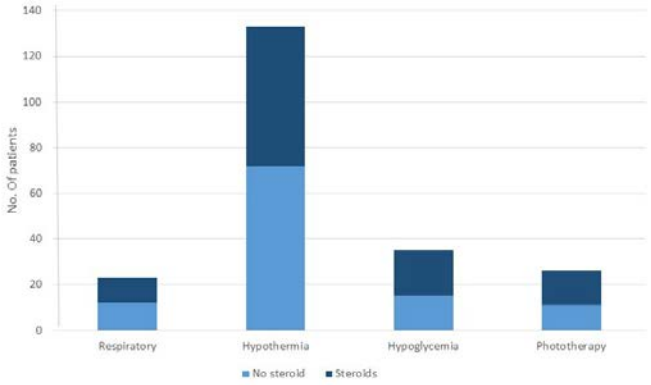


Figure 2. Effect of antenatal steroid exposure on outcomes



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Abstract: 327

Duration of respiratory support prior to discharge does not predict hospital readmission among extremely low gestational age newborns

Samantha J. Palmaccio[1], Judy Aschner[1], Jaeun Choi[3], Mariam S. LaTuga[2]

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Background After discharge from neonatal intensive care, approximately 30% of extremely low gestational age neonates (ELGAN) will require inpatient hospitalization. Known risk factors for readmission include medical morbidities such as bronchopulmonary dysplasia. We hypothesized that duration and timing of weaning from respiratory support prior to discharge home would impact hospital readmission rates.

Objective

Design/Methods In this retrospective chart review, we examined readmission rates for ELGAN admitted to the Montefiore Weiler Hospital Neonatal Intensive Care Unit (NICU) in the years 2013-2015. Those neonates who died before 48 hours of life or who were transferred prior to discharge home were excluded. Readmission was defined as admission to the Montefiore Children's Hospital within 90 days of NICU discharge. Immunization data were obtained from the New York City Immunization Registry.

Results Readmission status of 141 infants born at < 29 weeks gestational age and who survived to discharge was determined. 30 (21%) of these infants were subsequently readmitted within 90 days, primarily for respiratory complaints. Overall, readmitted infants were born at an earlier gestational age (25.8 ± 1.6 weeks) compared to infants who did not require readmission (26.5± 1.3 weeks, p = 0.02). Birth weights were also smaller among infants who required readmission, 800g± 248g compared to 914g± 214g (p= 0.003). There was no difference in birth weight percentile for gestational age between the two groups. Bronchodilator treatment within 7 days of

discharge was more likely in infants who were not readmitted (39.6%) compared to infants readmitted (16.7%, p= 0.02). Duration off respiratory support prior to discharge, prophylaxis against respiratory syncytial virus, concurrent neonatal morbidities and feeding variables did not predict 90 day readmission rates following discharge from the NICU. Similarly, season of discharge also did not predict 90 day readmission rates.
Conclusion(s) In this ELGAN cohort, lower gestational age and birth weights were associated with higher rates of readmissions after NICU discharge. Duration and invasiveness of respiratory support did not predict risk of 90 day readmission, nor did discharge during months with traditionally higher prevalence of respiratory viruses.
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Abstract: 328
Longitudinal measurements of resting energy expenditure in healthy term infants during the first two months of life.
Sourabh Verma, Sean Bailey, pradeep n. mally, Heather B. Howell
Neonatology, NYU School of Medicine, New York, New York, United States

Background Disruption in energy balance can be a major limiting factor for proper growth, cognitive advancement, and motor development. Resting energy expenditure (REE) is the energy required to maintain the body's basic cellular metabolic activity and organ function. Predictive equations used to estimate REE may be inaccurate. Indirect calorimetry (IC) is the gold standard for measuring REE. There is limited longitudinal normative REE data in healthy, full-term infants using IC.
Objective To perform a longitudinal study of REE in healthy term infants at one month and two months of age using an IC.
Design/Methods A prospective pilot study was conducted in healthy term newborns at one and two months of life by measuring expired gas fractions of oxygen and carbon dioxide with an FDA approved IC in a respiratory and metabolic steady state. Each test was preceded by flow and gas calibration. Subjects were fed a minimum amount one hour before the test. A sleeping or inactive awake stage was a pre-requisite for the test. Anthropometric, birth, and feeding history data were obtained. Steady state was defined as a period of at least 5 minutes with <10% variation between consecutive VCO2 and VO2 values with <5% coefficient of variation for respiratory quotient.
Results A total of twenty-eight measurements were performed. Fifteen subjects completed their first month and thirteen subjects finished the second month visit. Mean REE values were 64.1±12.7 and 58.4±14.3 Kcal/Kg/Day at one and two months of age respectively. Mean VO_2 and VCO_2 measurements were 9.3±2.0 and 7.7±1.2 at one month and 8.1±2.2 and 6.4±1.1 ml/Kg/min at two months of life respectively. A scatter plot demonstrating the mean REE measurements for individual subjects in relation to their corrected gestational age is shown in Figure 1. REE values based on WHO predictive equations were found to be 48.5±1.4 and 51.0±1.3 Kcal/Kg/day at one and two months of life respectively. These values were significantly different from the measured REE by IC.
Conclusion(s) Our pilot study demonstrates REE values for healthy term newborns at one and two months of life using IC. There appears to be an overall consistency in REE values with a tendency for a decrease in individual longitudinal measurements over time between 1 and 2 months of life. These results may serve as a basis for other REE comparative studies that address different disease states and various nutritional protocols.

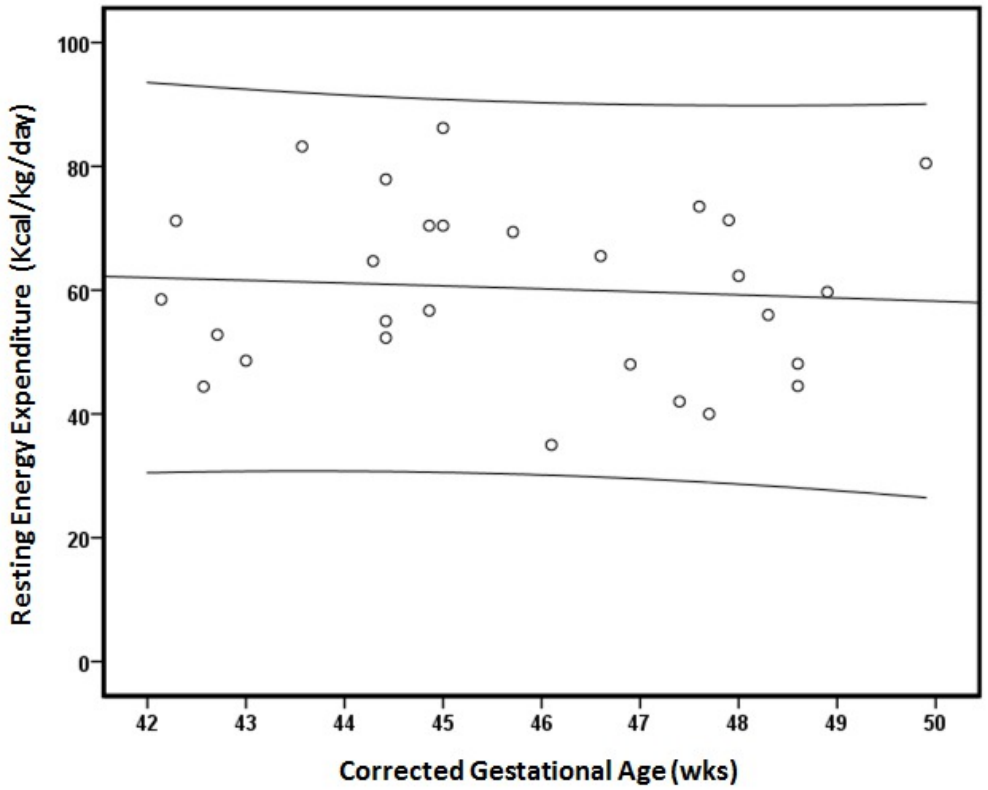

Figure 1: Scatter plot demonstrating the mean REE measurements for individual subjects in relation to their corrected gestation age when data were collected along with a fit line. The two outside lines around the fit line represents the 95% confidence interval.

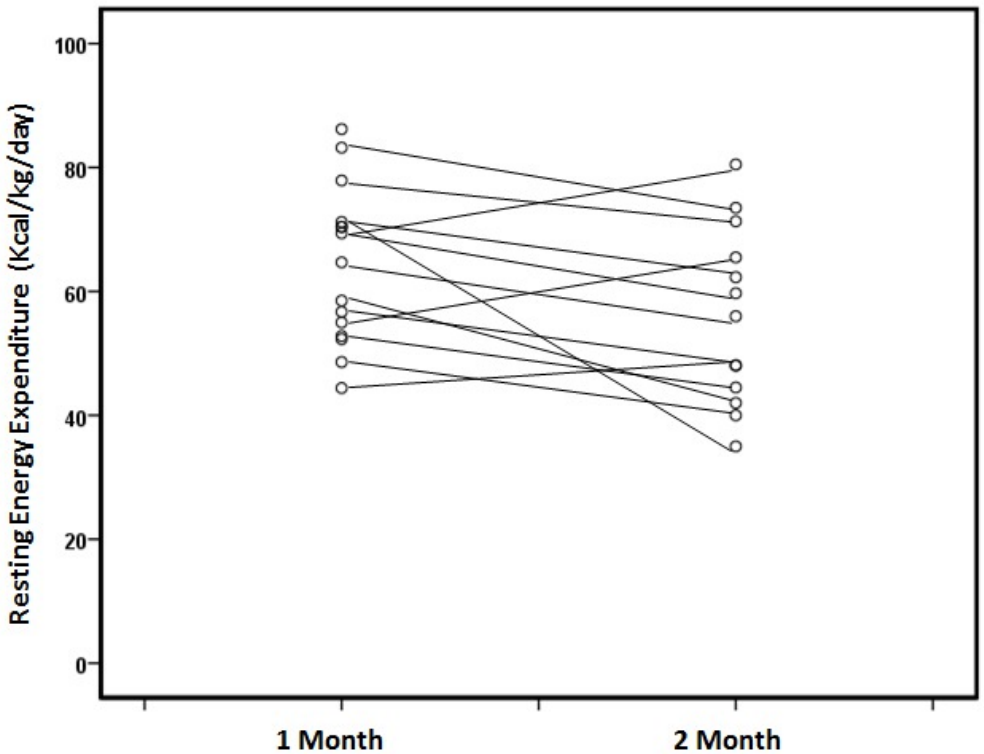

Figure 2: Mean REE values on the first and second month of life for each study subject.

Table 1: VO2, VCO2, calculated REE and measured REE values of newborns.

	VO2	VCO2	REE by WHO equation (Kcal/Kg/day)	Measured REE by IC

	(ml/Kg/min)	(ml/Kg/min)		(Kcal/Kg/day)
One month	9.3±2.0	7.7±1.2	48.5±1.4	64.1±12.7
Two months	8.1±2.2	6.4±1.1	51.0±1.3	58.4±14.3

Table 2: Subject Characteristics

1. Demographics	
- Male	40%
- Mean Birth Wt (Kg)	3.25±0.40
- Mean Birth Length (cm)	49.7±2.4
- Mean Birth HC (cm)	34.2±1.0
2. Ethnicity	
- Caucasian	33%
- African American	7%
- Hispanic	40%
- Asian	20%
3. Type of Feeding	
- Exclusive BF	80%
- Exclusive Formula	13%
- Both BF + Formula	7%
4. Type of delivery	
- Cesarean Section	27%
- Vaginal	73%
5. APGAR scores	
- 1 minute median	9
- 5 minute median	9

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Abstract: 329

Full Term Neonate with Unexpected Collapse

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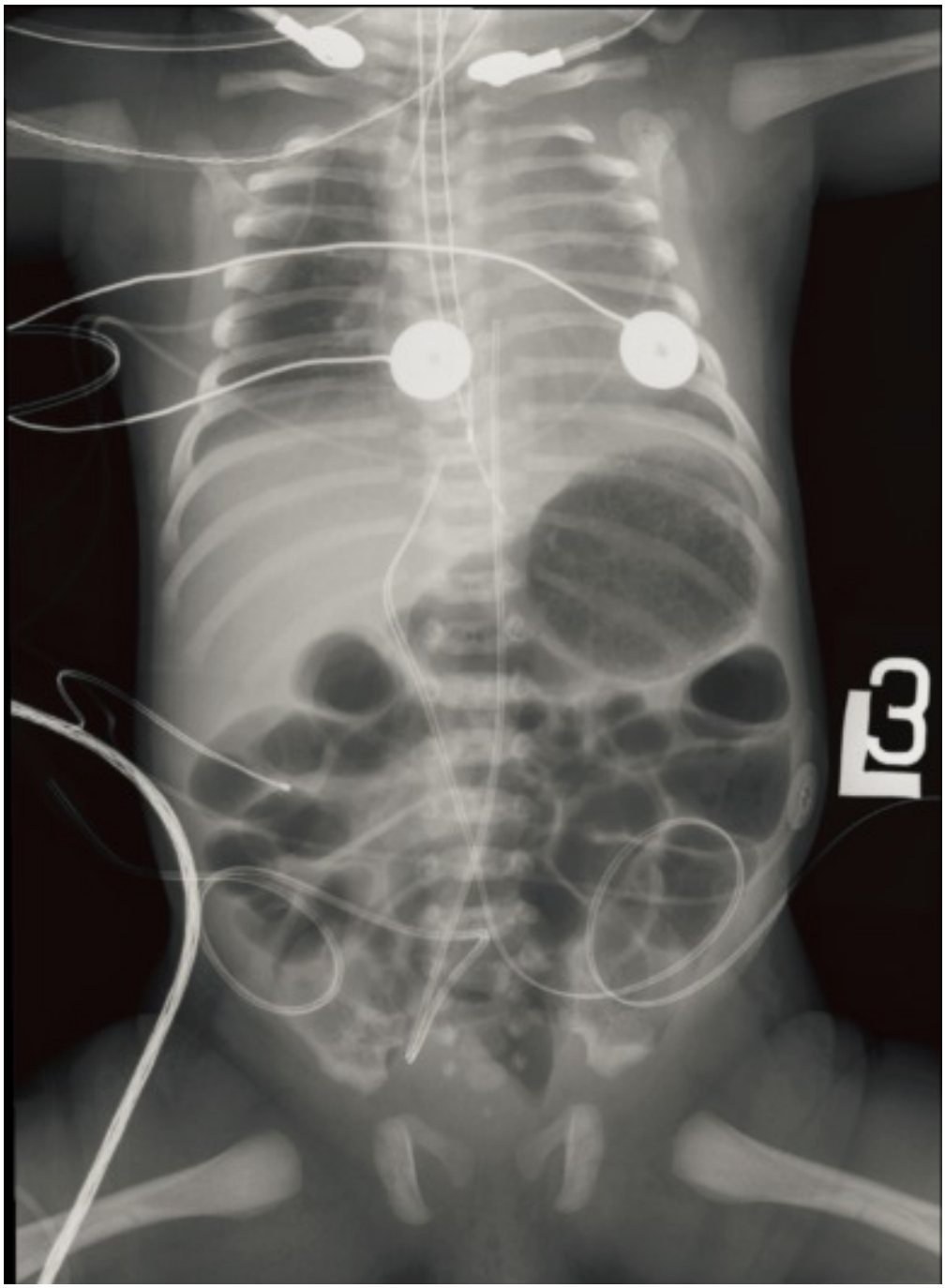
History (including chief complaint, history of present illness and relevant past and family medical history) A 3040 gm AGA female was born at 38 1/7 weeks gestation to an 18 year old G1P0 mother with negative prenatal labs via vaginal delivery induced for pre-eclampsia. Pregnancy was also complicated by obesity and elevated serum AFP without concerning ultrasound findings. Mother was on magnesium sulfate during labor for seizure prophylaxis. NICU was called to the delivery due to magnesium exposure and concern for spina bifida. APGARs were 8 and 9; the infant was vigorous with good tone and spine intact. At 90 minutes of life, she was skin to skin with her mother after a brief first breastfeeding attempt. A nurse noted the infant to be limp, pale and apneic when she approached for assessment. The infant was taken to a radiant warmer for resuscitation, where her HR was 60 bpm. PPV was initiated with HR response to greater than 100 bpm. NICU team arrived within 2 minutes and found the infant cyanotic, limp and apneic. Despite increase in HR and SpO2 to appropriate values following PPV with higher pressures and FiO2, she was intubated for persistent apneic unresponsiveness. Physical exam showed Sarnat Stage III severe encephalopathy.

On admission to the NICU, the infant was mechanically ventilated with minimal settings, cooled per protocol, underwent umbilical line placement, received antibiotics, and acidosis was corrected with fluid resuscitation and sodium bicarbonate.

At 18 hours of life, a Replogle was placed to low intermittent suction after the abdomen was noted to be distended but soft with mild

tenderness and no discoloration. Output was scant and non-bilious. Combination chest/abdominal radiograph after Replogle placement is shown.
Physical examination findings (including vital signs) Exam showed stupor, absent spontaneous activity and primitive reflexes, flaccid tone, minimally reactive pupils and apnea/hypopnea. No obvious dysmorphic features.
Laboratory or Diagnostic imaging or Procedures Umbilical venous gas: 7.28/46/30/20/-5.6
ABG (1 hr of life): 7.00/35/124/9/-23, lactate 14.9.
CMP: CO2 14 mmol/L, magnesium 4.7 mg/dL; otherwise normal
CRP: < 0.5 mg/dL
CBC: WBC 7.9 K/mcL; 52% segmented neutrophils, no bands, 42% lymphocytes, 5% monocytes and 1% eosinophils); Hemoglobin 11.5 gm/dL, Hematocrit 35%; Platelets 283 K/mcL
Ammonia: 17 mcmol/L.
Admission Imaging:
Head ultrasound: no acute intracranial hemorrhage
Abdominal ultrasound: no free fluid
Echocardiogram: moderate patent ductus arteriosus with bidirectional shunting, small patent foramen ovale, qualitatively normal biventricular systolic function.
Final Diagnosis Achalasia presenting as sudden unexpected postnatal collapse



Chest/Abdominal Radiograph after Replogle Placement

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Abstract: 330

19-Month-Old Male Found Unresponsive

Aanchal Sharma, Dana Kaplan
Pediatrics, Staten Island University Hospital, Staten Island, New York, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A nineteen-month-old male was brought into the emergency department (ED) via ambulance after an episode of apnea and cyanosis. On the night of admission, his parents awoke after they heard the patient's sister screaming. The parents ran into the bedroom, where the patient and his five-year-old sister were co-sleeping, to find the patient cyanotic with loss of consciousness. EMS was immediately called and prior to arrival to the ED, the patient regained consciousness without intervention by EMS. Past medical history and family history were noncontributory.

Physical examination findings (including vital signs) Vital signs upon presentation to the ED included temperature 97.9°F, heart rate 103-160 beats per minute (nl: 98-140 bpm), respiratory rate 26-34 breaths per minute (nl: 22-37 bpm), and pulse oximetry of 96-98% on room air. On physical examination, a linear circumferential mark on the patient's neck was noted as well as scattered petechiae on his cheeks bilaterally. Physical exam was otherwise unremarkable.

Laboratory or Diagnostic imaging or Procedures Chest x-ray was normal and x-ray of his neck revealed hypopharyngeal dilatation. Liver enzymes were normal, AST 67 (nl: 22-58 IU/L) and ALT 15 (nl: 11-39 IU/L). Skeletal survey was normal, with no evidence of previous or acute fractures. Doppler studies of neck vasculature showed patent bilateral common carotid arteries and internal jugular vein, with no evidence of common carotid arterial dissection.

Final Diagnosis Accidental Strangulation with Human Hair

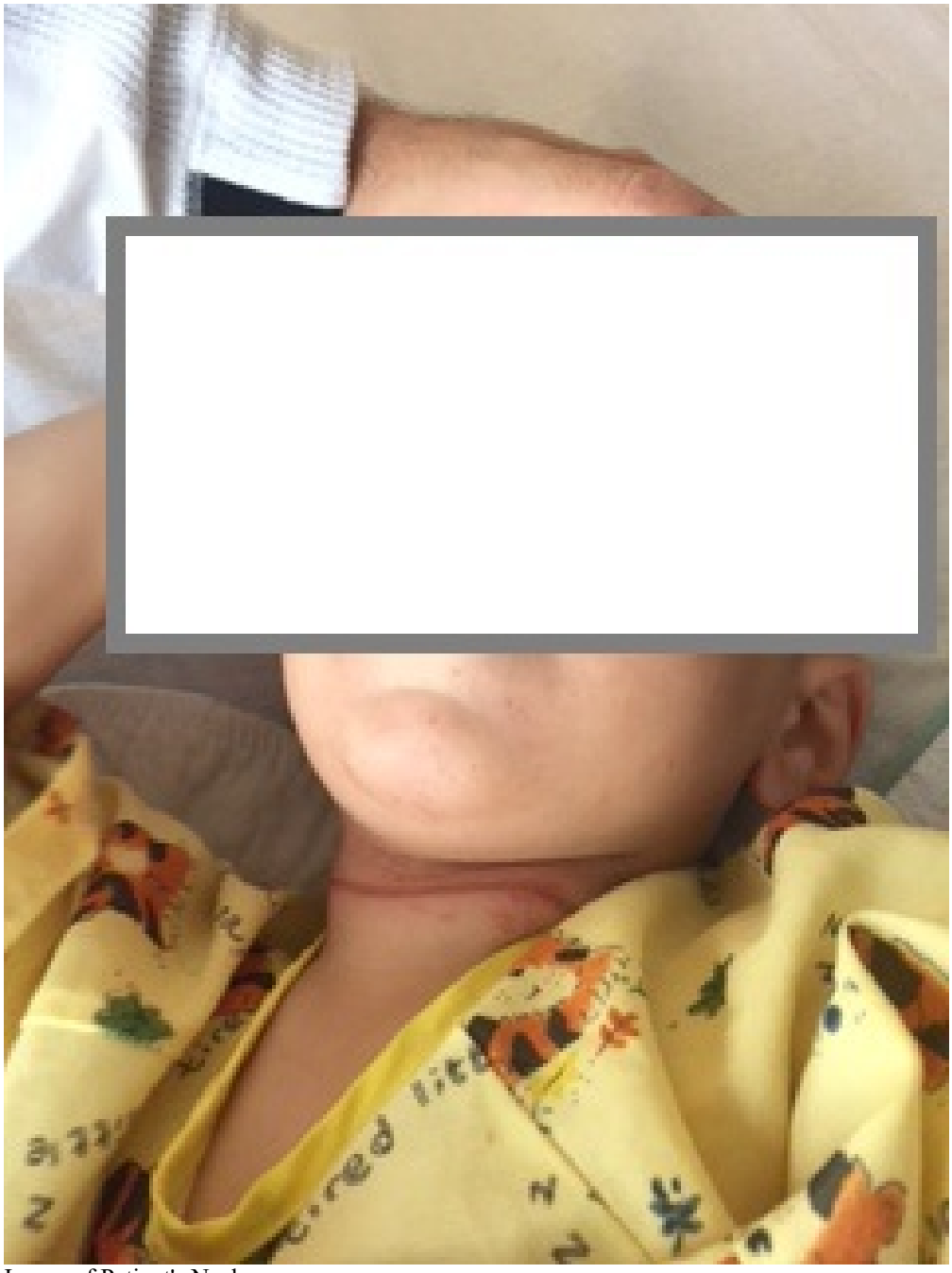
Image of Patient's Neck

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Abstract: 331

Scalp Swelling Beyond the Immediate Postpartum Period

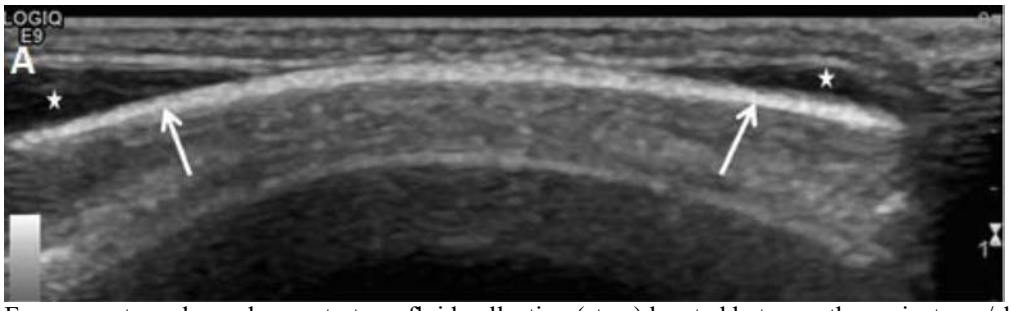
Mark D. Bouchard[1], Linda DIToro[2], Jeremy Neuman[3], Richard Sidlow[1], Dana Kaplan[1]

[1]Pediatrics, Staten Island University Hospital- Northwell Health, Staten Island, New York, United States, [2]Premier Pediatrics of New York, Staten Island, New York, United States, [3]Radiology, Staten Island University Hospital, Staten Island, New York, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A fourteen-week-old male, accompanied by his biological parents, presented to their
pediatrician's office after his mother noticed "bumps" on the child's scalp that same morning. Both parents denied any history of head trauma, insect bites, changes in behavior, appetite, activity, recent fevers or illness. Birth history, confirmed by medical record review, was significant in that the patient was born full term via emergency caesarian section after a failed vacuum assisted delivery. Bruising without swelling was noted on the scalp where the vacuum device was applied twice, which spontaneously resolved after several days. Scalp electrodes were also placed intravaginally during labor.
In the emergency department, the patient's development and growth, including head

circumference, were both appropriate for age. There was no significant family medical history. Psychosocially, both parents denied any history of substance abuse, psychiatric co-morbidities,including postpartum depression, prior investigations with child protective services, or domestic violence in the home.
Physical examination findings (including vital signs) On physical examination the patient's vitals were: T 98.6, HR 135, RR 34, BP 89/53, Sat 99% RA. The patient was active and alert, with scant, thin hair noted over the scalp without apparent breakages. The only abnormal finding was a 3x3cm swelling noted over the occiput with extension over the right parietal bone. The swelling was fluctuant and mobile without overlying bruising, erythema, crepitus, or observed tenderness to palpation.
Laboratory or Diagnostic imaging or Procedures Imaging included a head ultrasound (Figure 1), which showed a hypoechoic fluid collection on the right and posterior scalp. Non-contrast computed tomography(CT) of the head demonstrated a hypodense fluid collection at the vertex that crossed suture lines, without underlying fracture or intracranial hemorrhage. A skeletal survey, complete metabolic panel, amylase, and lipase were all unremarkable. The parents were discharged home with the child and follow up with the primary pediatrician was recommended.
Final Diagnosis Delayed Subaponeurotic Fluid Collections

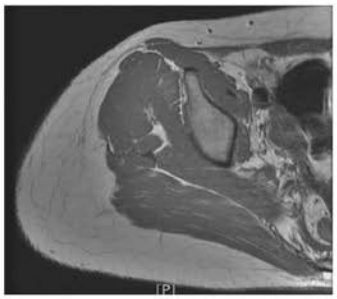
Traction on the scalp during delivery leading to aponeurotic tissue disruption and small subaponeurotic bleeds can be masked early on due to soft tissue swelling and molding. Gradual oozing into the subgaleal space over several weeks could lead to scalp swelling.

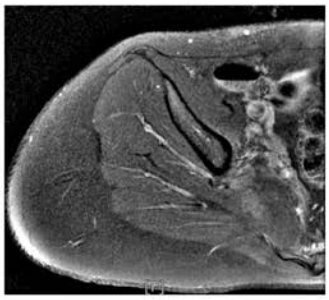


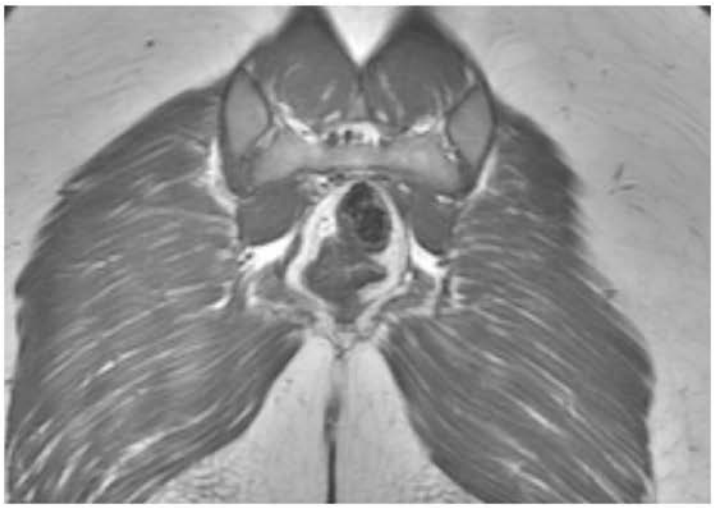
Frequency transducer demonstrates a fluid collection (stars) located between the periosteum/skull(arrows) and the scalp. The fluid appears separate on this image because pressure applied by the probe flattened the center of the lesion.

##PAGE_BREAK##
Abstract: 332
An unusual case of hip pain in a teenager
Marium Malik, Josue Diaz-Frias, Mohamed Almuqamam
Pediatrics, The Brooklyn Hospital Center, Brooklyn, New York, United States

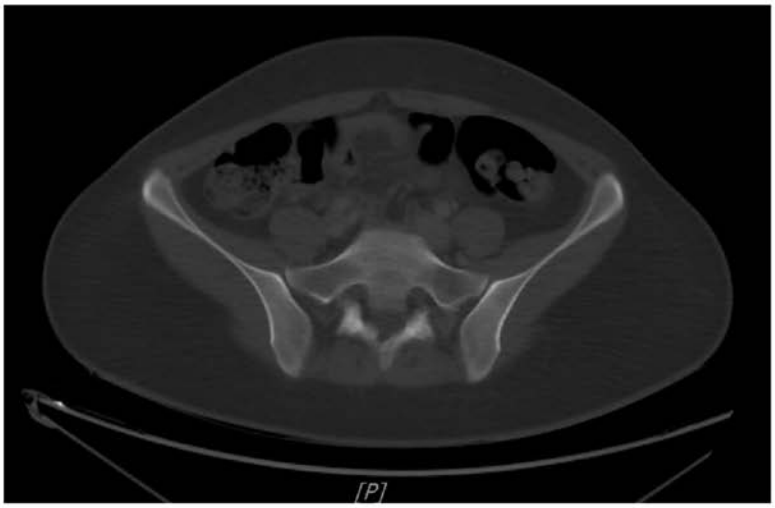
History (including chief complaint, history of present illness and relevant past and family medical history) 18 year old female presented to the ED with one day history of an acute onset, throbbing, right posterolateral hip pain with radiation to the right inguinal region on external rotation of hip joint. There was no history of trauma, fever, headache, nausea, vomiting, diarrhea, numbness or tingling of the extremities, no associated weakness in the right leg or change in sensation. The patient denied presence of any skin rash, preceding sore throat, cough, chest pain, shortness of breath, dysuria, urinary frequency/urgency or incontinence. Past medical, surgical, family and social history were noncontributory. In the ED, patient was afebrile, appeared non-toxic but was refusing to bear weight. Physical exam was notable for mild tenderness over the right posterolateral hip and right sacroiliac joint. Passive and active flexion and extension of the legs, abduction and external rotation of right hip was associated with worsening pain (FABERE test/Patrick test positive). Straight leg raise test was negative and neurovascular function was intact.
Physical examination findings (including vital signs)
Laboratory or Diagnostic imaging or Procedures Initial laboratory studies demonstrated leukocytosis of 21.5 K/cmm with 88.9% neutrophil predominance, CK 56 U/L, ESR 5 MM/HR and CRP 30.99 mg/L. Hemoglobin and hematocrit was 14 g/dl and 40% respectively, BMP was within normal. X-rays of the lumbar spine showed spina bifida occulta involving S1 but otherwise unremarkable. CT scan of the pelvis with IV and oral contrast was non sepecific. MRI spine was performed which revealed a small right sacroiliac joint effusion, mild to moderate edema surrounding the sacroiliac joint which was suggestive of acute right sacroiliitis. Peripheral blood cultures drawn on day of admission grew gram positive cocci in clusters (later identified as methicillin sensitive staphylococcus aureus), 2 subsequent blood cultures were negative. Transthoracic echo was performed to rule out infective endocarditis. CRP increased to 100.98 mg/dl and downtrended thereafter.
Final Diagnosis Patient was started on IV ceftriaxone and Vancomycin for presumptive osteomylelitis/septic arthritis along with analgesics and admitted to the pediatric unit. MRI confimed diagnosis of acute pyogenic sacoilitis. Ceftriaxone was changed to cefazolin after positive blood cultures. Orthopedics and neurosurgery teams advised against joint fluid aspiration because of the very minimal effusion. On hospital day 17, patient was able to ambulate with help of a walker and later discharged with home services including Physical Therapy and home antibiotic IV infusion to complete 6 week course of antibiotics.

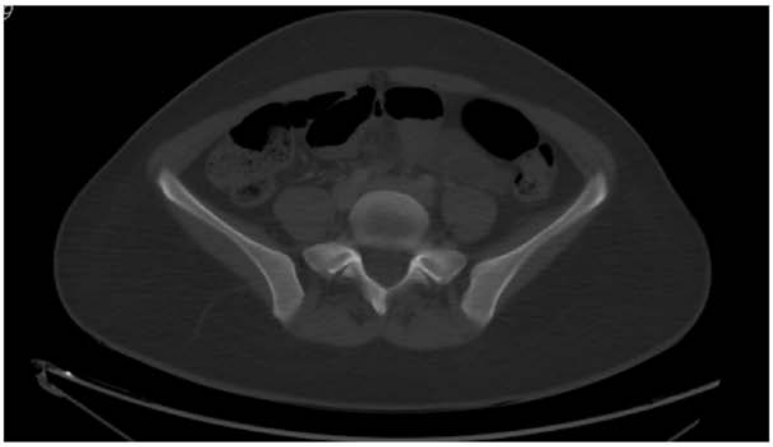






Minimal edema noted at the proximal rectus femoris muscle attachment along with mild nonspecific edema along the proximal right iliotibial tract. Nonspecific edema along the right pelvic side wall, medial right acetabulum and surrounding the obturator internus. Nonspecific mild presacral edema. No drainable fluid collection, consistent with acute right sacroiliitis with surrounding reactive changes.





No discrete CT abnormality identified; Scattered nonspecific sclerotic and lucent changes of the included osseous structures identified.

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Abstract: 333

Polycystic ovarian syndrome: a diagnostic masquerade in the pediatric population

Daniel Mak[1], Susan Brill[2], Weizhen Xu[3]

[1]Pediatrics, Saint Peter's University Hospital, NORTH BRUNSWICK, New Jersey, United States, [2]Adolescent Medicine, Saint Peter's University Hospital, New Brunswick, New Jersey, United States, [3]Pediatric Endocrinology, Saint Peter's University Hospital, New Brunswick, New Jersey, United States

History (including chief complaint, history of present illness and relevant past and family medical history) A 20-year-old female with Hashimoto thyroiditis, diagnosed at age 9 yrs, presented with irregular menses since menarche at 12 years of age. She was referred to Adolescent Medicine for reported “hot flashes” for one year. She was previously diagnosed with PCOS with clinical signs of hirsutism, acne and irregular menses.

Physical examination findings (including vital signs) Weight: 58 kg (53% tile); Height 160 cm (31% tile)

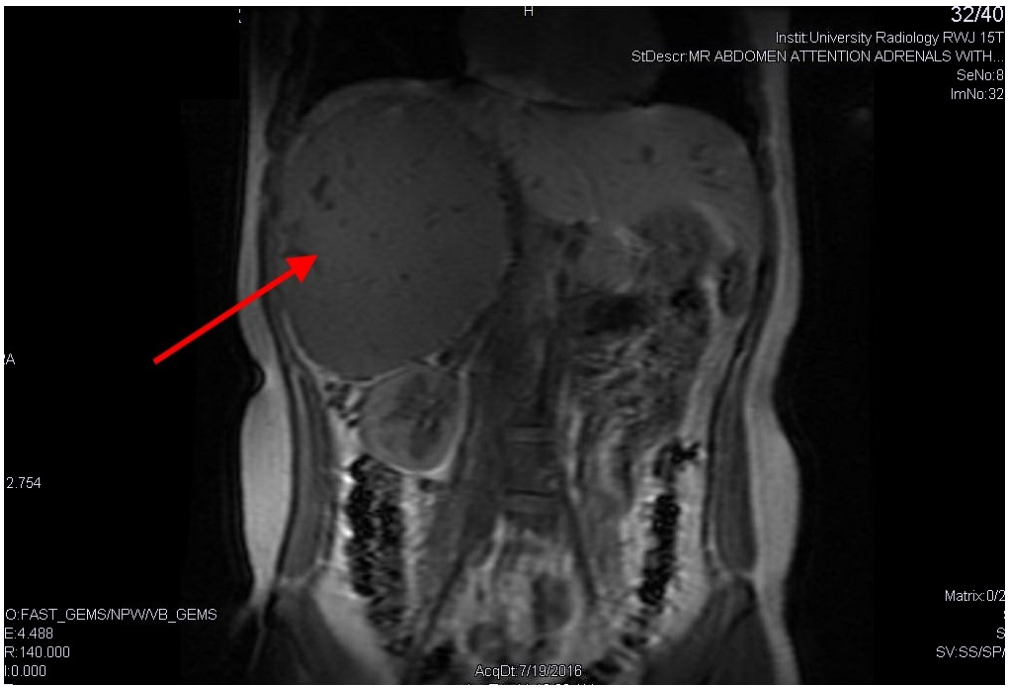
Temp 98.4F, HR 76, RR 16, BP 110/72, SpO2 100% room air

General: comfortable, no distress

CVS: regular rate and rhythm, no murmur

Resp: clear to auscultation

Abdomen: soft, non-distended, non-tender, no organomegaly, good bowel sounds
Breast: Tanner V
Genitalia: Tanner V pubic hair, mild clitoromegaly
Skin: hirsutism, acne
Laboratory or Diagnostic imaging or Procedures Hormonal workup revealed markedly elevated serum dehydroepiandrosterone sulfate (DHEA-S) (4947 mcg/dL), elevated prolactin (41 ng/mL) and very low FSH (<0.3 mlU/mL). Imaging for a source of excess hormone secretion revealed a large right-sided adrenal mass. The mass was removed and was determined to be an oncocytic adrenal adenoma without definitive malignancy. Using the Modified Weiss System for adrenocortical oncocytic neoplasms, adverse prognostic features for this mass included tumor necrosis, large size (16.5 cm) and weight (1434 grams). Additionally, Ki67, a marker for cell proliferation was low (2%) which suggested the slow tumor growth over many years. After the tumor removal, DHEA-S decreased as expected to normal levels and clinical features such as irregular menses and virilization improved.
Final Diagnosis Polycystic ovarian syndrome (PCOS) is a diagnostic dilemma in adolescent females and many of the features of PCOS overlap with the normal natural progression of puberty. Diagnostic tools have largely been derived from adult criteria. Although PCOS is the most common cause of hyperandrogenic anovulation, the diagnosis must be made after excluding other disorders that account for hyperandrogenism and anovulation. The 1990 National Institute of Child Health and Human Development (NICHD) Consensus conference discussed that the major diagnostic criteria for PCOS included evidence of clinical and/or biochemical hyperandrogenism, oligo-ovulation in the setting that excluded other disorders such as Cushing's syndrome, hyperprolactinemia, congenital adrenal hyperplasia, and androgen-secreting tumors. Our case emphasizes the importance of this diagnosis of exclusion.



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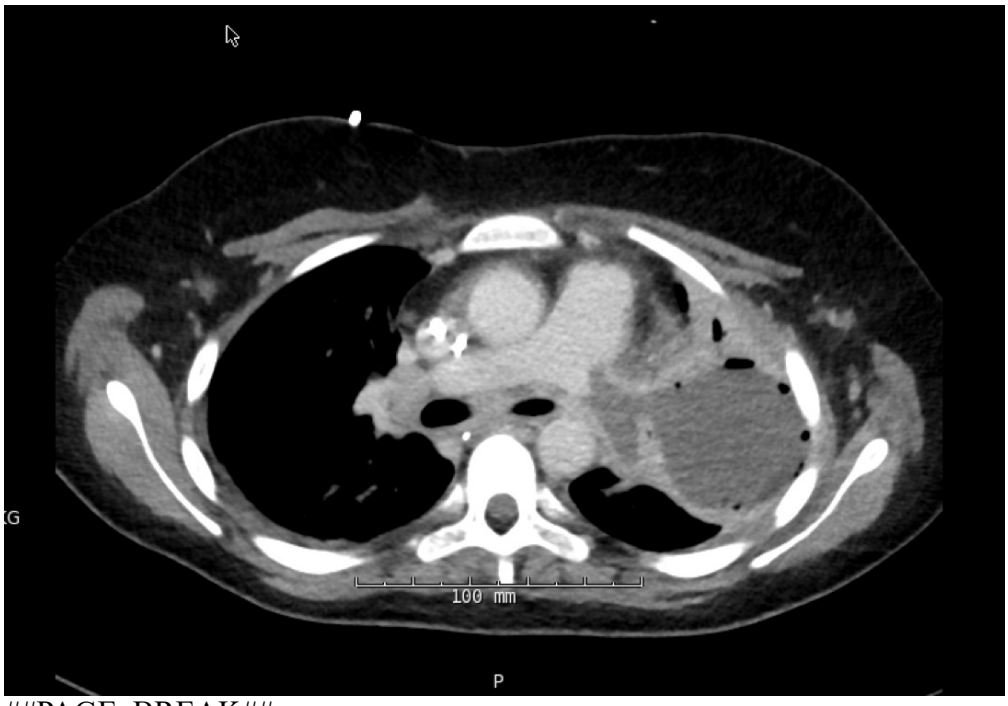
Abstract: 334
Hickam's Dictum in Action: Two Simultaneous Causes of Respiratory Disease in a Single Patient
Kevin O'Callaghan, Kelley Erickson, Lori Handy
Division of Pediatric Infectious Diseases, Children's Hospital of Philadelphia, PHILADELPHIA, Pennsylvania, United States

History (including chief complaint, history of present illness and relevant past and family medical history) CC: 14 year old female with multiply relapsed ALL, transferred from outside hospital (OSH) for CAR T cell therapy, and subacute respiratory decompensation with LUL infiltrate and parapneumonic effusion.

HPI:
14 year old female with a long oncologic history (as per PMHx) of ALL and 3 relapses. Presented from OSH for CAR T-cell therapy, as well as assessment of respiratory disease of unclear etiology. 3 prior relapses with complications as below. Most recently, admitted with a third relapse after BMT. Her course was complicated by bilateral talonavicular/tibiotalar septic arthritis, with wash-out performed.
Subsequently, she developed progressive respiratory distress, with a LUL infiltrate and a parapneumonic effusion. Initial bronchoscopy was unrevealing. There was concern for recurrence versus initial presentation of fungal pulmonary disease, and she was transferred here for CAR T therapy assessment, and further work-up of her pulmonary complaints.

Relevant past and family medical history:
Initial dx: ALL in October 2009, with chemotherapy course complicated by bilateral hip osteonecrosis.
- First relapse March 2013, complicated by disseminated Candida disease.
- Second relapse 2016, complicated by MSSA bacteremia, typhlitis, and osteomyelitis of the right hand. Also had new lung lesions on CT chest concerning for fungal infection
- Initial assessment for CAR T cell therapy in May 2016
- BMT in November 2016, complicated by a LLL pulmonary infection
- Third relapse in October 2017, remained inpatient until her transfer to current hospital. Complicated by bilateral tibiotalar/talonavicular septic arthritis. Subsequently, had worsening respiratory distress, with LUL consolidation and parapneumonic effusion.
Physical examination findings (including vital signs) Temp: 36.9 °C Pulse: 110 RR: 20 BP: 106/65 SpO2: 99 % FiO2 (%): 100 % O2 Flow Rate (Lpm): 1 Lpm
GENERAL: no acute distress
NECK: supple
CARDIOVASCULAR: tachycardic, normal S1 and S2, soft systolic murmur along LLSB
CHEST: diminished breath sounds (L>R), crackles noted at LLL
ABDOMEN: round, soft, non-tender, normoactive bowel sounds, unable to palpate liver or spleen
EXTREMITIES: bilateral ankles with well approximated incisions
Laboratory or Diagnostic imaging or Procedures CT chest: "Large pulmonary embolism obstructing the left main pulmonary artery"
BAL bronchoscopy: "Numerous fungal hyphae are present with mostly acute angle branching and occasional septations"
Final Diagnosis 1) Large left-sided pulmonary embolism with left upper lobe ischemia/necrosis
2) Fungal hyphae on bronchoscopy samples consistent with Aspergillus pulmonary disease



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Abstract: 335
Hyponatremic seizures in a patient with repaired congenital diaphragmatic hernia
Sheryl Purrier, Sourabh Verma
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History (including chief complaint, history of present illness and relevant past and family medical history) Ex 39 2/7 week of gestation Asian male, with known left-sided congenital diaphragmatic hernia (CDH), born via vaginal delivery to a 34-year-old G3P1011 mother. He underwent uncomplicated repair of CDH on day of life (DOL) 2, was transitioned to room air on DOL 10 and tolerated full enteral feeds on the pediatric floor by DOL 14. On DOL 17 he had decreased feeding and an episode of bradycardia requiring initiation of NICU transfer. Just prior to transfer he had a prolonged generalized seizure unresponsive to phenobarbital, and requiring emergent intubation.
Maternal history was notable for an ectopic pregnancy and an uncomplicated birth of a male infant as well as demise of two maternal uncles in China with possible adrenal pathology. Parents screened negative for rare and common mutations of congenital adrenal hyperplasia via the CYP21A2 gene.

Physical examination findings (including vital signs) Birth examination was notable for decreased breath sounds at left lower lung field, ankyloglossia, up slanting palpebral fissure, high arched palate, smooth philtrum, and no murmur with normal vital signs. Prior to his seizure he developed slow feeding, hypotonia and decreased activity.
Laboratory or Diagnostic imaging or Procedures Renal ultrasound showed mild bilateral hydronephrosis. Echocardiogram showed structurally normal heart. Complete blood cell counts and electrolytes were normal pre and post operatively. Laboratory tests evaluating seizure etiology revealed Na^+ 111 mmol/L, K^+ 9.2 mmol/L, pH 7.49, bicarbonate 16 mmol/L. Hypertonic saline, albuterol, calcium gluconate, insulin and broad-spectrum antibiotics were administered. Due to development of hypotension dopamine and hydrocortisone were added. Differential included septic meningitis and adrenal insufficiency. Infection was ruled out and antibiotics were stopped. Video EEG and MRI brain were normal. Newborn screens and microarray were normal.
Endocrine work-up showed normal DHEA sulfate, 17OHP, cortisol, renin and low aldosterone. Adrenal ultrasound was unrevealing. Due to continued electrolyte derangements off steroids, he was continued on hydrocortisone and started on fludrocortisone, and sodium chloride supplements, with PM 60/40 formula. He was discharged home at 5 weeks later, on continued steroids and supplementation.
Final Diagnosis Additional NR0B1 sequencing and deletion/duplication analysis confirmed a variant of X-linked congenital adrenal hypoplasia. To the best of our knowledge, this is the first case report of X-linked congenital adrenal hypoplasia in a patient with CDH that presented with hyponatremic seizures.

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The Great Debate - Resolved: Children's Healthcare Needs are Best Met with a Single Healthcare Payor System

Alan Fleischman
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The Great Debate - Resolved: Children's Healthcare Needs are Best Met with a Single Healthcare Payor System

Evan Fieldston
Children's Hospital of Philadelphia, Philadelphia, Pennsylvania, United States

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Abstract: 336

Direct Measurement of Neonatal Cardiac Output Utilizing the COstatus Monitor

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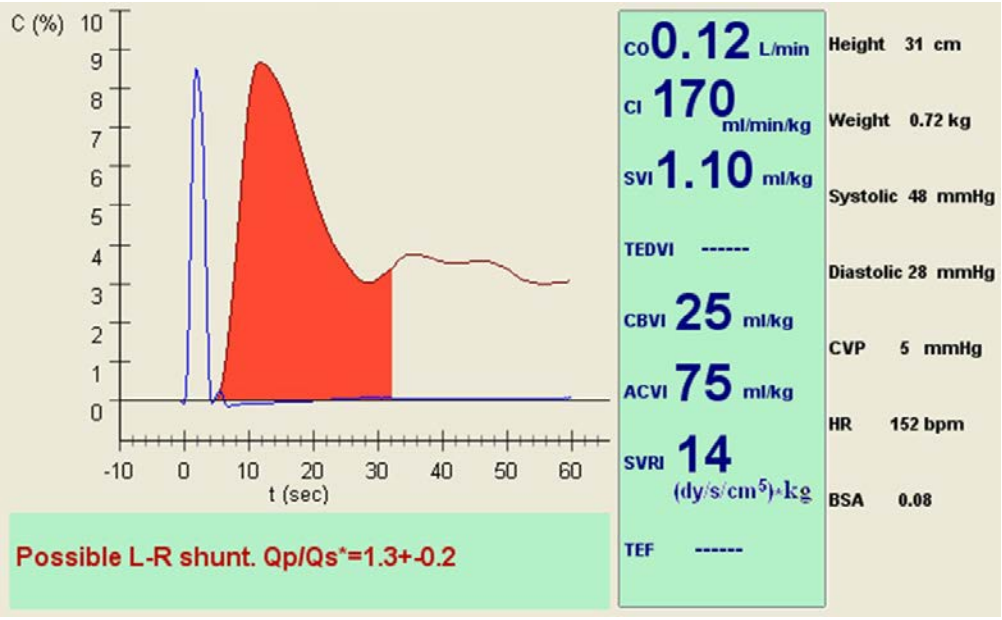
Background Knowledge of cardiac output is a valuable tool in the treatment of critically ill patients. Often, cardiac output is measured indirectly using nonspecific clinical markers. Previous methods of direct calculation of cardiac output have involved considerable risk and have not been feasible in the neonatal population. Less invasive methods exist, but are inaccurate. The COstatus monitor utilizes ultrasound dilution for direct measurement of cardiac output and is suitable for use in the neonatal population. It has been extensively studied in an animal model and has been validated in various pediatric populations.
Objective The purpose of this study was to establish the feasibility of directly measuring cardiac output in a neonatal population using the COstatus monitor (Transonic Systems Inc., Ithaca, NY). This monitor provides measurements of cardiac output, active circulation volume, and central blood volume.
Design/Methods The ultrasound velocity of blood decreases with an injection of saline, producing a dilution curve. This monitor utilizes a system of an extracorporeal loop attached to arterial and venous lines to measure cardiac output using ultrasound dilution. There are two clamp-on flow/dilution sensors and a small pump that circulates blood at 9mL/min. Two to three injections of 1mL/kg (3mL maximum) body temperature isotonic saline were injected into the venous loop, allowing for measurement of hemodynamic status. Up to two measurement sessions were performed daily for a maximum of four days for each patient.
Results Cardiac output was measured 54 times in 12 neonates with no adverse events. Infants ranged in weight (0.72-3.74 kg), gestational age (24-41.3 weeks), and day of life (1-13 days). The mean cardiac output of this cohort was 0.43 L/min (SD 0.26) with a mean cardiac index of 197 mL/kg/min (SD 72). In addition, we collected data for central blood volume index, active circulating volume index, and systemic vascular resistance index (Table). The COstatus monitor also provides Qp/Qs and alerts to the presence of a possible shunt when providing the results of a measurement (Image).
Conclusion(s) Direct measurement of cardiac output by ultrasound dilution via the COstatus monitor is feasible in a neonatal population. Minimal variance was exhibited for all parameters when taking consecutive measurements. Further studies are needed utilizing this technology to establish normative cardiac output ranges for neonates, as well as trends during the first week of life.

Study materials funded by Transonic Systems Inc., Ithaca, NY.



Sample of displayed results after cardiac output measurement

Parameter	CO, L/min	CI, mL/min/kg	CBVI, mL/kg	ACVI, mL/kg	SVRI, mmHg*kg/(L/min)
Mean ± SD	0.43±0.26	197±72	16.6±8.1	76±13	16.4±4.8
Range	0.11-0.82	125-435	8-40	53-100	5-22.5
Reproducibility (%)	8.16%	8.13%	8.95%	8.32%	8.59%

*Reproducibility is the coefficient of variation (SD/mean*100%) of consecutive measurements

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Abstract: 337

Utility of Brain Natriuretic Peptide (BNP) Levels in Screening for Critical Congenital Heart Disease

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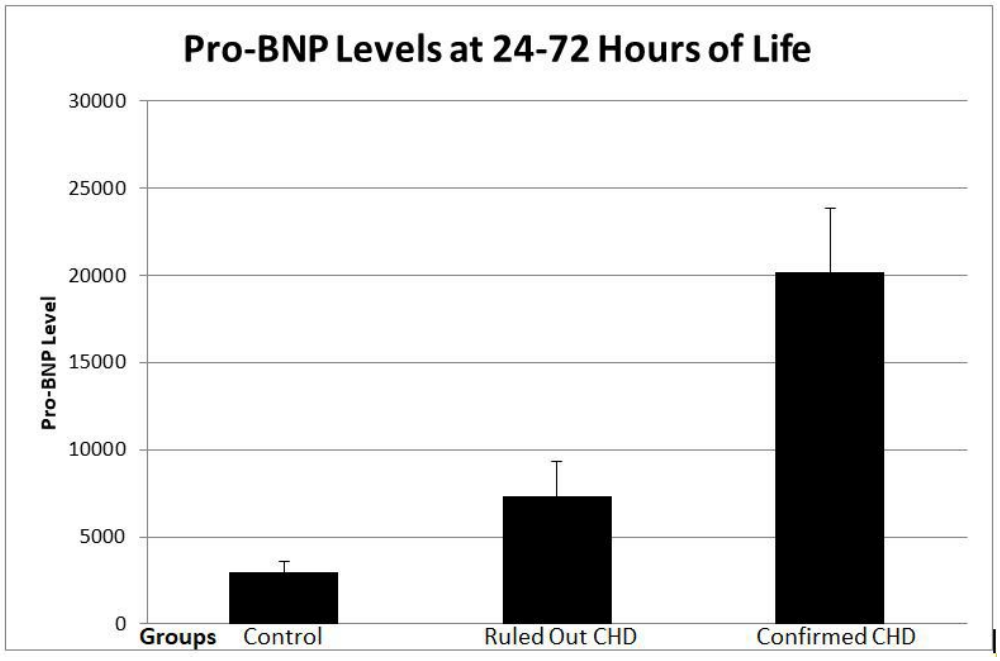
Background Critical congenital heart disease (CCHD) is the leading cause of infant mortality due to birth defects in the United States. The American Academy of Pediatrics suggests screening newborns by measuring pre- and post-ductal oxygen saturations after 24 hours of life. Analysis of pooled studies revealed pulse oximetry screening has an estimated sensitivity of 69.6% with a PPV of 47%. Coarctation of the aorta, in particular, accounts for 7% of CCHD, but is not one of the seven lesions targeted by current screening practices, and is the most commonly missed CCHD lesion. It has been suggested that BNP may be elevated early in life if prenatal ventricular function is impaired, but studies targeted to newborns in their initial hospitalization are required to determine its utility in screening for missed CCHD.

Objective To compare BNP levels between neonates with suspected aortic anomalies and healthy infants at 24-72 hours of life to determine if levels can be a useful screening tool for CCHD.

Design/Methods In this prospective pilot study, BNP levels were measured in 11 healthy newborns with no suspicion of CCHD and in 13 newborns with abnormal fetal ECHO, with state mandated dry blood spot collection at 24-72 hours for ease of sampling, and with postnatal echocardiography in suspected newborns to determine anatomy.

Results Out of 13 infants with abnormal prenatal ECHO, 5 infants had coarctation and 2 had transposition of the great arteries, and 6 had noncritical abnormalities or normal postnatal echos. BNP levels were significantly greater at 24-72 hours of life in the 13 infants with abnormal fetal echo (mean 14265, σ 9500 pg/L) vs the control group of healthy newborns (mean 2976, σ 1875 pg/L) ($p<0.01$). Among the 7 with confirmed CCHD, BNP was significantly higher (mean 20189, σ 8260 pg/L) vs. the control healthy group (mean 2976, σ 1875 pg/L) ($p<0.001$). BNP levels were also significantly higher among the 6 infants with suspected CCHD ruled to have noncritical abnormalities or normal postnatal echos (mean 7353, σ 4418 pg/L) vs the control group (mean 2976, σ 1875 pg/L) ($P=0.014$). BNP levels were significantly lower in suspected infants with noncritical abnormalities or normal postnatal ECHO (mean 7353, σ 4418 pg/L) vs infants with confirmed CCHD (mean 20189, σ 8260 pg/L) ($P<0.008$).

Conclusion(s) Our data suggests that BNP as a biomarker in addition to pulse oximetry could increase the sensitivity of CCHD screening, though a larger population based study is required to validate the findings of the pilot study.



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Abstract: 338

Literature Review of Isolated Brachiocephalic Vessels and Discussion of Three Cases

Sarah Kollar, Olga Toro-Salazar

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Background Isolation of a subclavian artery is a rare anomaly in which a subclavian artery has lost its connection with the aorta, instead connecting to the pulmonary artery (PA) by a patent ductus arteriosus (PDA). Stewart, Kincaid, and Edwards introduced the term isolation in 1964. Four types of isolation may occur: right aortic arch (RAA) with isolated left subclavian artery (ILSCA), left aortic arch with isolated right subclavian artery (IRSCA), RAA with isolated left common carotid artery (ILCCA), and RAA with isolated left innominate artery (ILIA) (Figure 1).

Objective A thorough review of the literature was performed to uncover the incidence of these anomalies and identify presenting symptoms to promote early diagnosis. We also report two cases of ILSCA and one case of ILIA, demonstrating the different imaging modalities for diagnosis.

Design/Methods Literature review using PubMed database. Search terms included “isolated” or “in isolation” combined with subclavian, common carotid, or innominate. Each article was reviewed and repeat cases discarded. Table 1 reports the frequency of each defect, presenting symptoms, and associated genetic or cardiac abnormalities.

Results We reviewed 135 articles, identifying 90 cases of ILSCA, 31 ILIA, 30 IRSCA, and 9 ILCCA since 1970. Overall, 62% were associated with congenital heart disease (CHD), most commonly tetralogy of Fallot (TOF) (Table 1). In Case 1, TOF diagnosed prenatally and postnatal transthoracic echocardiogram (TTE) demonstrated ILSCA from the left PA by PDA, confirmed with cardiac MRI (Figure 2A). TTE demonstrated flow reversal in left vertebral artery suggesting subclavian steal (Figure 2B). Case 2 corresponds to an infant with RAA, ILSCA, and tricuspid atresia with identifying CT images in Figure 2C-D. Case 3 had prenatal diagnosis of single ventricle anatomy and postnatal TTE showed double inlet left ventricle with aortic atresia and bilateral PDA. CT confirmed RAA with left-sided PDA supplying an ILIA (Figure 2E-F).

Conclusion(s) These cases demonstrate the utility of multimodality imaging in the diagnosis of brachiocephalic vessel isolation. MRA is ideal due to its ability to depict vessel morphology and assess flow reversal. Identifying TOF with isolation is crucial prior to Blalock-Taussig shunt placement. Furthermore, isolation in association with a non-patent ductus arteriosus may lead to neurological deficits secondary to vertebrobasilar steal. Early recognition can reduce adverse outcomes including arm claudication, atrophic upper limb, and neurological deficits.

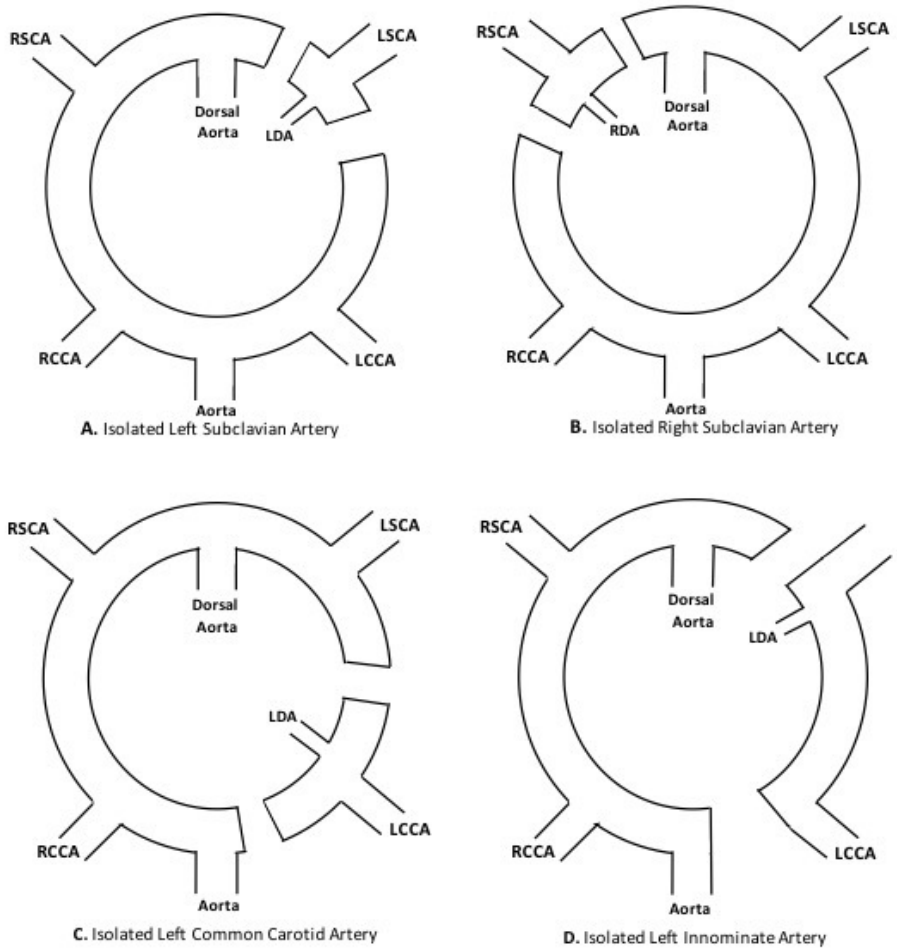

Figure 1: A. Isolated LSCA due to loss of left 4th arch and distal left dorsal aorta with persistence of left 6th (ductal) arch connecting the 7th intersegmental (subclavian) artery to the PA **B.** Isolated RSCA due to loss of right 4th arch and distal right dorsal aorta with persistence of right 6th arch connecting the 7th intersegmental artery to the PA. **C.** Isolated LCCA due to loss of left 4th arch and left branch of the aortic sac with the left 6th arch connecting the PA to the 3rd arch (common carotid) **D.** Isolated LIA due to loss of left branch of the aortic sac and left dorsal aorta with the left 6th arch connecting the PA to the truncoaortic sac, feeding the left 7th intersegmental (subclavian) artery and the left 3rd arch (common carotid artery).

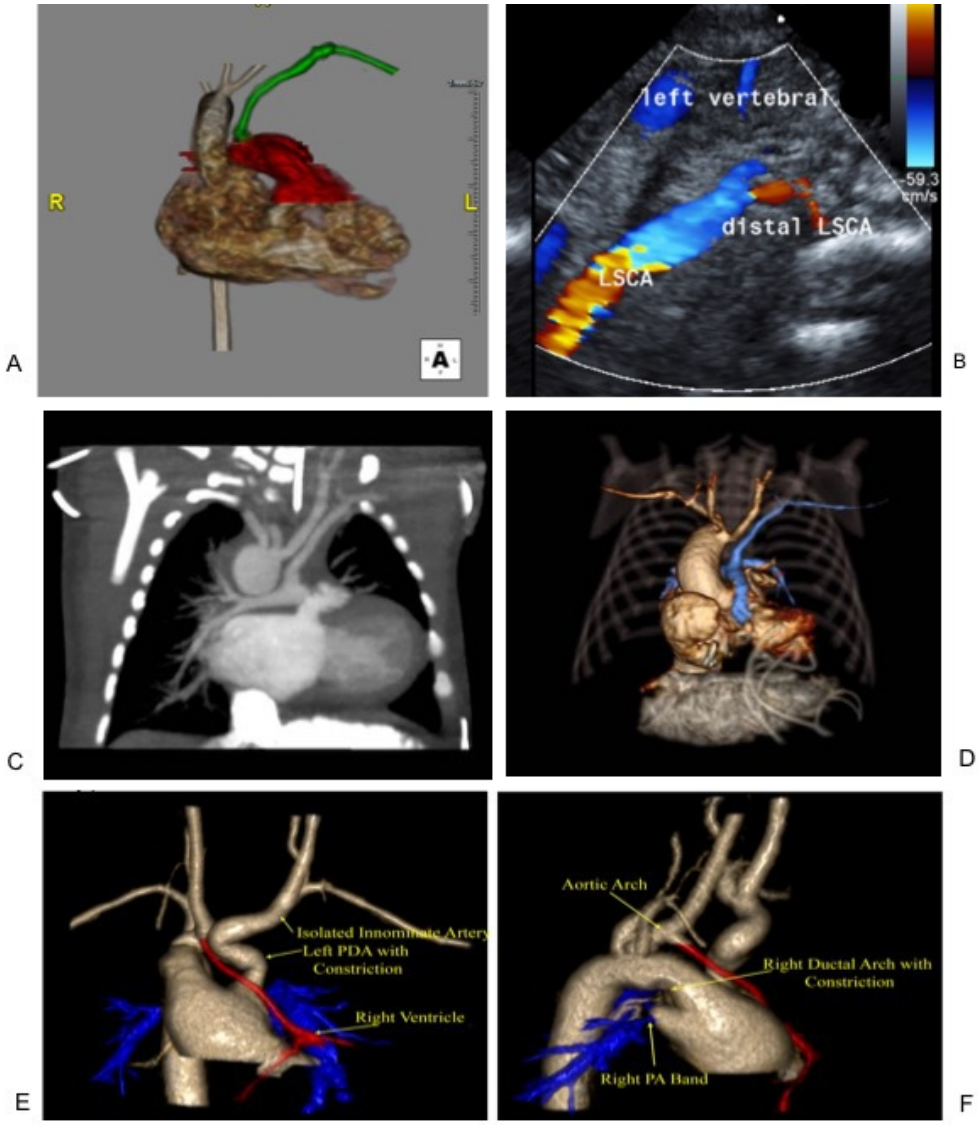

Figure 2: A. 3-D volume rendered MRA in the AP view showing RAA and ILSCA communicating with the PA by left-sided PDA **B.** TTE showing ILSCA with flow reversal in the left vertebral artery demonstrating steal **C.** CT in the AP view showing ILSCA in connection with the LPA **D.** 3D volume rendered CT in the AP view displaying RAA with ILSCA **E.** 3-D volume rendered CT of Case 3: DILV with isolation of innominate artery and **F.** Lateral view showing right ductal constriction

Table 1: Summary of Reported Brachiocephalic Vessels in Isolation

Location of Isolation	Number of Cases	Intracardiac Defects [Number of Cases Seen]	Associated Syndromes [Number of Cases Seen]	Symptoms
Left Subclavian Artery	90	TOF [25] VSD [10] ASD [4] Coarctation [3] Bilateral SVC [3] D-TGA [2] Atrioventricular Canal [2] Tricuspid Valve Atresia [1] DORV [1]	DiGeorge [8] VACTERL [2] CHARGE [1] Scimitar [1] Heterotaxy [1] Peutz-Jeghers [1] Trisomy 21 [1] Williams-Beuren [1]	Left arm claudication Left arm ischemia Right facial numbness Left cerebral atrophy Blurry vision Hearing loss left ear Pulmonary HTN Vertebrobasilar insufficiency
Right	30	VSD [9]	DiGeorge [6]	Right arm cyanosis

Subclavian Artery		D-TGA [4] TOF [1] ASD [1]	Polysplenia [1] Klippel-Feil [1]	Intellectual disability Decreased brain size in utero Pulmonary HTN
Left Common Carotid Artery	9	TOF [3] Ebstein	DiGeorge [2] CHARGE [1] Primordial Dwarfism [1]	Cyanosis with feeding Pulsatile left neck swelling
Left Innominate Artery	31	VSD [6] DORV [3] ASD [3] TOF [2] D-TGA [1] Atrioventricular Canal [1]	DiGeorge [2] CHARGE [1] Trisomy 21[1] Asplenia [1] Polysplenia [1] Goldenhar [1] Prader Willi [1]	Left limb claudication Left limb weakness Atrophic left limb/hand Left cerebral atrophy Vertebrobasilar insufficiency Pulmonary HTN TIA/SAH

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Abstract: 339

A novel alpha-tropomyosin mutation (D55N) is associated with familial dilated cardiomyopathy

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Background Dilated cardiomyopathy (DCM) is the most common form of cardiomyopathy and is associated with significant morbidity and mortality. Familial forms constitute the single most common etiology of DCM, and many genes and mutations have been implicated in DCM, most of which code for structural components of the sarcomere, costamere, or nuclear membrane. Identifying pathogenic mutations is critical in determining pathophysiology and possible therapeutic interventions. We report familial DCM spanning four generations in a family of Greek descent associated with a novel α-tropomyosin (TPM1) mutation, D55N. TPM1 mutations have previously been reported in both hypertrophic and dilated cardiomyopathy.

Objective

Design/Methods A retrospective analysis of the pedigree was conducted. The proband and each participating family member (n=9) underwent a history, physical exam, electrocardiogram, echocardiogram, and genetic testing for the D55N mutation. Individuals were considered to have clinical DCM if they met either of the following criteria: i) fractional shortening below 25% or left ventricular ejection fraction below 45%, or ii) left ventricular end diastolic dimension greater than 117% of the normal value adjusted for body surface area and age.

Results The age of diagnosis of clinical DCM in the genotyped participants ranged from the fourth to the seventh decade of life. However, family members that were presumed affected but not genotyped spanned in age from six months to eighty-six years old, including two individuals who underwent orthotopic heart transplant in the first and second decades of life. The pattern of inheritance of DCM in this family was found to be autosomal dominant with a 71% penetrance.

Conclusion(s) The association of the D55N mutation in the TPM1 gene with DCM serves as additional support for TPM1 being a disease gene for DCM. Further investigation is ongoing to determine the functional impact of the mutant in order to better understand the pathophysiology of DCM.

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Abstract: 340

Assessment of Pediatric Cardiology Referral Practices for Inpatient and Outpatient Post-Cardiac Surgery Physical Therapy

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Background Congenital heart disease (CHD) occurs in 4-12 per 1,000 live births with more than 30% of affected children requiring palliative or corrective surgery in early life. Studies on adult cardiac surgery patients clearly demonstrate the benefit of physical therapy (PT), a standard postoperative care step. However, it is unknown to what extent pediatric cardiac patients are referred for post-surgical PT in both inpatient and outpatient settings.

Objective To assess pediatric cardiologist (PC) referral practices for both inpatient and outpatient post-cardiac surgery physical therapy.

Design/Methods An anonymous, three-part survey was distributed to PC nationwide via Survey Monkey. In Part 1, PC were asked non-identifiable demographic questions, including those on practice setting and post-fellowship training. In Part 2, PC indicated how many outpatients they typically see in a week as well as how much time they commit to teaching or supervising PC fellows in the out-

patient setting. In Part 3, subjects specified how often they refer CHD patients post-operatively for inpatient and outpatient PT: never (0% of the time), rarely (1-20%), sometimes (21-50%), often or very often (51-80%), always or almost always (81-100%). Linear regressions were performed to determine whether the rate of referral differed across community type or teaching load.
Results PC (N=129) responded from 37 states: 53% had completed post-fellowship training, 72% worked in an urban setting, 80% had been in practice for ≥ 5 years, and 85% were primarily hospital-based. Physician PT referral practices are shown in Tables 1a (inpatient) and 1b (outpatient). Only 26% of surveyed PC "always or almost always" referred post-operative cardiac patients for inpatient PT, and only 10% for outpatient PT. In addition, 33% and 41% of PC stated they "never" or "rarely" refer for inpatient PT or outpatient PT, respectively. Rate of referral for both inpatient and outpatient PT were the same across urban, rural, and suburban settings. However, those who spent more hours teaching per week were significantly more likely to refer for both inpatient PT ($\beta = 0.27$, $p = 0.006$) and outpatient PT ($\beta = 0.17$, $p = 0.03$).
Conclusion(s) Research has indicated PT as standard of care for adult post-operative patients. However, given the low rates of referral to pediatric PT found in this study, it is imperative that more research investigate the potential benefits of PT for post-operative pediatric patients.

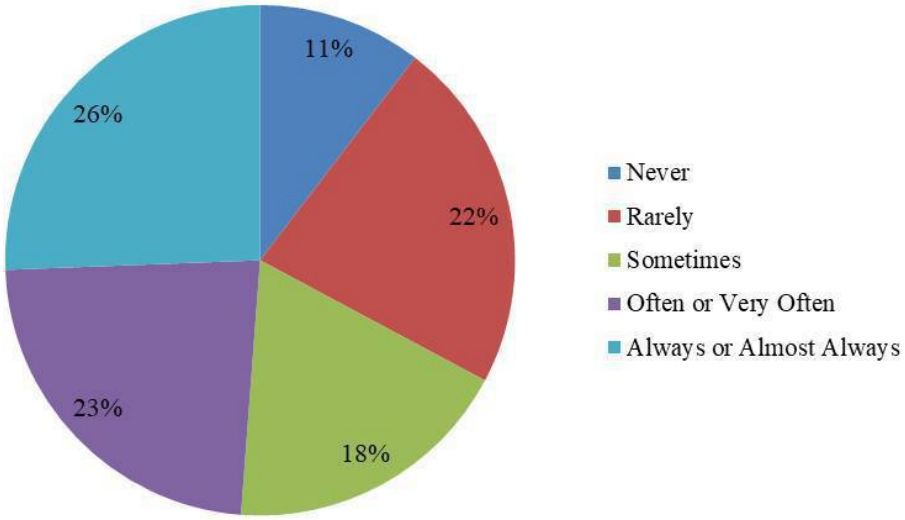

Table 1a. Responses to Question: For patients who require or had significant cardiac surgery, how often do you or your staff refer patients post-operatively for in-patient physical therapy?

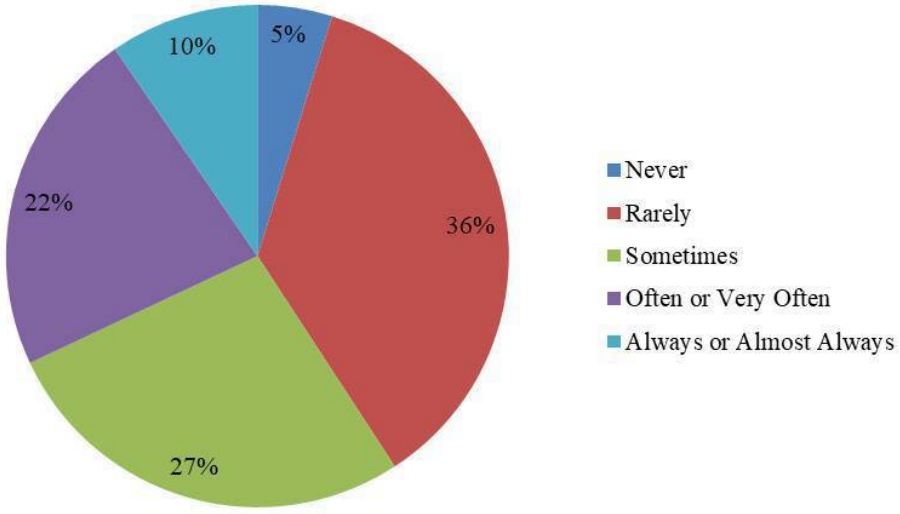

Table 1b. Responses to Question: For patients who require or had significant cardiac surgery, how often do you or your staff refer patients post-operatively for out-patient physical therapy?

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Abstract: 341
NEONATAL PERMEABILITY TRANSITION PORE CLOSURE IS ASSOCIATED WITH INCREASED CARDIAC FUNCTION
Ryan E. Alanzalon, Gisela Beutner, George A. Porter
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Background Recent studies have shown that embryonic myocytes have less active mitochondria and an immature cellular structure. In addition, the neonatal heart appears to be more closely related in structure to the embryonic/fetal heart with progressive differentiation into its mature form over time. Mitochondria appear to regulate these changes during the neonatal transition. The closure of the mitochondrial permeability transition pore (PTP), by pharmacologic or genetic inhibition of Cyclophilin D (CyPD), is associated with differentiation in cultured neonatal myocytes (in vitro). Pharmacologic inhibition can be achieved utilizing a widely available medication, Cyclosporin A (CsA), as well as a related analogue (NIM811). Thus, we sought to evaluate CyPD inhibition's effect on in vivo cardiac function.
Objective We hypothesized that closure of the mPTP in the neonatal mouse heart will increase cardiac function by enhancing myocyte differentiation and maturation without longer-term deleterious effects.
Design/Methods One-day-old WT or CyPD null mice were treated with daily intraperitoneal injections of vehicle (inert), CsA, or NIM811 for five consecutive days. At six days old and weanling, the mice underwent echocardiography to evaluate ejection fraction (EF), a measure of cardiac function. Hearts were then harvested for further biochemical analysis. In addition, a WT treated cohort was maintained until three months of age to assess cardiac function and longer term effects.
Results WT mice treated with CsA or NIM811, as well as CyPD null mice, had significantly higher EF at six-days-old ($P<0.0001$) compared to WT untreated or vehicle-treated mice. At both weanling and three months of age, vehicle, CsA, and NIM811 mice showed no difference in EF; all mice survived to the respective time-point. Biochemical evaluation involving assays of electron transport chain function and structure remain ongoing.
Conclusion(s) Our results demonstrate that PTP closure in the neonatal mouse heart is associated with increased EF. Our most recent data suggests that there is no clinical difference in EF at both weanling and three months of age across the cohorts. This suggests that PTP closure enhances the neonatal transition to a more differentiated myocardium leading to an earlier-onset of higher ejection fraction usually observed in mature animals without overt longer-term deleterious effects.
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Abstract: 342
Improved Utilization of the AHA 14-Element Guideline to Preparticipation Physical Exam to Prevent Sudden Cardiac Death in the Pediatric Population
Priya Misra, Christa Miliaresis, Robin Altman, Michael Gewitz
Pediatrics, Westchester Medical Center/Maria Fareri Children's Hospital, Valhalla, New York, United States

Background The AHA and AAP have agreed on a 14-element guideline for preparticipation physical exam (PPE) screening in pediatric patients who participate in physically intense activities in order to prevent sudden cardiac death. This provides a standardized and proven approach to these patients, ensuring them a thorough evaluation. A recent survey of pediatricians in the greater Westchester area noted that only 24% of practitioners who perform PPE were aware of the 14-element guideline for cardiovascular screening of competitive athletes. This raises concern that these student-athletes are not receiving the necessary evalution prior to engaging in physically intense activities.
Objective Our goal is to increase the use of this 14-element guideline for PPE by local Pediatricians in Westchester, NY and to study the change that arises both in sports participation and in patient referrals to Pediatric Cardiology for further evaluation. We hope to create a template in NextGen, the EMR for these practices, that will automatically offer the 14 elements when a physician indicates that a patient participates in sports.
Design/Methods Initial methods include collecting baseline data on patients who participate in competitive sports, and the number of elements that were evaluated during their PPE according to the AHA guidelines. Afterwards, we will provide local pediatricians with a checklist of all 14 elements that nurses and physicians can use during their PPE. We will measure the rates of referrals before and after implementing the checklist, and study whether this difference increased the identification of at-risk patients. We will compare the incidence of pediatric heart disease diagnosed through these referrals, and study whether participation in sports was positively impacted through proper evaluation.
Results Analysis of baseline data for 200 patients shows an average of 4 elements being addressed, the most common being history of chest pain or syncope, and the presence of murmur and femoral pulses. BP was commonly recorded but rarely addressed and elements like Marfanoid features, and history of murmur and elevated BP were never evaluated. The highest score was 7 and the lowest was 2.
Conclusion(s) Analysis of preliminary data shows a great need to improve use of the AHA guidelines. Our checklist has already been circulated to local pediatricians and final data on another 200 patients will be analyzed by March 2018. We hope to increase the average score to at least 10.
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Abstract: 343

Pulmonary Artery Acceleration Time Inversely Correlates with Invasive Mean Pulmonary Artery Pressure in Infants Less Than One Year of Age

Jessica S. Gaulton[1], Laura Mercer-Rosa[2], Andrew C. Glatz[2], Erik A. Jensen[1], Maria V. Fraga[1], Jason Z. Stoller[1]
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Background Standard echocardiographic measures of pulmonary hypertension (PH) in infants do not always correlate with invasive pulmonary hemodynamic measures. Preterm infants with bronchopulmonary dysplasia (BPD) are at high risk of developing PH. Pulmonary artery acceleration time (PAAT) measured by echocardiography has been shown to inversely correlate with pulmonary artery pressure (PAP) and pulmonary vascular resistance (PVR) in adults and children older than one year of age. This relationship has not yet been studied in infants, particularly among preterm infants.
Objective To measure the correlation between PAAT by echocardiography and PAP and PVR by cardiac catheterization among a cohort of infants without critical congenital heart disease.
Design/Methods Patients ≤12 months of age with an echocardiogram within 10 days of cardiac catheterization performed at the Children's Hospital of Philadelphia between 2011 and 2017 were reviewed. Infants with congenital heart diseases other than PDA, ASD, and VSD were excluded. Linear regression analysis was used to assess the correlation between echocardiography-derived PAAT and cardiac catheterization-derived systolic PAP (sPAP), mean PAP (mPAP), and indexed PVR (PVRi). Models were adjusted for right ventricular ejection time (RVET) to account for heart rate.
Results Fifty-eight patients met the inclusion criteria. Twenty-seven infants (47%) were male. The gestational age at birth and birthweight were 32 5/7 ± 6 1/7 weeks and 1,949 ± 1,215 grams (mean ± SD), respectively. The postmenstrual age and weight at catheterization were 53 3/7 ± 13 2/7 weeks and 4,834 ± 1,947 grams (mean ± SD), respectively. Forty-four infants (76%) had a PDA, 8 had a VSD, and 4 had an ASD. The time between echocardiogram and catheterization was 4 ± 3 days (mean ± SD). 64% of infants were preterm and 48% had a diagnosis of BPD. The PAAT inversely correlated with mPAP, sPAP, and PVRi. After controlling for RVET, the relationship between PAAT and mPAP remained statistically significant but the relationships between PAAT and sPAP and PVRi did not.
Conclusion(s) Lower PAAT by echocardiography is associated with higher invasive mPAP in infants less than one year of age. Additional non-invasive measures of PH may avoid the need to perform more invasive or costly procedures. PAAT may offer a reliable non-invasive tool for screening and monitoring of PH in term and preterm infants, but its diagnostic utility needs further exploration.

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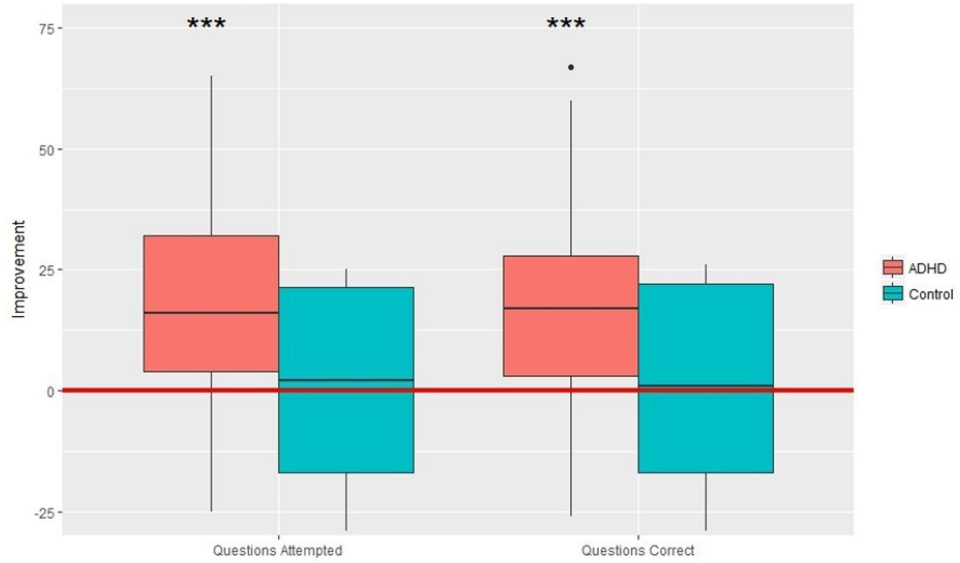
Abstract: 344

Impact of Beta Binaural Beats on Academic Performance of Children with Attention Deficit/Hyperactivity Disorder

Jay Shah, Prithwijit Das, Meng'ou Zhu, Sharnendra K. Sidhu, David Rapoport, Ruth L. Milanaik
Division of Developmental and Behavioral Pediatrics, Cohen Children's Medical Center, Locust Valley, New York, United States

Background Neurons communicate through synchronized electrical impulses, known as brainwaves, which vary in frequency and include alpha, beta, delta, gamma, and theta. Beta brainwaves (BW) are associated with attention and engagement. Research has shown that children with Attention Deficit/Hyperactivity Disorder (ADHD) have lower levels of BW. Therefore, enhancing the frequency of BW may lead to increased alertness. One proposed mechanism of augmenting BW is through the use of binaural beats: auditory wave interference created when two distinct frequencies are presented in opposing ears. To date, no study has investigated the effect of beta binaural beats (BBB) on student performance on academic tasks.
Objective To evaluate the effects of BBB on attention to task of students with and without ADHD, and assess students' perceived focus and performance with and without BBB.
Design/Methods Students (8-18 years), ADHD and control, were recruited to take randomized and modified versions of the Permanent Product Measure of Performance (PERMP), a math test, and Guilford's Alternative Uses Task (GAUT), a creativity assessment, under timed conditions. Baseline tests were distributed first without BBB, then with BBB. Paired t-tests were used to determine whether there was significant improvement using BBB within and between ADHD and control groups. At the end of each test, participants evaluated their perceived performance and focus on a 5-point scale (1=Not Well, 5=Very Well), and reported their preferred testing conditions.
Results Overall, 56 students (45 ADHD, 11 control) participated in the study; 75% male; 80% white, 7% Asian, 4% black, and 9% other; 7% Hispanic/Latino. ADHD subjects using BBB showed significant improvement on the PERMP ($p<.05$, Figure 1) and in two GAUT metrics ($p<.05$, Figure 2) while the controls did not. Higher self-assessment ratings of focus and performance were observed among both groups of students when listening to BBB ($p<.001$). Over 50% of students preferred using BBB, with 80% reporting that they performed better under these testing conditions.
Conclusion(s) Students with ADHD performed significantly better on math and select creativity tasks when using BBB. Additionally, when listening to BBB, most students reportedly felt more focused and confident in their academic performance. While the preliminary results of this pilot study are promising, more research is needed to further evaluate the potential of BBB as a supplementary tool to help children with ADHD focus in various settings.

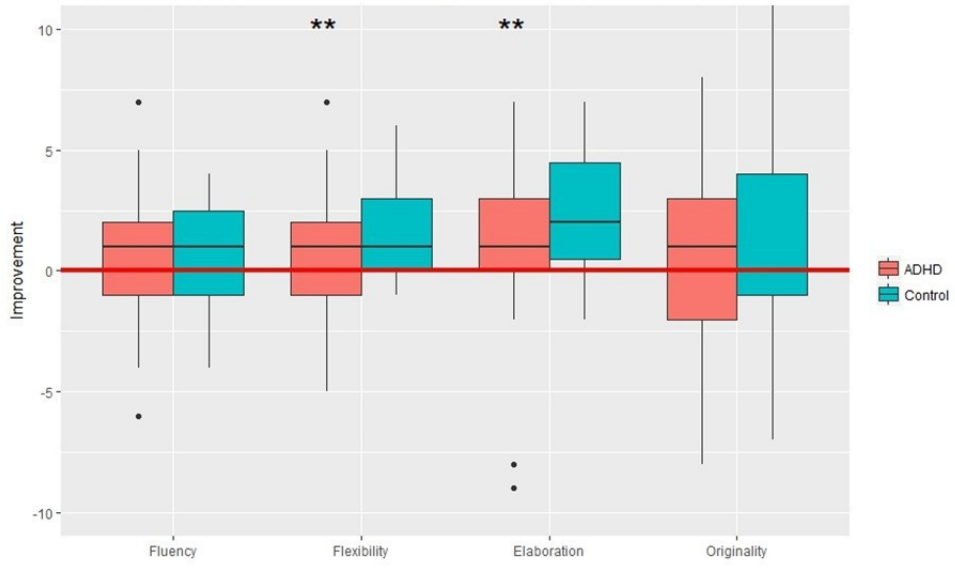
Figure 1. Improvement on the modified Permanent Product Measure of Performance (PERMP) among students with and without ADHD using beta binaural beats (BBB).



***Statistically significant difference from baseline (p<.01)

Figure 1. Improvement on the modified Permanent Product Measure of Performance (PERMP) among students with and without ADHD using beta binaural beats (BBB).

Figure 2. Improvement on the modified Guilford's Alternative Uses Task (GAUT) among students with and without ADHD using beta binaural beats (BBB).



***Statistically significant difference from baseline (p<.05)

Figure 2. Improvement on the modified Guilford's Alternative Uses Task (GAUT) among students with and without ADHD using beta binaural beats (BBB).

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Abstract: 345

Outcomes of Neonates with Mild Encephalopathy Who Underwent Therapeutic Hypothermia Are Comparable to Those with Moderate Encephalopathy

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Background Therapeutic hypothermia (TH) has been shown to reduce neurodevelopmental (ND) deficits in neonates presenting with moderate and severe hypoxic ischemic encephalopathy (HIE). Recent reports suggest that neonates with mild HIE may also be at risk

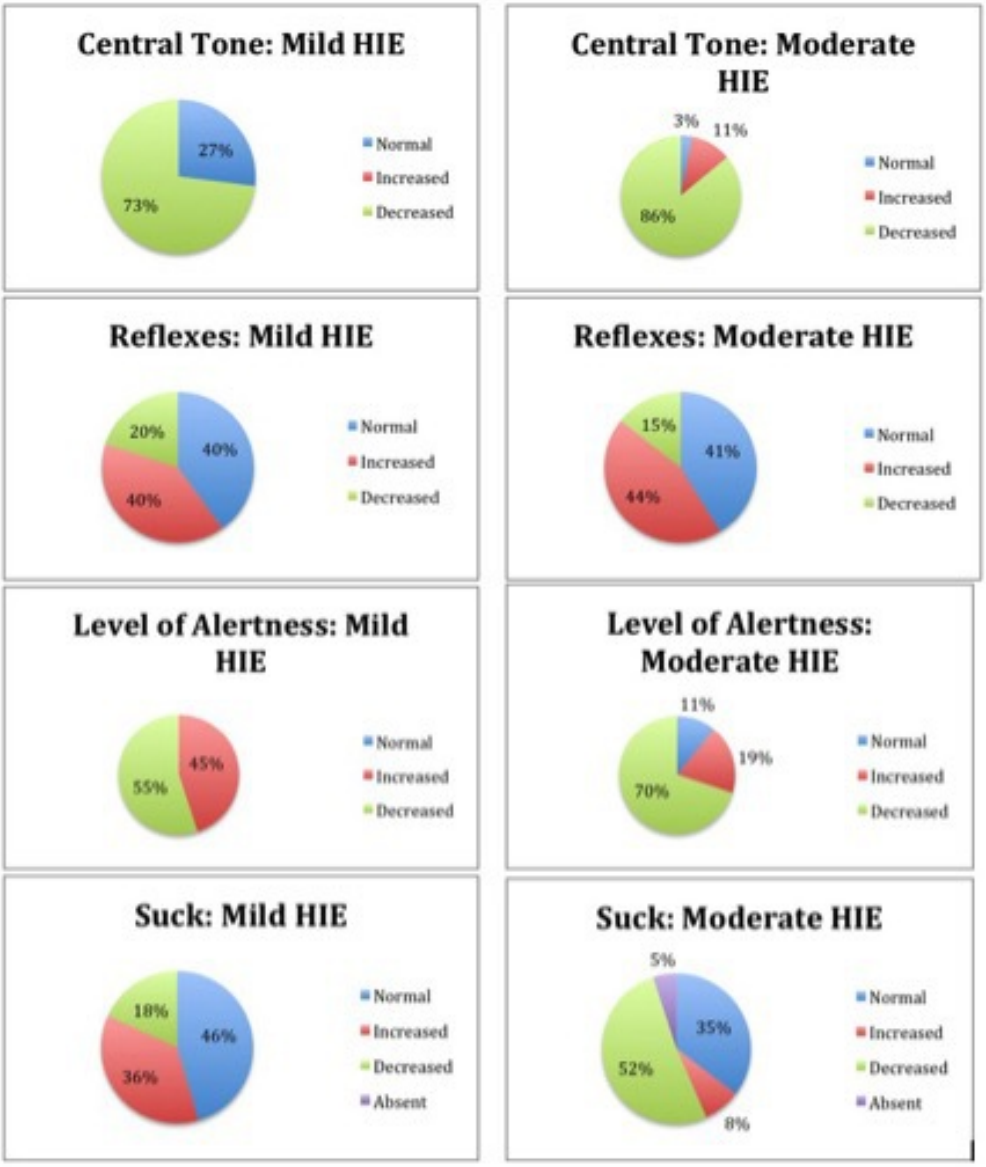
for adverse ND outcomes, raising questions as to potential benefit of TH in this group. Since 2011, we have performed TH on neonates presenting with mild HIE.

Objective To describe the characteristics, short term clinical and long term ND outcomes among neonates with mild vs moderate HIE who underwent TH.

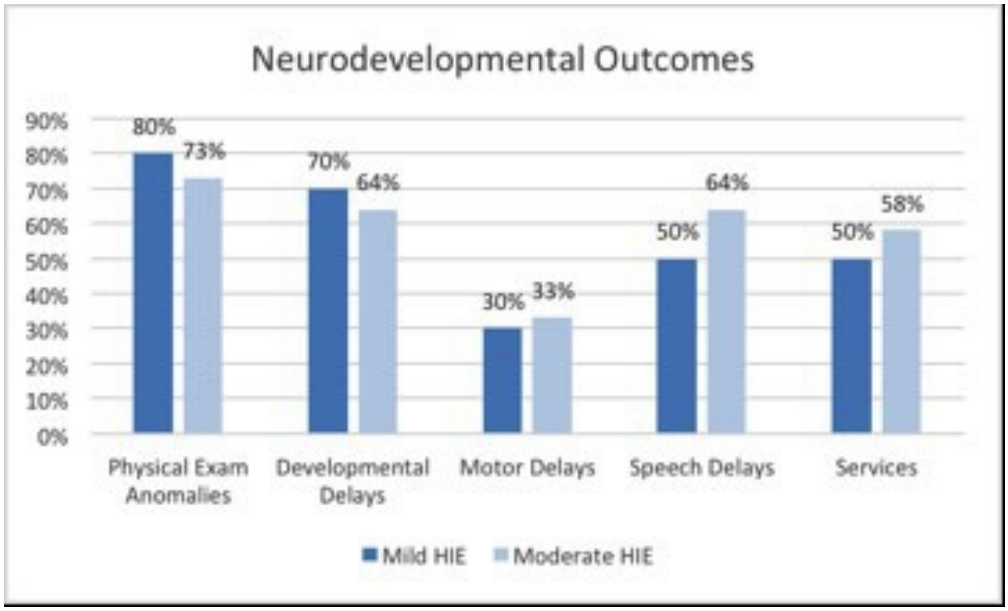
Design/Methods A retrospective chart review looked at infants with mild and moderate HIE who underwent selective head cooling (SHC) between 2011-2017 at New York Presbyterian Hospital. Demographics, clinical characteristics, EEG and MRI findings, and developmental outcomes were included. Eligible candidates for TH have a combination of at least 3 findings including a sentinel event, need for resuscitation at birth, cord arterial pH < 7.00, and base deficit (BD) > -12. Mild encephalopathy was based on some of the following: hyperalertness, subtle mouthing or eye movements, weak suck, central hypotonia and hyperreflexia. The study was IRB approved.

Results 11 infants with mild and 37 with moderate HIE were included. Both groups presented with similar perinatal and postnatal characteristics except the cord arterial pH (6.84±0.13 vs 7.01±0.20, p=0.01) and BD (-17.7±5.5 vs -12.8±6.8, p=0.02) were lower in the mild vs moderate HIE group (Table 1). Clinical seizures (Sz) upon enrollment were seen in 0/11 vs 9/37 (p=0.09) with mild vs moderate HIE. Evolution to clinical Sz during SHC was seen in 4/11 (36%) vs 16/37 (43%) (p=1.0) and aEEG Sz in 6/11 (55%) vs 19/37 (51%) (p=1.0) with mild vs moderate HIE. No infant in either group had bilateral basal ganglia injury on MRI. Developmental findings at 18 months for the mild vs moderate HIE groups included: normal 20 vs 28%, mild motor delays 30 vs 34%, speech delays 50 vs 65% and requiring services 50 vs 56% (Figure 2).

Conclusion(s) This report supports the growing evidence that some infants who present with mild HIE in the context of a constellation of findings culminating in perinatal depression progress to moderate encephalopathy during TH. Such infants may progress to adverse long term ND outcomes, at rates that are comparable to those with moderate HIE. It is incumbent upon providers to develop criteria for defining mild encephalopathy in the context of perinatal hypoxic ischemia.



Initial neurologic examination at the time of initiation of therapeutic hypothermia.



Neurodevelopmental outcomes. 10 out of 11 patients in the mild HIE group and 33 out of 37 in the moderate HIE group were followed in our Neurodevelopment Clinic after discharge. Follow up typically starts at 3-4 months post discharge, continuing until 6+ years of age. Services include: physical therapy, occupational therapy, speech therapy, and applied behavior analysis therapy.

Baseline maternal, perinatal and neonatal characteristics and demographics

	Mild HIE (n=11)	Moderate HIE (n=37)	P Value
Maternal / Perinatal Characteristics			
Maternal age (years)	30.5 ± 7.2	30.7 ± 7.5	0.94
Chorioamnionitis	3 (27)	4 (11)	0.33
Abnormal fetal heart rate tracing	6 (55)	20 (54)	1.00
Meconium stained amniotic fluid	5 (45)	9 (24)	0.26
Placental abruption	1 (9)	6 (16)	1.00
Uterine rupture	1 (9)	1 (3)	0.41
Vaginal delivery	3 (27)	13 (35)	0.73
Cesarean section	1 (9)	8 (22)	0.66
Emergent cesarean section	7 (64)	16 (43)	0.31
Neonatal Demographics			
Birth weight (gram)	3297 ± 470	3219 ± 544	0.67
Gestational age (week)	40.2 ± 1.5	39.3 ± 1.6	0.10
Male	6 (55)	23 (62)	0.73
Outborn	9 (82)	28 (76)	1.00
Neonatal			

Resuscitation			
Positive pressure ventilation	11 (100)	35 (95)	1.00
Intubation	10 (91)	31 (84)	1.00
Chest compressions	2 (18)	11 (30)	0.70
Epinephrine	1 (9)	5 (14)	1.00
Apgar score			
5 minute Apgar ≤ 5	10 (91)	28 (76)	0.41
10 minute Apgar ≤ 5	4 (36)	16 (43)	1.00
Blood gas			
Arterial cord pH	6.84 ± 0.13 (10)	7.01 ± 0.20 (30)	0.01
Arterial cord base deficit	-17.7 ± 5.5 (8)	-12.8 ± 6.8 (26)	0.02
Initial postnatal pH	7.04 ± 0.13	7.08 ± 0.16	0.07
Initial postnatal base deficit	-19.1 ± 5.2	-17.0 ± 5.9	0.11
Initial postnatal lactate	10.8 ± 4.9 (10)	11.0 ± 5.2 (36)	0.91

Data is presented as mean +/- s.d. (n) or n (%).

Hospital Course and Clinical Outcomes

	Mild HIE (n=11)	Moderate HIE (n=37)	P Value
Clinical seizures at enrollment (hours)	0 (0)	9 (24)	0.09
Age at enrollment (hours)	4.5 ± 0.8	4.4 ± 1.3	1.00
Clinical seizures	4 (36)	16 (43)	1.00
EEG seizures	6 (55)	19 (51)	0.56
MRI abnormalities	4 (36)	20 (54)	0.49
Discharge vEEG abnormalities	5 (45)	17 (46)	1.00
Discharge physical exam abnormalities	2 (18)	15 (41)	0.28

Data is presented as n (%). Evidence of EEG seizures reflects seizures seen on amplitude integrated electroencephalography or video electroencephalography. Abbreviations: MRI: magnetic resonance image, EEG: electroencephalography, vEEG: video electroencephalography.

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Abstract: 346

Effects of Therapy Putty Usage on Academic Performance and Perceived Attention to Task in Students with ADHD

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Background Therapy putty (TP) has been promoted as an effective self regulation tool for children with attention deficit/hyperactivity disorder (ADHD). Putty manufacturers claim that manipulating TP provides “heavy sensory input” allowing ADHD children to take focus off sensory needs and onto tasks at hand. To date however, no studies have examined the validity of these claims pertaining to the efficacy of TP on student academic performance.
Objective To assess the impact of TP usage on task completion and accuracy of students with/without ADHD, and examine student perceptions regarding the effect of TP on focus and performance estimates.
Design/Methods Students (n=81) aged 8-18 years (43 with ADHD [AS], 38 without ADHD [CS]) completed a 3-minute timed modified Permanent Product Measure of Performance (mPERMP), a skill-adjusted math test, and a Forward Digit Span Test (FDST), a listening test measuring recall ability, with/without TP. Parents reported demographics and rated their child’s academic performance. Subjects were randomized into 2 cohorts, which differed in the order of the tasks completed. Following successful completion of each task, subjects evaluated their focus and performance on a 10-point Likert Scale. A paired t-test was used to analyze the effects of TP.
Results Of the 81 subjects, 70% identified as male; 52% White, 28% Asian, 10% Black, and 10% other; 90% Non-Hispanic/Latino. Mean age of AS was 11.7 years (SD: 2.5); mean age of CS was 10.8 years (SD: 2.3). 62% of parents believed their children were academically performing in the “average” range. Table 1 depicts performance on the mPERMP and FDST with/without TP usage. Table 2 shows participants’ mean focus and performance scores for both tests with/without TP usage. All p-values correspond to a 95% confidence interval.
Conclusion(s) For all subjects, TP usage was significantly associated with lower mPERMP completion and accuracy scores as well as lower mean perceived focus and performance ratings. While students with ADHD showed significant FDST accuracy score improvement with TP, there was no significant impact on mean perceived FDST focus or performance ratings. Our study suggests that ADHD students may benefit from TP usage with listening tasks only although more research is needed to support this finding. All therapies that are intended for classroom use by ADHD students should be thoroughly studied prior to implementation as these intended therapy tools may actually pose a distraction to students and lead to lower academic success.

Table 1. Performance on the modified Permanent Product Measure of Performance (mPERMP) and Forward Digit Span Test (FDST) of students with and without ADHD using and not using therapy putty (TP).

	mPERMP						FDST			
	Completion Score	p-value	Accuracy Score	p-value	Completion + Accuracy Cumulative Score	p-value	Accuracy Score	p-value	Digit Span Length Score	p-value
ADHD Without Putty	96.7	.02*	96.3	.01*	193.0	.02*	9.0	.03*	6.0	.06
ADHD With Putty	87.8		86.9		174.6		9.6		6.2	
Control Without Putty	105.2	.03*	104.2	.03*	205.2	.03*	9.3	.62	6.0	1.0
Control With Putty	98.4		97.7		191.9		9.4		6.0	

*P-value is statistically significant.

Table 1. Performance on the modified Permanent Product Measure of Performance (mPERMP) and Forward Digit Span Test (FDST) of students with and without ADHD using and not using therapy putty (TP).

Table 2. Perceived focus and performance rating on the mPERMP and FDST among students with and without ADHD who used and did not use therapy putty (TP).

	mPERMP				FDST			
	Mean Focus	p-value	Mean Performance	p-value	Mean Focus	p-value	Mean Performance	p-value
ADHD Without Putty	8.56	.02	8.91	<.01	7.91	.38	8.60	.05
ADHD With Putty	7.90		7.67		8.16		8.00	
Control Without Putty	7.74	.10	8.08	<.01	7.79	.65	8.29	.05
Control With Putty	7.30		7.03		7.97		7.55	

Table 2. Perceived focus and performance rating on the mPERMP and FDST among students with and without ADHD who used and did not use therapy putty (TP).

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Abstract: 347

Evaluating patient satisfaction with a multidisciplinary home visiting program for children with special needs

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Background The Pediatric Visiting Doctors and Complex Care (PVD) Program is a pediatric home visiting program for children with special needs within an academic medical center. The program provides comprehensive primary care at patients’ home and has been associated with decreased utilization in ER visits and hospitalizations. As Medicaid transitions from fee-for-service to value-based

care, it is important to identify successful elements of such pilot programs that can be applied to other practices.
Objective The purpose of this study was to evaluate patient satisfaction and understand the strengths and weaknesses of the program from the patients' perspective.
Design/Methods A survey with both qualitative and quantitative components assessed patient satisfaction. Satisfaction was qualitatively measured using open-ended questions, and quantitatively measured using a five-question survey using a Likert scale. Net Promoter Score (NPS) was used to calculate patient satisfaction. Surveys were conducted in person in English and Spanish and then transcribed. Thematic coding of qualitative portion was done by two investigators.
Results Over 200 patients have been enrolled in the program including children with poorly controlled asthma, infants discharged from the NICU and children with medical complexity. Twenty-five interviews were conducted in a nearly consecutive manner and included 3 asthma patients, 8 NICU graduates and 14 medically complex patients. All families approached consented to the study and thematic saturation was achieved. The NPS was 94.44 out of 100 and almost all (98.6%) patients were extremely likely to recommend the practice to others. Most (88.2%) preferred the home delivery model of care. The majority of families (88.6%) felt that they could access their care team easily. Qualitatively, some of the themes identified by families as elements of success for the program were convenience of home visits ("it takes away the stress…I don't have to go anywhere"), enhanced care coordination, increased patient education, and patient-centeredness ("better relationship than with any of her other pediatricians").
Conclusion(s) Caregivers were extremely satisfied with the PVD program and the majority preferred receiving care at home compared to the clinic. For children with special needs, innovative approaches o care delivery such as this program are key to providing high quality care. Future plans include tracking total costs of care and other health outcomes.

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Abstract: 348

Gender Disparities in Wandering Prevention and Response Planning for Children with Autism Spectrum Disorders

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Background Although wandering, or elopement, endangers the lives of both girls and boys with autism spectrum disorders (ASDs), a 2017 study published by the National Autism Association reported that wandering incidents in which the eloper was female were more likely to end in death[1]. Given their increased mortality risk, proactive implementation of wandering prevention and response measures (WPM) for girls with ASDs is essential.
Objective To characterize the use of WPM in girls with ASDs and to determine whether WPM use differs according to gender in the ASD population.
Design/Methods In the largest study of wandering prevention in the ASD population to date, 1613 parents of children with ASDs between the ages of 4 and 18 completed a detailed questionnaire about their child's wandering history and their use of WPM, including electronic tracking devices (ETDs) and other interventions such as physical barriers (gates, locks, alarms), identification methods (bracelets, temporary tattoos) and behavioral interventions (social stories, visual prompts). Chi-square tests were used to compare WPM use between girls and boys.
Results 20.7% of respondents (n=334) had a female child with ASD. Although the majority of parents, regardless of child gender, utilized one or more WPM, parents of girls were significantly less likely to report current use of an ETD for their child (18.6% vs. 25.2%; p=.012) or to have utilized at least one other intervention to mitigate wandering risk in the previous 12 months (85.9% vs. 91.3%; p=.003). Preparatory measures aimed at facilitating child recovery in the event of a wandering incident were also implemented less frequently for girls; an emergency contact plan or family wandering plan was in place for just 26.4% of girls, compared to 32.5% of boys (p=.032). Use of swimming lessons to prevent drowning in the event of a wandering incident did not differ between girls and boys (33.8% vs. 34.5%; p=.824).
Conclusion(s) In this large, national sample of children with ASDs, girls were less likely than their male peers to have several types of WPM in place. Given that wandering incidents involving girls are more likely to be fatal, rectifying this disparity is essential to ensure the safety of this vulnerable group of children.

[1]National Autism Association. "Mortality & Risk in ASD Wandering/Elopement 2011-2016." March 2017.

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Abstract: 349

Too Cool for School: Examining Portrayals of Academics in Children's Television Programming

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Background Studies examining the influence of commercials on children's food preferences have demonstrated how media shapes youth perceptions and behaviors. Consequently, it's important to consider how other aspects of children's lives, such as academics, may be influenced. For every 3 hours that children spend in school, 5 hours are spent watching TV. Thus, it is possible that academic depictions (AD) in TV content may affect children's attitudes towards school and learning. To date, little research has been done to evaluate AD in children's TV programming (CTP).
Objective This study aims to investigate the portrayal of academics in popular CTP through the documentation of academically-

focused activities and traits exhibited by characters in the shows.
Design/Methods Ratings of currently airing CTP were used to identify the 30 most popular U.S. shows. Two 30-minute episodes of each show were randomly selected for viewing. Inter-rater reliability was tested prior to data collection. CTP were examined for # of AD, overall attitude towards academics (positive, neutral, negative), teacher portrayals (outgoing/friendly, willing to help, neutral, assigns large workload, mean), character attitude towards academics (diligent-enthusiastic, diligent-unenthusiastic, neutral, inattentive-indifferent, inattentive-rebellious), and stereotypical student depictions (popular-pretty, socially-awkward, nerdy-uncool, athletic-cool). A linear regression was done to assess the overall portrayal of academics based on recommended age of viewers as provided by the parent network.
Results Overall, 40% of episodes contained AD. Overall AD episode attitudes are shown in Figure 1A. Teacher portrayals are shown in Figure 1B. CTP character attitudes towards academics are shown in Figure 1C. Stereotypical depictions of students are presented in Figure 1D. As the recommended age of viewers increased, the overall portrayal of academics became more negative (β= -0.256, $p<.001$).
Conclusion(s) Many CTP episodes examined in this study negatively depicted academics in shows geared towards older children. In contrast, shows aimed at a younger demographic depicted a much higher proportion of enthusiastic learners and a positive attitude towards academics. As TV content can be profoundly impactful on youth, these depictions may cause children to reflect negatively on future academic experiences and possibly diminish enthusiasm for learning. Pediatricians and educators should encourage more positive portrayals of academics in CTP.

Table 1. Characteristics of currently airing children's TV programming (CTP).

Table 1A. Overall attitudes towards academics in CTP episodes.

Overall Attitudes Towards Academics	Percentage (n=54)
Positive	46%
Neutral	21%
Negative	33%

Table 1B. Teacher portrayals in CTP episodes.

Portrayals of Teachers	Percentage (n=34)
Outgoing/friendly with students	23%
Willing to help students	32%
Neutral	12%
Assigns large workload	21%
Mean to students	12%

Table 1C. Attitudes of CTP characters towards academics in episodes.

Character Attitudes Towards Academics	Percentage (n=54)
Diligent-Enthusiastic	56%
Diligent-Unenthusiastic	20%
Neutral	9%
Inattentive-Indifferent	4%
Inattentive-Rebellious	11%

Table 1D. Stereotypical depictions of students in CTP episodes.

Stereotypical Depictions of Students	Percentage (n=27)
Popular-Pretty	33%
Socially-Awkward	15%
Nerdy-Uncool	44%
Athletic-Cool	8%

Table 1. Characteristics of currently airing children's TV programming (CTP).

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Abstract: 350
Telling Your Child They Have Autism Spectrum Disorder: Barriers and Unmet Needs of Parents
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Pediatrics, Steven & Alexandra Cohen Children's Medical Center of New York, Lake Success, New York, United States

Background For parents of children with autism spectrum disorders (ASDs), deciding whether and how to tell a child or young adult that he or she has ASD may be a challenging process, compounded by the communicative and social deficits associated with this condition. The extent to which parents of children with ASDs receive information, support, or advice (ISA) – from physicians and other resources – about disclosing the diagnosis from to their child has not previously been examined.
Objective To characterize the challenges and concerns faced by parents who are considering talking to their youth with ASD about the diagnosis, and to assess the adequacy of the ISA provided by professionals to parents during this process.
Design/Methods Parents of individuals with ASDs ages 8-25 were recruited via outreach to ASD advocacy and support groups from across the US. Respondents completed a detailed online questionnaire in which they reported whether they or others had ever told their child that he or she has ASD. All respondents completed additional questions about concerns they had regarding the disclosure process, the sources from which they received ISA about how to discuss the diagnosis, and sources from which they would have liked to receive more ISA.
Results 21% of the 117 parents had never discussed the ASD diagnosis with their child. Commonly cited concerns in this group – 50%

of whom were planning to inform their child of the diagnosis in the future – were that the child might not understand the diagnosis (92%) or that learning of the diagnosis would hurt the child's self-esteem (71%) or make them feel different (71%). Among those who had not discussed the diagnosis with their child, just 42% had received ISA from any source, compared to 63% of the parents who had disclosed the diagnosis to their child (Table 1; chi-square p = .06). Just 20% of all parents – including 21% of those who had disclosed the diagnosis to their child and 13% of those who had not -- had received ISA from a physician or other medical professional. The majority of all parents (67%) expressed a need for more ISA from at least one source, with 39% specifying a desire to receive greater ISA from a medical professional.
Conclusion(s) Although the majority of parents of youth with ASD had discussed the diagnosis with their child, less than half received ISA from a medical professional, and the overwhelming majority wanted more ISA in general. Physicians are not currently meeting the needs of parents confronting this challenging process.

Table 1. Sources of information, support, or advice regarding disclosure of an ASD diagnosis that were identified by parents of children with ASD

Source	All respondents (n = 115)	Discloser Group* (n = 91)	Non-Discloser Group* (n = 24)
Any Source	**58.4%**	**62.9%**	**41.7%**
Spouse or domestic partner	17.7%	23.6%	4.2%
Friend or family member	14.2%	16.9%	4.2%
Physician or other medical professional	19.5%	21.3%	12.5%
Other professional (therapist, social worker, teacher, or psychologist)	36.3%	41.6%	16.7%
Other parents of children with ASD	26.5%	27.0%	25.0%
Informational materials (internet resources, books, videos)	33.6%	37.1%	20.8%
Support groups	16.8%	16.9%	16.7%

* Parental receipt of information, support, or advice from numerous sources is compared for those who had previously discussed the ASD diagnosis with their child ("Discloser Group") and those who had not discussed the diagnosis with their child ("Non-Discloser Group"). Two respondents who were "not sure" whether they had discussed the diagnosis were excluded from analysis.

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Abstract: 351
Financial Barriers to Electronic Tracking Device Use among US Children with Developmental Disabilities at Risk of Wandering
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Background Wandering places children with developmental disabilities (CWDD) at risk of injury and death. Although electronic tracking devices (ETDs) may appeal to parents of CWDD concerned about wandering risk, these devices are often costly. If implemented, legislative measures that would allocate funding for ETDs, such as Kevin and Avonte's Law, could alleviate financial barriers to ETD use. However, the availability of financial assistance for families who cannot afford ETDs remains limited.
Objective To assess – in a large, national sample – the extent to which cost is a barrier to ETD use among US parents of CWDD, and to characterize wandering severity in CWDD who lack access to ETDs for financial reasons.
Design/Methods 1711 US parents of CWDD (autism spectrum disorder, intellectual disability, and/or developmental delay; ages 4-18) completed a detailed questionnaire about their child's wandering history and their use of wandering prevention measures, including ETDs. Non-ETD users were asked to select, from a list, all reasons why they did not use an ETD, such as cost, hassle, and/or lack of perceived need. Chi-square tests were used to compare families who identified cost as a barrier to ETD use ("CB" group) to those for whom cost was not a barrier ("non-CB" group).
Results 44% (n=523) of the 1191 families who had never used an ETD identified cost as a reason for non-use, of whom 33% cited cost as the only reason. The vast majority (95%) of children in the CB group had a history of wandering, and 54% were reported to have been at risk of serious injury due to wandering in the past 12 months. The family impact of wandering was high in the CB group, with most reporting that they had avoided participating in an activity (87%) or leaving the child under the supervision of another (80%) due

to wandering concerns. CWDD whose parents could not afford ETDs tended to exhibit more frequent wandering behavior than those for whom cost was not an issue, as evidenced by the finding that children in the CB group were more likely than those in the non-CB group to have wandered from home, a public place, or school/daycare/summer camp ($p<.05$ for all) in the previous 12 months.
Conclusion(s) Cost is a major barrier to ETD use among parents of CWDD, and those that are least able to afford ETDs may be among those who need them the most. Financial assistance, via legislation and expanded insurance coverage for ETDs, is urgently needed to safeguard CWDD from wandering-related morbidity and mortality.

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Abstract: 352

Prescription-Filling Patterns following Acute Asthma Exacerbations in an Inner-City Pediatric Emergency Department

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Background Asthma notoriously poses a tremendous health burden to the pediatric population of Bronx, New York, with prevalence among the country's highest. Ethnic minorities comprise the majority of the Bronx and studies show an inverse association between minority status and adherence to asthma medication regimens. Prescription-filling (Rx-F) represents a modifiable risk factor for non-adherence and can be objectively assessed by mining centralized pharmacy data. Little is known about the Rx-F habits of this distinct populace, with recent studies relying on self-reported patient data.
Objective This study aims to investigate the rate of Rx-F for pediatric asthmatic patients in a South Bronx community hospital Pediatric Emergency Department (PED) and evaluate subsequent risk for 72-hour re-presentation to the PED.
Design/Methods A retrospective chart review of a random sample of patients aged 0-21 years discharged from our PED with an acute asthma exacerbation (AAE) from January 1 to July 1, 2017, and e-prescribed both albuterol and oral steroids. Centralized pharmacy data was utilized to obtain the proportion of prescriptions (Rx) filled within 3 days of PED discharge, described as percentage proportions.
Results 739 patients were identified with AAEs. A randomized sample of 200 patients revealed that 64% (128/200) of patients filled both their albuterol and steroid Rx within 3 days; 10.5% (21/200) filled one Rx, and 25.5% (51/200) filled neither Rx. Oral steroids were more likely to be filled (71.4%) compared to albuterol (28.6%). Moreover, 81.8% (54/66) of Rx sent to the hospital's internal pharmacy compared to 70.9% (95/134) of those sent to an external pharmacy were filled. There was no statistical significance when comparing likelihood of Rx-F by pharmacy ($p=0.13$). Of the 6 patients who returned to PED within 3 days, 2 filled their Rx fully, 1 partially, and 3 not at all; there was no statistically significant difference between groups.
Conclusion(s) To our knowledge, the information collected here is the first of its kind pertaining to the culturally and behaviorally distinct Bronx community. Findings demonstrate Rx-F patterns amongst these patients that leave room for significant improvement. While statistical analysis is limited by population size and a low rate of 72hr re-presentation, we believe this pilot study lays the foundation for implementation of a quality improvement initiative with the potential to positively impact morbidity of pediatric asthmatics in the Bronx.

TABLE 1a: Prescription-Filling Within 3 Days from Discharge

	Fully (Albuterol + Corticosteroid)	Partially (Albuterol or Corticosteroid)	None
Number (out of 200)	128	21	51
%	64	10.5	25.5

TABLE 1b: Albuterol vs. Corticosteroid in Partially-Filled Prescriptions

	Albuterol only	Corticosteroid only
Number (out of 21)	6	15
%	28.6	71.4

TABLE 2: Likelihood of Prescription Filling by Pharmacy

	Hospital pharmacy	Other
# Prescriptions Filled	54	95
Total # Sent to Pharmacy	66	134
%	81.8%	70.9%

TABLE 3: Return to PED Within 72 Hours by Prescription-Filling Status

	Fully (Albuterol + Corticosteroid)	Partially (Albuterol or Corticosteroid)	None
Number (out of 6)	2	1	3
%	33.3	16.7	50

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Abstract: 353

Implementing IPASS (Illness' Severity, Patient Summary, Action List, Situation Awareness and Contingency Planning and Synthesis by Receiver) in Resident Sign-outs: A Resident Quality Improvement Initiative

Madhavi Lakkaraja, Marina Rubin, Diana Aschettino, Chionye Ossai, Qiyun Shi, Mahalakshmi Gopalakrishnamoorthy, Srinivasan Mani, Yin Htun, Kirollos Yousef, Ting-Chang Hseigh, Mary Augustian, Kusum Viswanathan, Fernanda Kupferman
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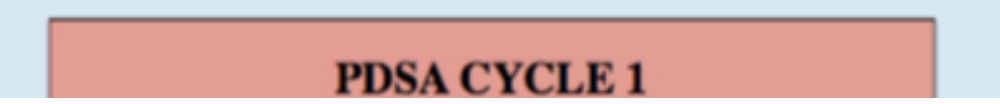
Background According to the Joint Commission, communication is the most common root cause of sentinel events. The frequency of handoffs has increased due to ACGME restriction of residents' duty hours. ACGME requires that residents acquire competence in teamwork, effective communication and safe hand-offs. Our institution utilizes the SBAR (Situation, Background, Assessment, Recommendation) handoffs technique. However, this system is not performed uniformly and often varies among hand-offs participants. The IPASS study was a landmark multi-site patient safety effort, found to improve physician handoffs communication and to reduce preventable medical errors.

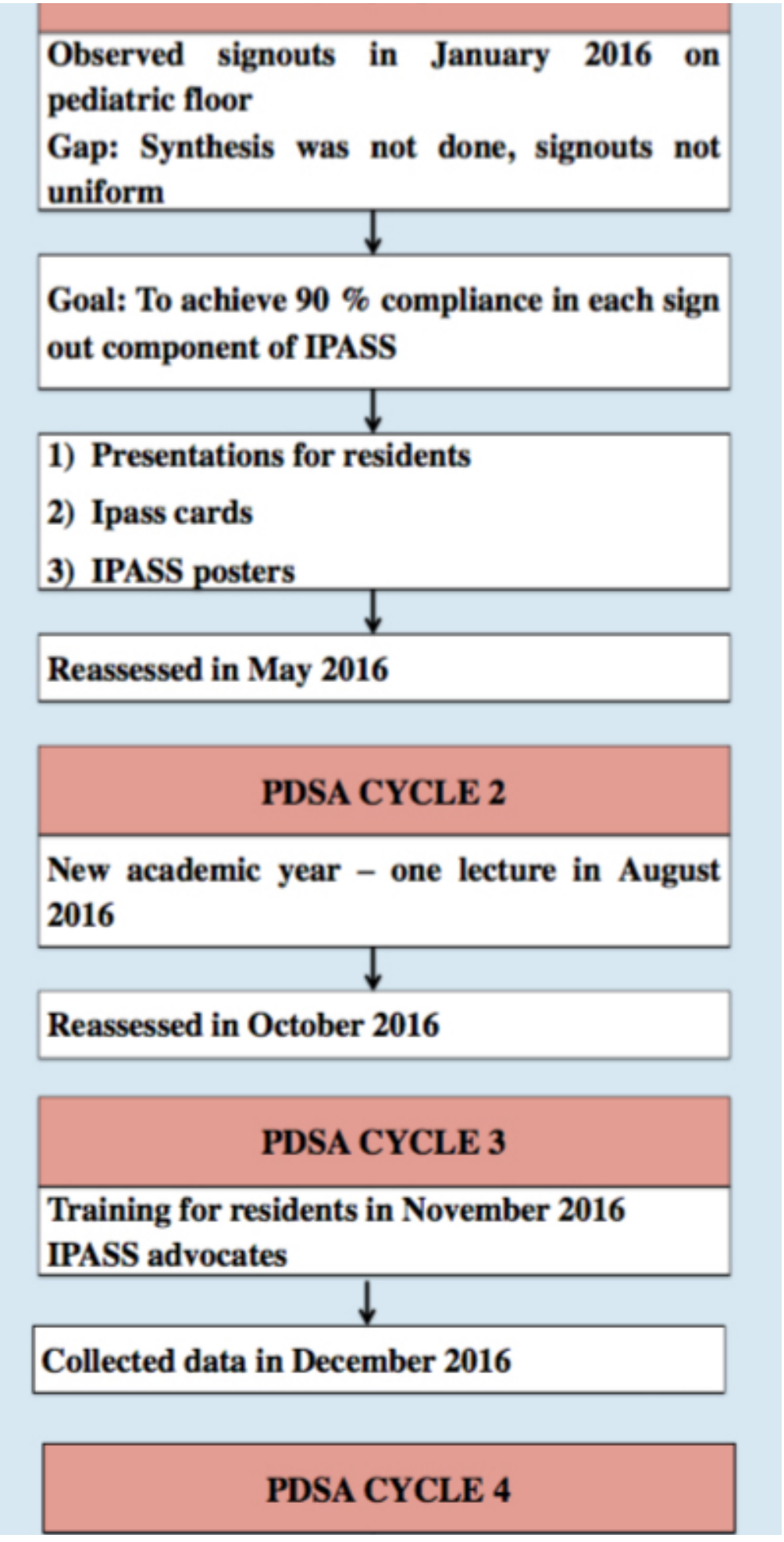
Objective To improve the effectiveness of handoffs communication utilizing the IPASS bundle.

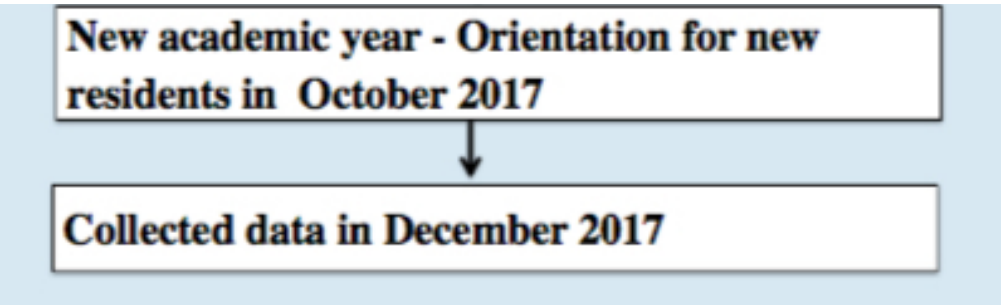
Design/Methods This was a resident-led quality improvement initiative in the Department of Pediatrics at Brookdale Hospital. Plan, Do, Study, Act (PDSA) cycles were implemented from January 2016 to December 2017 (Figure 1) to improve the effectiveness of resident sign-outs in our pediatric inpatient unit. A checklist was designed to measure whether pediatric residents appropriately implemented all the components of the IPASS bundle for an effective transition of care. Our goal was to achieve 90% compliance in each IPASS component. Strategies utilized included resident training, resident champions, IPASS cards and posters.

Results Four PDSA cycles were performed between January 2016 and December 2017. Baseline data included 100 sign-outs events. Synthesis by receiver increased from 0% to 90% after the first PDSA cycle (Table 1). The first cycle involved resident training and IPASS cards. Gradual improvements in signs-outs were observed between PDSA cycles. IPASS champions from different years of training (PL 1,2,3) were instrumental in improving compliance. A dip at the end of the second and fourth PDSA cycles was observed after the beginning of the new academic year.

Conclusion(s) This quality improvement initiative led by residents successfully achieved its goal for most IPASS components. Few specific areas turned to be more challenging. Future PDSA cycles should target these difficult areas. Simulation techniques will be implemented as the next strategy for improvement. Continuous reinforcement remains key to success.




Observed signouts in January 2016 on pediatric floor
Gap: Synthesis was not done, signouts not uniform
Goal: To achieve 90 % compliance in each sign out component of IPASS
1) Presentations for residents
2) Ipass cards
3) IPASS posters
Reassessed in May 2016
PDSA CYCLE 2
New academic year – one lecture in August 2016
Reassessed in October 2016
PDSA CYCLE 3
Training for residents in November 2016
IPASS advocates
Collected data in December 2016
PDSA CYCLE 4



PDSA Cycles between January 2016 and December 2017

Compliance in each of component of the IPASS in resident sign outs

FACTOR	Baseline (Jan 2016) (%)	Cycle 1 (May 2016) (%)	Cycle 2 (Oct 2016) (%)	Cycle 3 (Dec 2016) (%)	Cycle 4 (Dec 2017) (%)
Severity of illness (i.e. stable/watcher/unstable)	1	14	75	100	25
Summary Statement containing					
Name	99	100	100	91	100
Age	59	95	100	100	100
Gender	56	62	100	100	100
Past pertinent history	26	38	0	100	83
Reason for admission	73	95	100	100	100
Events leading to admission (in brief) (with physical examination and labs)	34	43	0	100	67
Hospital course including key events and updates	76	81	50	100	100
Highlights any special concerns (social/family/nursing/chronic conditions)	26	20	25	18	8
Assessment by problem/diagnoses	39	71	50	100	91
Plan for hospitalization by diagnoses	27	47	50	100	91
Action List /To do list	81	95	100	100	100
Timeline, priority and clearly assigned	6	14	25	36	100
Results to be reviewed	32	24	25	36	100
Situation awareness any specific things to keep in mind about patient, or team members or environmental factors	26	14	25	18	50
Clear Contingency plan	6	5	25	27	33
Synthesis by receiver	0	90	100	100	92
Questions by receiver	65	100	25	100	100

IPASS (Illness' Severity, Patient Summary, Action List, Situation Awareness and Contingency Planning and Synthesis by receiver)

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Abstract: 354

Ultrasound for Ankle Injuries in Children

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Background Ultrasound (US) is useful in the diagnosis of fracture, with ends of bones more difficult to assess with US. Ankle injuries are common, with sprains more common than fractures, and patients are often assessed with X-rays. The Ottawa ankle rules (OAR) reduce X-rays by 30%, and point-of-care ultrasound (POCUS) may further reduce X-rays for ankle injuries.

Objective To determine if POCUS can decrease X-rays in children with ankle injuries. Secondary objectives were to determine the test performance characteristics for ankle US compared to X-ray diagnosis of fracture, analyze diagnostic errors, and compare US, OAR, and US+OAR as a screening tool for ankle fractures.

Design/Methods This was a prospective study of children < 21 years presenting to a pediatric emergency department with an ankle injury requiring X-rays. Patients were excluded if they had a known fracture. Pediatric emergency medicine (PEM) physicians received a 1-hour didactic and hands-on training session on ankle US. Before obtaining X-rays, a PEM physician performed an ankle US using a linear 10-5 MHz transducer with a standardized scanning protocol including transverse and longitudinal views of the distal tibia and fibula and determined if the US was positive, negative, or equivocal for fracture. All patients received an ankle X-ray, and X-ray interpretation by a radiologist was the reference standard for fracture.
Results 90 patients with a mean age of 13.3 (+/- 4.0) years were enrolled by 4 PEM physicians. 7 (8%) patients had an ankle fracture on X-ray. 17 (19%) patients had a positive US, 60 (67%) patients had a negative US, and 13 (14%) patients had an equivocal US. 45 (50%) patients had open physes. 2 ankle fractures were missed by US, 1 intra-articular and 1 distal tibia spiral fracture, both in patients with open physes and neither required operative management. Ankle US had a sensitivity of 71% (95% confidence interval (CI) 29-96%), specificity of 70% (95% CI 59-79%), likelihood ratio (LR) + of 2.4 (95% CI 1.3-4.2), and LR- of 0.41 (95% CI 0.13-1.33). Ankle US would reduce X-rays by 60 (67%), missing 2 fractures; OAR would reduce X-rays by 13 (14%), missing 1 fracture; and US+OAR would reduce X-rays by 11 (12%), with no missed fractures.
Conclusion(s) In our study, POCUS of the ankle could not reduce X-rays in patients with open physes without missing fractures. POCUS and OAR alone missed fractures, but US+OAR missed no fractures at the expense of not being able to reduce X-rays. US may be useful for evaluating fractures of the ankle in patients with fused growth plates.

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Abstract: 355

Sudden Unexplained Infant Death Syndrome: Racial Disparities Persist After Education

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Background Educational programs are the primary approach to the prevention of Sudden Unexplained Infant Death Syndrome (SUIDs). Despite a statewide reduction in SUIDs (0.5 per 100,000 live births), the rate among Non-Hispanic Blacks (172 per 100,000 live births) remains disproportionately high. In our community, the rate of SUIDs among women who self-identified as Black remains even higher, at 190 per 100,000 live births.
Objective To determine if a family's knowledge about safe sleep after standardized education varied by race.
Design/Methods This is an ongoing prospective quality assurance project performed at an urban academic medical center with preliminary data from 10/2017 - 12/2017. A standardized approach to family SUIDs education was introduced one month prior to the study. At the time of infant discharge, families were interviewed about their knowledge of SUIDs. Associations between demographic factors and SUIDs knowledge were evaluated by Chi Square or Fisher exact test, as appropriate.
Results 86 patients were recruited; 43 were Non-Hispanic Black, 38 were Hispanic and 5 were of other ethnicities. Although only 56% of families recalled receiving SUIDs education prior to discharge, 95% reported the correct safe sleep position, 91% correctly answered questions about crib setup, and 95% reported an association between bed-sharing and SUIDs. Only 16% were able to describe an association between breastfeeding and SUIDs prevention, while 23% reported an association between tobacco smoking and SUIDs.

No association between race and primary language or parental recall of having received education was reported. No association between race and knowledge of bed-sharing, safe crib environment, sleep position, or the association with breastfeeding was seen. Non-Hispanic Blacks were more likely to be able to report the association of SUIDs and tobacco use (35% versus 14%; $p<0.05$) than mothers of other ethnicities. No associations between primary language, multiparity, adequacy of prenatal care or maternal age and knowledge of risk of tobacco use were seen.
Conclusion(s) Even after SUIDs education, all recruited patients showed poor recollection of the associations between SUIDs and breastfeeding or tobacco use. Non-Hispanic Blacks were more likely to report the association of SUIDs and tobacco use. Further patient education is necessary in this domain and recruitment of a larger sample size will help determine if any other racial differences exist in SUIDs knowledge.

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Abstract: 356

Do Differences in Pain Perception Between Pediatric Patient and Emergency Department (ED) Clinician Impact Adequacy of Pain Management?

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Background Although self-report pain scales are the gold standard in determining a patient's pain level, clinicians often use behavioral evaluations instead to assess pediatric pain. This creates an opportunity for discrepancies in pain perception. Few studies have directly explored the significance of these discrepancies in the ED setting and its contribution to the prevalence of suboptimal treatment of pediatric pain.

Objective To determine if significant discrepancies in pain scale scores (PSS) between child and clinician exist at both initial ED evaluation and disposition, and analyze how discrepancies affect adequacy of pain management.

Design/Methods 86 patients ages 4-18 presenting to the ED with a pain-related chief complaint participated in the study. Child and clinician were blinded from one another and each assessed the child's pain level at initial evaluation and disposition using one of two pain scales: the Faces Pain Scale-revised (ages 4-7) or the Numerical Rating Scale-11 (ages ≥8). Children ≥ 13 years also completed a survey at disposition regarding perceived adequacy of pain management. Lin's concordance correlation coefficient (CCC) and paired t-tests were used to determine agreement and mean difference in child/clinician PSS, respectively, with a 2-point difference demarking a clinically significant/insignificant discrepancy (CSD/CID). Fisher's Exact Test was used to determine if a CSD at initial evaluation affected adequacy of pain management, as measured by pediatric PSS at disposition and survey data.

Results CCC between child and ED clinician showed low agreement at both initial evaluation (0.27) and disposition (0.31). Mean difference in estimated pain was 2.13 at initial evaluation ($p<0.001$) and 2.06 at disposition ($p<0.001$), both a CSD. CSD at initial evaluation was shown to be significantly associated with: (1) child PSS at disposition ($p=0.008$) 22.5% fewer children went home with 'no pain' ($p=0.007$) and 17.3% more children went home with 'severe pain' ($p=0.027$) in the CSD versus the CID group; (2) perceived adequacy of pain management ($p=0.028$) 35.3% more adolescents rated their pain management as 'fair' or 'poor' when there was a CSD at initial evaluation.

Conclusion(s) CSD in PSS between child and clinician positively correlate with undertreatment of pain at disposition and attitudes reflecting inadequacy of pain management. These findings reinforce the value of clinicians utilizing PSS during ED care of pediatric patients.

Figure 1: Characteristics of enrolled ED pediatric patients

	Total (N=86)
Age	
N	86
Mean (SD)	10.5 (4.16)
Median	10.0
Interquartile range	7.0, 14.0
Range	(4.0-18.0)
Gender	
Female	45 (52.3%)
Male	41 (47.7%)
Chief complaint	
MVC	1 (1.2%)
Fall	2 (2.3%)
Chest pain/syncope	5 (6%)
Soft tissue wound/injury	10 (12%)
Extremity injury	26 (30.2%)
Neck/back pain	5 (5.8%)
Abdominal pain	18 (20.9%)
Head injury/headache	14 (16.3%)
ENT-related pain	2 (2.3%)
GU pain	1 (1.2%)
Sickle Cell Disease	2 (2.3%)

Figure 2. Adolescent responses regarding pain treatment

	Total (N=30)
Perceived adequacy of Pain Management during ED stay	
Missing	1 (.%)
Excellent	3 (10.3%)
Very good	6 (20.7%)
Good	14 (48.3%)
Fair	5 (17.2%)
Poor	1 (3.4%)

Child pain scores at disposition stratified by child-ED clinician discrepancy at initial evaluation

	Clinically insignificant discrepancy (CID) at initial evaluation (N=32)	Clinically significant discrepancy (CSD) at initial evaluation (N=54)	Fisher's exact test p-value (<0.05)
Child pain score at disposition			
No pain (0)	9 (28.1%)	3 (5.6%)	0.007
Mild pain (1-3)	10 (31.3%)	17 (31.5%)	1.000
Moderate pain (4-6)	12 (37.5%)	23 (42.6%)	0.658
Severe pain (7-10)	1 (3.1%)	11 (20.4%)	0.027
Overall distribution of pain scale scores (PSS) between groups			0.008

Perceived adequacy of pain management

	Clinically insignificant discrepancy at initial evaluation (N=12)	Clinically significant discrepancy (CSD) at initial evaluation (N=17)	Fisher's exact test p-value (<0.05)
Survey rating of pain treatment during ED stay			0.028
Excellent, Very Good or Good	12 (100%)	11 (64.7%)	
Fair or Poor	0 (0%)	6 (35.3%)	

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Abstract: 357

Evaluation of young, afebrile infants with focal infections to identify those at risk for serious bacterial infection (SBI)

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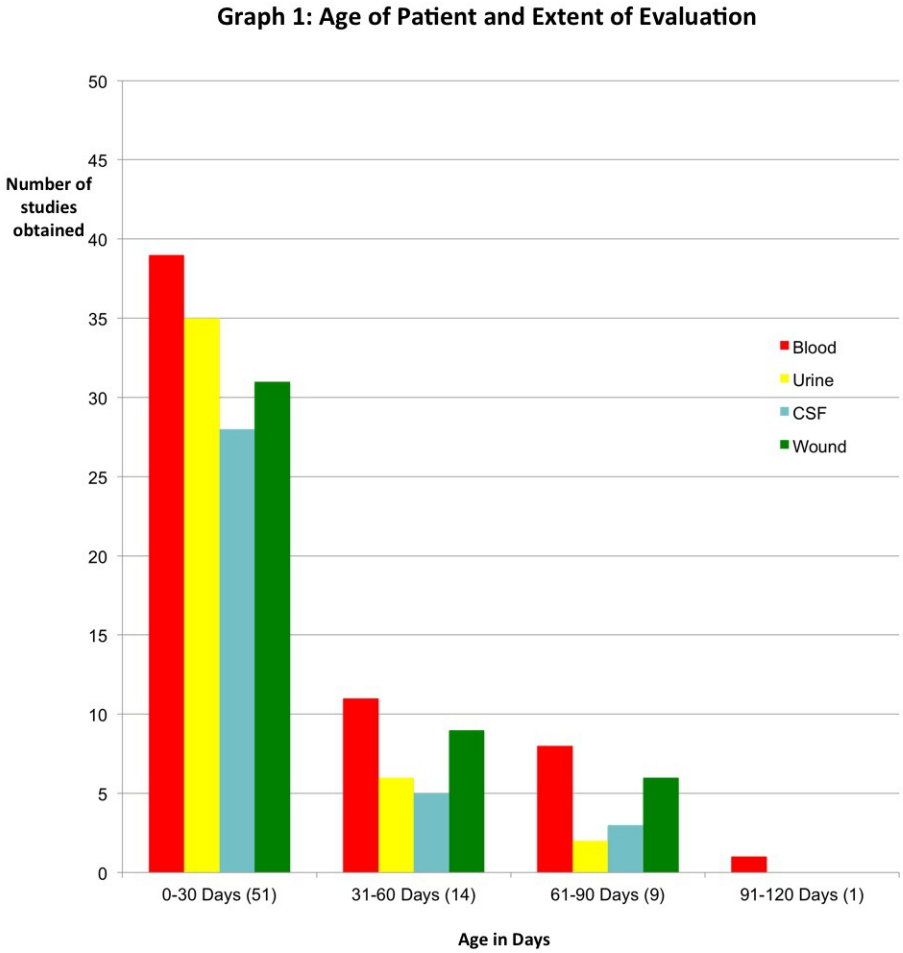
Background There are well-established guidelines regarding the medical management of the febrile infant. However, there is a gap in the literature regarding management of the afebrile, well-appearing infant who presents to the pediatric emergency department (PED) with a focal infection.

Objective To determine the variability in diagnostic evaluation performed for these infants and to examine the incidence of serious

bacterial infection (SBI) in patients for whom blood, urine and CSF cultures were obtained. The hypothesis is that this subset of infants may not always warrant a full laboratory assessment.
Design/Methods A retrospective chart review examining the records for all afebrile infants 0-4 months of age with a focal infection, specifically skin or soft tissue infection (SSTI), who presented to two PEDs over a six year period. The SSTIs included abscess, carbuncle, furuncle, pustule, vesicle, paronychia, perirectal abscess, cellulitis, orbital and periorbital cellulitis, mastitis and omphalitis. Charts were eliminated if they met the exclusion criteria of fever, ill appearance or focal infection other than SSTI such as conjunctivitis, dacryocystitis or otitis media. The final cohort consisted of 75 charts.
Results Blood was drawn for 59 patients (79%) with one positive blood culture that grew Klebsiella pneumoniae. The primary diagnosis for this patient was perirectal abscess, which was drained with a positive wound culture growing Klebsiella and MSSA. There were 43 patients (57%) with urine studies with one urine culture positive for E. coli. This patient's diagnosis was a perirectal abscess and the wound culture was positive for E. coli, Clostridium clostridioforme and Bacteroides fragilis. None of the 36 patients (48%) with CSF studies had a positive CSF culture. Of the 46 wound cultures (61%) obtained, there were 31 positive results with the following most common organisms: Klebsiella (10), MSSA (8), MRSA (5) and E. coli (5). There was a positive correlation between the age of patients and the extent of the diagnostic evaluation with younger patients more likely to have a full laboratory assessment.
Conclusion(s) There was a low rate (2.7%) of SBI in patients who were afebrile, well-appearing and presented with a focal SSTI. This data may support a limited laboratory evaluation consisting of blood and urine studies in addition to wound cultures. Currently, chart review is underway for two additional PED facilities which will expand the sample size. These results will be reported.



Graph 1: Age of patients and Extent of Evaluation. There was a positive correlation between the age of the patient and the extent of the laboratory assessment. Younger patients were more likely to have blood, urine and CSF studies.

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Abstract: 358
The Usefulness of Widened Pulse Pressure in Pediatric Patients with Suspected Bacterial Infection
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Background Severe sepsis is a leading cause of morbidity and mortality in pediatric patients. Patients with severe sepsis often have peripheral vasodilation leading to a drop in systemic vascular resistance, which can lead to a widened pulse pressure (WPP). A WPP is

observed in many pediatric patients but its significance and usefulness is unclear.
Objective The objective of this study was to evaluate the relationship between widened pulse pressure and severe sepsis in patients with suspected bacterial infections.

Design/Methods We retrospectively reviewed charts of all patients aged 2 months – 17 years who presented to the pediatric emergency department (PED) during the year of 2016 who had blood cultures drawn, antibiotics given, and were admitted to the hospital. We reviewed all patients' vital signs throughout their PED stay. We defined WPP as a systolic blood pressure greater than double the diastolic blood pressure. Our primary outcome of severe sepsis was defined as the use of vasopressors for at least 6 hours within 24 hours of leaving the PED.

Results We analyzed 1175 patients on unique visits excluding multiple admissions. We identified 32 septic patients with the patient incidence of sepsis as 2.7% (95%CI: 1.9% to 3.8%).
Approximately 59% of patients with severe sepsis had WPP before the start of vasopressors. In multivariable analysis, the hazard for severe sepsis was significantly higher in patients who had WPP during ED stay (p=0.04). Specifically, a patient with WPP had a hazard of sepsis 2.2 times higher than a patient with no WPP (HR=2.2; 95% CI: 1.04, 4.7).
In the 129 patients who had WPP and fever but no tachycardia, tachypnea or hypotension during their ED stay the rate of sepsis was 0/129=0%.
In patients with severe sepsis the first vital sign changes seen were tachycardia, tachypnea and fever, all of which were noted within a median of 17 minutes of presentation to the ED. Widened pulse pressure was seen at a median of 82 minutes, and lastly hypotension at a median of 181 minutes.

Conclusion(s) We demonstrated that in patients with suspected bacterial infection, a WPP is significantly associated with severe sepsis. However, in patients with a WPP and fever without any other vital sign abnormalities we found the rate of severe sepsis to be 0%. In patients with other vital sign changes including tachycardia and tachypnea, we found that WPP precedes hypotension by an average of 99 minutes, therefore it may be a useful predictor of patients who are developing decompensated shock.

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Hyperpyrexia and Risk of Serious Bacterial Infection

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Background Hyperpyrexia in children (temperature >106oF) has been linked to increased risk of serious bacterial infection (SBI). Much of the existing literature was conducted over a decade ago, and findings then largely supported the association between hyperpyrexia and SBI. Vaccines have since decreased the incidence of invasive bacterial diseases, such as bacteremia and meningitis.
Objective The objective of this study was to determine the risk of serious bacterial infection in children with hyperpyrexia in the current vaccine era.
Design/Methods We conducted a retrospective chart review of children <18 years old presenting to a large tertiary pediatric emergency department (PED) over a three-year period with a documented temperature of >106oF at presentation. We reviewed the electronic medical record for demographic and clinical data, including history of fever and associated symptoms, physical examination, laboratory evaluations, diagnosis, antimicrobial administration, and disposition of patient. We defined SBI as a bacterial pathogen isolated from blood, urine, cerebrospinal fluid, respiratory, or stool cultures.
Results Of 185,474 PED visits, 73 patients presented with hyperpyrexia (<0.04% of total visits). Amongst the 73 patients, 47 (64%) were male, with the mean age was 3.7 years (SD:3.3). A total of 14 patients (19.7%. CI: 11.8, 29.7) had a SBI (6 bacteremia, 6 urinary tract infection, 1 tracheitis, 1 gastroenteritis). A respiratory viral panel (RVP) PCR was performed in 55 patients, of which 40 (73%) had an identified viral infection. In those with SBI that had a RVP performed, 4 out of 12 had a virus detected. While the type of virus was not statistically significant between patients with SBI and patients without SBI, you were significantly more likely to have a SBI if you had a negative RVP as compared to those with a positive RVP (53% vs. 10%, p = .0015). In the SBI group, 4 out of 14 patients were discharged home with appropriate treatment and the remainder were admitted to the hospital. Furthermore, in patients with hyperpyrexia, 10 patients (13.6%) were diagnosed with pneumonia on chest radiography, 47 patients (64%) received antimicrobials, and 31 patients (42%) were admitted.
Conclusion(s) Although a rare occurrence, pediatric patients with hyperpyrexia are at risk for SBI in the current vaccine era. While rapid viral testing aids in the evaluation of patients with hyperpyrexia, the risk of SBI remains clinically elevated in those with identified viral infections.

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Genetic Risk Scores for Height and Obesity in Cystic Fibrosis

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Background Worsening lung function is a significant contributor to morbidity and mortality in Cystic Fibrosis (CF), and genetic modifiers appear to play an important role in disease severity. Additionally, poor nutritional status is associated with worse pulmonary function while increased height is an independent predictor of better lung function. In the non-CF population, a number of genetic variants associate with obesity and height, but the extent to which these genetic variants are operative in CF is not known.
Objective We aimed to assess whether Genetic Risk Scores (GRS) for height and obesity associate with height-z, BMI-z and pulmonary function in CF.
Design/Methods DNA was collected from children and adults with pancreatic insufficient (PI-) and sufficient (PS-) CF, recruited from Children's Hospital of Philadelphia/Hospital of the University of Pennsylvania CF Center. Clinical data were extracted from -2y up to 5y following enrollment. Single-nucleotide polymorphism (SNP) genotyping was performed using the Illumina BeadChip. Genetic risk scores (GRS) were generated for Height (697 SNPs), and Obesity (97 SNPs). Longitudinal mixed effects models were used to examine the relationship HT-GRS and Obesity-GRS with 1) BMI-Z and 2) HT-Z, respectively, as well as with 3) FEV1%-predicted.
Results Data (median; min-max) were available for 341 individuals (295 w/ PI-CF), aged 22.16y (3-77) with HT-Z = 0.089 (-3.72-2.73), BMI Z=-0.476 (-3.62-2.28); FEV1% (11-128). After adjusting for age, pancreatic insufficiency, FEV1%-predicted, every 1 SD increase in the HT-GRS is associated with a 0.25 SD increase in HT-Z ($p<0.001$). Similarly, every 1 SD increase in the Obesity-GRS was associated with a 0.14 increase in BMI-Z while PI was associated with a 0.44 SD lower BMI-Z ($p=0.003$). However, neither HT-GRS nor Obesity-GRS was found to associate with FEV1%-predicted ($p=0.86$ and $p=0.72$ respectively).
Conclusion(s) Despite the inflammatory nature of and propensity to poor nutritional status in CF, genetic variants appear to contribute to BMI and HT in CF and in the future may provide potential avenues for therapeutic leverage. These variants did not appear to confer a protective effect with respect to pulmonary function, but additional studies may help determine if effects are restricted to adulthood, when pulmonary function is more likely to be compromised, and if genetic variants related to skeletal muscle rather than obesity are relevant for CF outcomes.

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Abstract: 361

Significance of Gastric Residual in Preterm Infants ≤ 32 weeks of Gestation: Growth and Morbidity Outcomes

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Background Provision of nutrition to preterm infants is important and challenging aspect of neonatal care. Evaluation of gastric residual (GR) is a common practice in many neonatal intensive care units (NICUs). There is lack of uniform standards to define significant GR, and no evidence that this practice improves care, or prevents complications.
Objective To determine the significance of GR evaluation in preterm infants with gestational age (GA) ≤32 weeks.
Design/Methods A retrospective cohort study of preterm infants born ≤32 weeks GA, at Brookdale Hospital in New York, from Jan 2014 to May 2017. Death or transfer prior to 4 weeks of age, and being on continuous enteral feeding for ≥30 consecutive days were the exclusion criteria. GR consists of measuring gastric content before the next feed and calculating its proportion to the prior feed given. We used average of the daily GR", and days of having multiple GR present for analysis. When multiple GR were present and their average was >50%, the patient was considered as having "significant GR". Correlation between GR and outcome variables was done using Spearman's test. Group comparison was analyzed using chi-square, Mann Whitney, or T-test.
Results Among 1,424 infants admitted during the study period, 116 had GA ≤32 weeks. After exclusion criteria, 86 infants were studied, mean GA 29.5±2.7 weeks and birth weight 1152±301 grams. Higher daily GR and multiple days of GR was associated with increased days on parenteral nutrition (PN), percentage time spent as nil per os (NPO), duration to achieving full feeds, and length of hospital stay ($p<0.01$), but no significant effect on daily weight gain or change in Z score from birth to discharge (table 1). Compared to infants with non-significant GR, those with "significant GR" had more percentage of time spent as NPO status as well as increased duration of PN and achieving full feeds ($p<0.05$, table 2). Presence of significant GR did not affect their daily weight gain, change in weight percentiles, length of hospital stay, or incidence of non-surgical necrotizing enterocolitis (NEC), even though they had lower GA and weight at birth.
Conclusion(s) In preterm infants ≤32 weeks, presence of GR had negative impact on nutrition and hospital course, with no significant effect on the weight gain or incidence of non-surgical NEC. GR as an individual parameter (without correlation to other signs of abdominal pathology) is a weak indicator of intestinal pathology and should not be the only factor in deciding feeding advancement.

Table 1: Correlation between gastric residual (GR) parameters with nutrition details, NICU course, and weight parameters (n=86).

	Average daily GR [2]		Days of having multiple GR [2]	
	R-squar ed	p value	R-squar ed	p value
Average daily weight gain (gram/kg/day)	-0.101	0.354	-0.168	0.122
Weight Z scor e change fr om birth to discharge [1]	-0.052	0.613	-0.133	0.133
Average times of feeding held [2]	0.724	<0.001	0.704	<0.001

Days on par enteral nutrition [2]	0.607	<0.001	0.610	<0.001
Per centage of time spent as NPO status [2]	0.353	0.001	0.287	0.007
Days to achieving full feed [2]	0.606	<0.001	0.604	<0.001
Length of hospital stay [2]	0.305	0.004	0.541	<0.001

1: Weight Z scores using 2013 Fenton growth charts. 2: Variables are expressed as averages of values proportional to days to reaching 40 weeks post conception age. Abbreviations: GR=gastric residual, PCA=post conceptional age

Table 2: Comparison between preterm infants with or without significant gastric residual (GR) in baseline characteristics, nutrition details, NICU course, and weight gain pattern (n=86).

Variables	Non-significant GR (n=42; 49%)	Significant GR (n=44; 51%)	p value
Baseline characteristics			
Black maternal race, n (%)	37 (88%)	41 (93%)	0.479
Male gender , n (%)	21 (50%)	27 (61%)	0.289
Gestational age in weeks	30.2±2.8	28.8±2.4	0.011
Birth weight in grams	1220±296	1088±294	0.041
Weight per centile at birth [1]	37±25	47±30	0.085
APGAR at 5 min, median (IQR)	8 (8-9)	8 (7-9)	0.268
Effect on nutrition details			
Per centage (%) of time as NPO status [2]	0% (0%-2%)	1.3% (0%-5.3%)	0.022
Days to r eaching full feed [2]	17.6±16.2	29.7±18.4	0.002
Days on par enteral nutrition [2]	13±14.3	26.6±17.5	<0.001
Effect on weight gain and hospital course			
Average daily weight gain (grams/kg/day)	13.1±2.6	12.9±2.2	0.642
Change in weight per centile fr om birth to discharge	-23±19	-31±25	0.126
Small for gestational age at birth, n (%)	11 (26%)	7 (16%)	0.241
Discharge weight <10th per centile [1], n (%)	22 (52%)	18 (41%)	0.286
Days of hospital stay [2], median (IQR)	42 (31-64)	52 (38-74)	0.058
Non-surgical NEC, n (%)	4 (9.5%)	4 (9.1%)	1.000

Note: All data are expressed as mean±SD unless specified 1: Weight percentiles using 2013 Fenton growth charts 2: Variables are expressed as averages of values proportional to days to reaching 40 weeks post conception age. Abbreviations: GR=gastric residual, n=number, SD=standard deviation, IQR=inter-quartile ratio, NPO=nil per os, NEC=necrotizing enterocolitis

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Abstract: 362

Intrauterine growth restriction modulates hepatic gene expression in a sex-specific manner in rats

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Background Intrauterine growth restriction (IUGR) is associated with both increased perinatal morbidity and mortality. IUGR has also been implicated in programming of later life sequela such as hypertension and diabetes.
Objective To further elucidate the sex-specific effects of IUGR on the regulation of gene expression in a rat perinatal model.
Design/Methods IUGR was induced by fasting dams for 48 hours from embryonic day 19 to 21. Male and female pups were harvested 1hr following spontaneous vaginal delivery. Liver RNA was analyzed in triplicate for each sex using Affymetrix Rat Gene ST Arrays. Data were analyzed using Gene Set Enrichment Analysis (GSEA). To assess the effect of IUGR on growth during the postnatal period, vaginally delivered control and IUGR pups were cross-fostered to ad lib fed dams who had delivered the previous day. The cross-fostered pups were harvested at 1, 3 and 7 days post-birth.
Results Fasting induced a significant weight reduction in male and female pups at all time points analyzed (Fig. 1). There were no significant weight differences in liver:body weight ratio in either sex. Changes in gene expression at 1-hour post-birth were assessed using the Reactome suite of pathways in GSEA. When comparing, male control and IUGR pups, multiple pathways were altered in a highly significant manner (Fig. 2A). Male IUGR pups showed enrichment of genes related to tRNA aminoacylation, chaperone proteins and pre-NOTCH protein processing while male controls were enriched for protein translation, oxidative phosphorylation, bile acids synthesis and lipid metabolism. In contrast, fewer pathways were affected in the female IUGR pups (Fig. 2B). Female control pups showed enrichment of pathways related to cell proliferation, cholesterol biosynthesis and cytochrome P450-mediated processes. No pathways were enriched in female IUGR pups.
Conclusion(s) A 48-hour fast late in gestation induces growth restriction in pups of both sexes and is associated with slower growth throughout the first week of life. There are numerous changes in hepatic gene expression just after parturition in male IUGR pups compared to controls. In contrast, female pups show far fewer effects on hepatic gene expression at 1 hour post-birth. Understanding the mechanisms accounting for this sexual dimorphism has implications for persistent differences between the sexes with regard to the fetal origins of adult disease.

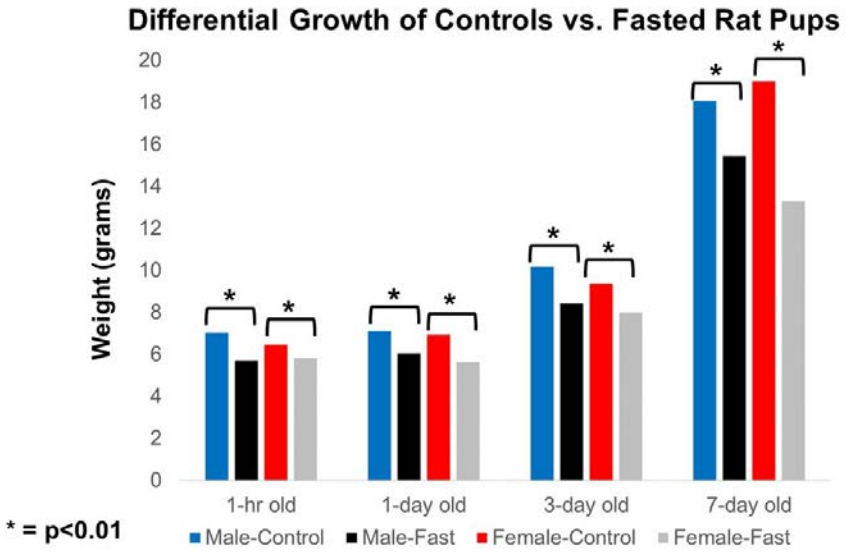

Figure 1: Average weight of control and fasted pups were graphed. At all time points and for all sexes, the fasted pups weight significantly less than controls ($p<0.01$).

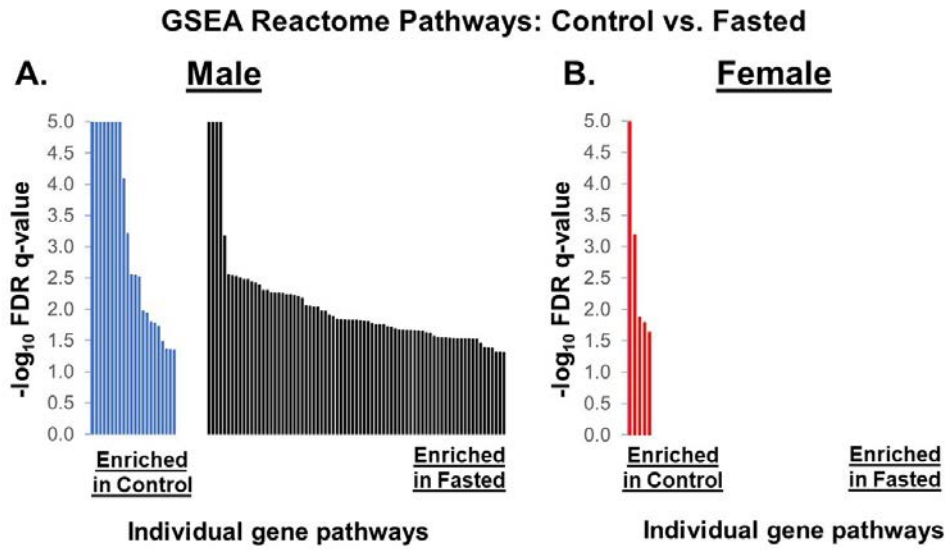

Figure 2: Individual significant gene sets (FDR q-value <0.05) were graphed with the $-\log_{10}$ of the FDR q-value. A: Male control vs. fasted. B: Female control vs. fasted.

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Abstract: 363

POTENTIAL CLINICAL APPLICATION OF POINT OF CARE BILIRUBIN BINDING CAPACITY IN THE CARE OF STABLE AND UNSTABLE NEONATES

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Background Bilirubin levels in the context of its binding to albumin, bilirubin binding capacity (BBC), and bilirubin production rates are likely to define an infant's risk of developing bilirubin induced neurologic dysfunction (BIND). Risk factors for BIND include prematurity, low albumin (Alb) levels, exposure to free fatty acids (IL), and neonatal instability. Measurements of BBC can be used to assess daily variations of BBC and thus infant's risk for BIND (Lamola AA et. al., Pediatr Res 2015;77:334).

Objective Measure variations of BBC using a new, automated, not as yet FDA approved, Point-of-Care (POC) hematofluorometer; and the effects of prematurity, instability and exposure to IL, all known to individually affect BBC.

Design/Methods We enrolled a convenience sample of 109 infants from both Well Baby and Intensive Care nurseries. 235 specimens were obtained concurrently with other clinically indicated blood studies from postnatal ages 1-4 days. Unstable neonates were defined by need for at least non-invasive respiratory support and ≥25% FiO2. BBC was directly measured by clinical personnel using a POC Bili 4 hematofluorometer (Aviv Medical, Lakewood, NJ). Alb levels were measured in the clinical laboratory.

Results Gestational age (GA) varied from 28-41 weeks. Ethnicities were: 30% white, 32% black, 19% Hispanic, 15% Asian and 4% other. Multiple BBC measurements of individual specimens had an intraspecimen variability between r=0.80 to r=0.86. Mean interday variation measurements (N=72) was 14.4%. BBC as well as Alb increased for each week of gestation (0.254 mg/dL/wk and 0.037 g/dL/wk). BBC was lower in unstable neonates (N=18) compared to well (N=91) infants (26.1±7.6 mg/dL v 28.6±6.3 mg/dL,respectively, p=0.02) and independent of GA (r=0.291, p=0.59). BBC was not significantly different in infants receiving IL (N=33) from those who did not (N=76).

Conclusion(s) BBC measurements using the new POC device had acceptable intraspecimen reproducibility and interday variability. Unstable neonates had lower BBC than well and stable infants, and thus may be at increased risk of BIND. Finally, for this sample size, there was no significant adverse effect of IL on BBC. We conclude that measuring BBC may be helpful in guiding the assessment of aggressive versus conservative management decisions in preterm and sick infants at risk for hyperbilirubinemia.

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Abstract: 364

Lipoprotein Subclass Analysis in Young Women with Turner Syndrome

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Background Turner syndrome (TS) is associated with increased cardiovascular disease (CVD) risk. In the general population with high CVD risk, increased small LDL particles, smaller LDL, larger VLDL and smaller HDL may better predict CVD risk compared to traditional lipid profiles. This pilot study examines body composition and lipoprotein subclass analysis in TS compared to healthy controls.
Objective
Design/Methods Whole Body DXA for lean body mass (LBM), fat mass (FM), %body fat (%BF), and visceral adipose area (VA) as well as fasting lipid panel and lipoprotein subclass analysis by NMR spectroscopy were measured in young women (age 16-23y) with TS and age-, BMI-, and race-matched controls. All TS subjects completed growth hormone therapy and were on stable estrogen doses for ≥ 18 months. Exclusion criteria: familial hypercholesterolemia, use of lipid lowering medications, and congenital cardiac defect not typical of TS aortopathy. Ttests were used to compare continuous data between groups. Regression models were developed to test the relationship of BMIZ and body composition with lipoproteins in TS vs controls.
Results 19 subjects were included, 10 with TS and 9 age-, BMI-, and race matched controls. One control did not complete lab testing. Mean age at estrogen initiation in TS was 13.6y. No differences were found between groups in total cholesterol, HDL cholesterol, LDL cholesterol, triglycerides, nonHDL, or TG/HDL. TS subjects had higher small LDL particles (TS 579 vs control 245 nmol/L, p=0.02), fewer large HDL particles (TS 9.8 vs control 12.5 umol/L, p=0.05), and smaller HDL size (TS 9.61 vs control 9.98 nm, p=0.05). TS subjects also had higher calculated lipoprotein insulin resistance scores (TS 39 vs control 25, p=0.006). FM and %BF were not different, but TS had lower LBM (p<0.001) and higher VA with increasing BMIZ (p=0.009). Differences in lipid subparticles and lipoprotein insulin resistance persisted after adjustment for BMIZ, FM, %BF, and VA.
Conclusion(s) In this cross-sectional pilot study, TS subjects had a more atherogenic lipoprotein subclass profile and higher lipoprotein insulin resistance index not explained by body composition differences. Lipoprotein subclass analysis may expand our understanding of the increased atherogenicity risk in TS. Further investigation is required to understand the clinical implications and potential therapeutic leverage of these findings.

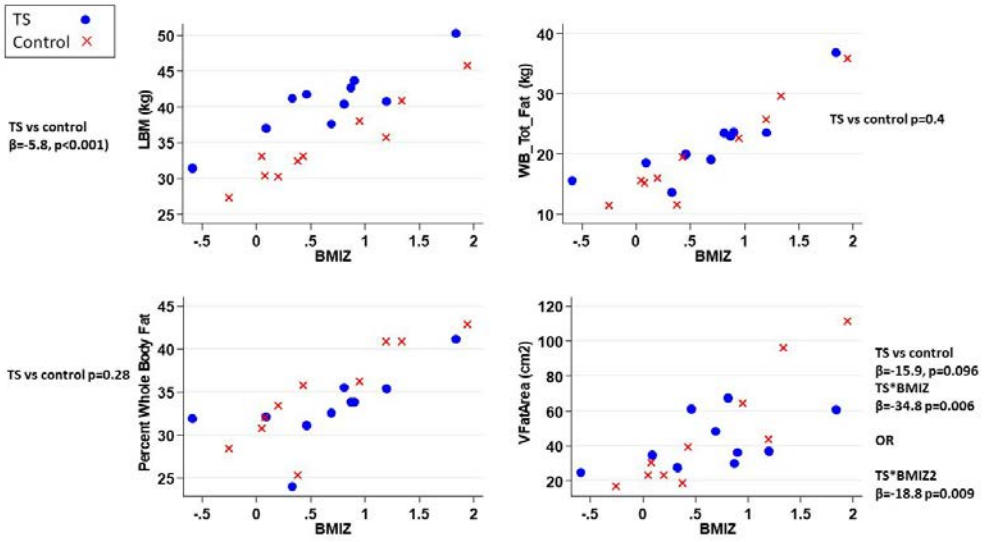

Figure 1: Relationship between BMIZ and body composition in TS vs controls

Table 1: Descriptive statistics of the participants, summarized by means (SD)

	Turner Syndrome Female (N=10)	Controls (N=9)	P values
Age (years)	19.3 (2.1)	20.7 (1.3)	0.11
BMI (kg/m2)	24.7 (4.3)	25.5 (3.3)	0.65
BMIZ	0.6 (0.7)	0.7 (0.7)	0.93
Height (cm)	150.7 (6.2)	160.1 (4.3)	0.001
Total cholesterol (mg/dL)	172.5 (35.9)	174.9 (20.8)	0.86
LDL cholesterol (mg/dL)	100.0 (36.1)	95.7 (23.1)	0.76
HDL cholesterol (mg/dL)	55.4 (8.8)	62.7 (16.5)	0.24

Triglycerides (mg/dL)	85.5 (25.9)	82.9 (34.1)	0.85
Non-HDL (mg/dL)	117.1 (37.1)	112.2 (26.1)	0.75
TG/HDL	1.6 (0.5)	1.5 (0.3)	0.78
LDL-P size (nm)	20.7 (0.5)	21.1 (0.5)	0.12
Total LDL-P (nmol/L)	1006.0 (339.1)	832.8 (187.9)	0.19
Small LDL-P (nmol/L)	578.5 (307.1)	245.3 (224.5)	0.02
Large LDL-P (nmol/L)	273.7 (182.7)	450.8 (260.3)	0.10
IDL-P (nmol/L)	153.6 (134.9)	136.8 (74.1)	0.74
HDL-P size (nm)	9.6 (0.4)	9.98 (0.4)	0.05
Total HDL-P (nmol/L)	38.2 (5.3)	36.9 (6.1)	0.62
Small HDL-P (nmol/L)	14.3 (6.0)	8.8 (7.3)	0.09
Medium HDL-P (nmol/L)	14.0 (4.5)	15.6 (8.2)	0.61
Large HDL-P (nmol/L)	9.8 (2.2)	12.5 (3.2)	0.05
VLDL & Chylomicron-P size (nm)	49.3 (8.8)	46.4 (3.7)	0.38
Total VLDL & Chylomicron-P (nmol/L)	43.0 (17.8)	50.6 (18.9)	0.38
Large VLDL & Chylomicron-P (nmol/L)	3.2 (1.5)	2.1 (0.9)	0.09
Medium VLDL-P (nmol/L)	11.8 (7.0)	13.6 (15.0)	0.74
Small VLDL-P (nmol/L)	28.0 (14.5)	34.8 (8.9)	0.24
Lipoprotein Insulin Resistance score	39.0 (8.4)	25.3 (10.5)	0.006

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Abstract: 365

Novel mutation of steroidogenic acute regulatory protein gene associated with lipoid congenital adrenal hyperplasia in a 46XY newborn.

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Background Lipoid congenital adrenal hyperplasia (LCAH), the most severe form of CAH affects both adrenal and gonadal steroidogenesis. It is an autosomal recessive condition most commonly due to mutations in the STAR gene that codes for steroidogenic acute regulatory protein required for the conversion of cholesterol to pregnenolone. This disorder has been most commonly described in the Japanese, Korean and Palestenian Arab children. We report a novel mutation in a 46 XY Bangladeshi patient with LCAH.
Objective .
Design/Methods A 13 day old female born to consanguineous parents (first cousins) presented with vomiting for 3 days. She was born full term, appropriate for gestational age for birth weight, length and head circumference, to a 22 year old G1P0 mother. There was no history of genital ambiguity or concerns for sexual assignment at birth. Newborn screening for CAH was negative. On examination, vital signs were stable with clinical evidence of dehydration. She was diffusely hyperpigmented especially on labia, nipples, axillae and ears. Genital exam showed female genitalia with normal appearing labia without rugation, normal clitoris and a distinct vaginal and urethral orifice. 1 cm bilateral soft round masses were felt in the inguinal canals. Initial laboratory evaluation included hyponatremia (110 meq/L), hyperkalemia (6.8 meq/L), blood glucose level of 56 mg/dl, elevated ACTH (1978 pg/ml), elevated plasma renin (108 ng/ml/hr) and low aldosterone (2.5ng/dl) as well as undetectable testosterone, DHEA, androstenedione and 17 hydroxyprogesterone. Cortisol level was not resulted. Patient was treated with intravenous fluids, hydrocortisone, fludrocortisone and salt.
Results Uterus and ovaries were not visualized on ultrasound but bilateral gonads suggestive of testes (0.1 ml in volume) were seen high in the inguinal canals. The adrenal glands were enlarged (Right 2.3 cm x 0.8 cm x 2 cm; Left 1.5 cm x 0.5 cm x 1.3 cm). The karyotype was 46 XY and fluorescent in situ hybridization for the SRY locus was positive. A chromosomal microarray showed multiple regions of homozygosity including STAR gene. STAR gene analysis showed a novel homozygous frameshift mutation (c.661_713dup,

p.L239VfsX100) which ultimately predicts a stop codon. This mutation has not been previously reported. Parental studies showed biparental inheritance
Conclusion(s) We report a Bangladeshi phenotypic female born to consanguineous parents with a 46XY karyotype and Lipoid CAH due to a novel homozygous STAR mutation.
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Abstract: 366
Does Prolonged Nasogastric Tube Feedings Reduce Gastroesophageal Reflux in Infants?
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Background Gastroesophageal reflux (GER) is common in the neonatal population. While generally benign in infancy, it may lead to adverse respiratory and nutritional outcomes and lengthen hospital stay. Prolonged nasogastric (NG) feeding is frequently used to reduce GER. However, prolonging NG feeds may delay gastric emptying or increase transient lower esophageal sphincter relaxation. Multi-channel intraluminal impedance with pH probe (MII-pH) is considered the gold standard for evaluation of GER. To our knowledge, no study has been performed investigating the relationship of feeding duration and GER using MII-pH as an objective measure.
Objective To determine if prolonging NG tube feedings for one hour or greater is associated with decreased GER and acid exposure.
Design/Methods This is a retrospective data analysis of all infants who underwent MII-pH study between October 2009 and August 2017 and received NG feedings. Infants were referred for MII-pH studies by the primary team for evaluation of potential GER. The method of feeding as well as duration of feed was determined. Infants were divided into two groups, NG tube feeds given via bolus (up to 30 minutes) or NG tube feeds given over a prolonged period (≥ 60 minutes). The number of reflux events and percent of time pH <4 was compared in the two groups. Linear regression analysis was performed to adjust for the difference in corrected gestational age between the two groups.
Results 55 infants underwent MII-pH study during the study period. Thirty infants (55%) received bolus NG feeding and 25 infants (45%) received prolonged NG feedings (≥ 60 minutes). There was no significant difference in demographics and clinical characteristics between the two groups except corrected gestational age (Table). Total reflux events were significantly lower in infants on prolonged NG feeding, and the difference remained significant after adjusting for corrected gestational age. There was no difference in acid exposure time between the groups.
Conclusion(s) The prolongation of NG feedings was associated with a decrease in total number of GER events. There was no reduction in the percent of time exposure to pH <4 with prolonged feeding.

Table

	Bolus NG feeds (n=30)	Prolonged NG feeds (n=25)	p-value
Birthweight (g)	1578 ± 1028	1492 ± 1270	0.784
Gestational age (weeks)	30 ± 5.3	29 ± 6.6	0.614
Corrected GA (weeks) at study	42 ± 4.5	4.6 ± 7.0	0.029
Total fluids (mL/kg/day)	141 ± 21	149 ± 17	0.125
Sex (% male)	11 (30%)	14 (56%)	0.151
Race (% black)	15 (50%)	12 (48%)	0.88
Human milk (%)	12 (40%)	8 (32%)	0.539
Reflux meds during study (%)	0 (0%)	1 (4%)	0.454
Study duration (hrs)	22.9 ± 1.8	22.5 ± 1.4	0.376
Reflux events (med, IQR)	28 (22-47)	19 (14-32)	0.036
Acidic events (med, IQR)	13.5 (8-20)	9 (7-18)	0.352
Non-acidic events (med, IQR)	15 (9-22)	10 (2-15)	0.069
Time with pH <4 (%)	4 ± 6.5	3.8 ± 4.8	0.91

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Abstract: 367
Is Gastroesophageal Reflux More Common in Preterm Infants with Bronchopulmonary Dysplasia? A Multiple Channel Intraluminal-pH Study.
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Background Gastroesophageal reflux (GER) is a common occurrence in premature infants. Bronchopulmonary dysplasia (BPD) is a major complication of prematurity. Infants with BPD may be at a higher risk of GER but evidence is conflicting. Multi-channel intraluminal impedance and pH (MII-pH) study is considered the gold standard for evaluation of GER. The data is limited on the relationship of BPD and GER as detected by the MII-pH study.
Objective To determine differences in GER episodes and acid exposure time in premature infants with and without BPD as demonstrated through MII-pH study.
Design/Methods This is a retrospective analysis of data on low birth weight (≤1500 gm) infants born between October 2009 and August 2017 at a single center. Infants were included in the analysis if they underwent MII-pH study for the evaluation of GER. BPD is defined as an oxygen requirement at 36 weeks post menstrual age. Demographics, baseline clinical characteristics, GER and pH data were compared between infants with and without BPD. Multiple linear regression analysis was performed to adjust for differences in birthweight, gestational age, corrected gestational age at time of study, total fluid intake and prolonged feeding (≥ 60 minutes).
Results A total of 68 infants met inclusion criteria for analysis (44 infants with BPD and 24 infants without BPD). The two groups differed in BW, GA, corrected GA, age at study, total fluid intake and number of infants on prolonged feeding. Infants in the BPD group had lower total, acid and non-acid GER episodes and lower acid exposure time compared when compared to the infants without BPD. However, when adjusted for confounding variables, there was no significant difference in all GER parameters between infants with and without BPD.
Conclusion(s) In very low birth weight preterm infants, BPD is not associated with increased GER episodes or acid exposure time as determined by MII-pH study.

Table 1

	BPD (n = 44)	No BPD (n = 24)	p-value	Adjusted p-value
Birthweight (g)	843 ± 246	1131 ± 262	<0.001	
Gestational age (weeks)	26 ± 1.7	28.8 ± 2.5	<0.001	
Age at study (days)	113 (85-138)	63 (55-82)	<0.001	
Corrected GA (weeks) at study	42.5 ± 4.3	39.5 ± 3.8	0.01	
Total fluids (mL/kg/day)	141 ± 15	155 ± 13	<0.001	
Sex (% male)	22 (50%)	10 (42%)	0.614	
Race (% black)	24 (55%)	18 (75%)	0.128	
Human milk (%)	14 (32%)	7 (29%)	1.000	
Prolonged feeding > 1 hour (%)	15 (34%)	2 (8%)	0.036	
Reflux medication during study (%)	3 (7%)	1 (4%)	1.000	
Study duration (hours)	22.8 ± 1.3	22.2 ± 1.8	0.12	
Reflux events (med, IQR)	29 (20-39)	52 (40-85)	<0.001	0.06
Acidic events (med, IQR)	12 (7-19)	20 (11-27)	0.001	0.06
Non-acidic events (med, IQR)	15 (8-26)	40 (18-57)	<0.001	0.2
Time with pH <4 (%)	4 ± 4.4	7.1 ± 7.4	0.03	0.2

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Abstract: 368

Diffuse Leptomeningeal Glioneuronal Tumor (DLGT)

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Background Abstract
DLGT is a rare and newly recognized tumor in the 2016 revision of the WHO classification of CNS tumors. DLGT typically occurs in pediatric patients and is a potentially life-threatening condition that is often confused with other neurologic conditions, such as

meningitis. To our knowledge, this is one of the first case reports written since the revised nomenclature. We describe an important diagnosis in the differential for a patient presenting with nonspecific neurological signs, concerns for hydrocephalus, diffuse leptomeningeal enhancement on neuroimaging, and a presumptive diagnosis of meningitis not responding to antimicrobials. Our purpose is to describe the presentation and diagnostic hallmarks of this uncommon but lethal condition, and to increase awareness of DLGT among pediatric providers.
Objective
Design/Methods Case Report
A 9-year-old male presented to our facility following a recent admission to another institution with a history of recurrent headaches, nausea, vomiting and lower extremity paresis. His initial work-up, including blood-work, EEG and CSF studies were non-diagnostic, and his neuroimaging was suggestive of an infectious etiology. He was treated with broad-spectrum antimicrobials for presumed meningitis. However, his condition rapidly deteriorated, and he met clinical criteria for brain death within 36-hours of admission to our PICU. Post mortem studies revealed edema, tonsillar herniation and diffuse infiltration of the leptomeninges by cells having features consistent with DLGT.
Results Discussion
DLGT is characterized by widespread leptomeningeal disease and histologic evidence of atypical oligodendroglial-like cells. On MRI, DLGT demonstrates contrast enhancement of leptomeninges, leptomeningeal cysts, and secondary communicating hydrocephalus when these features are present. Symptoms are suggestive of increased ICP secondary to communicating hydrocephalus, including headache, nausea, vomiting, ataxia, and/or papilledema. The prognosis of these tumors is variable and most have an indolent course; however, considerable morbidity and mortality can result. There is currently no standardized treatment for DLGT.
Conclusion(s) Conclusion
DLGT is a newly recognized tumor, and this is one of the first case reports written utilizing the revised nomenclature. DLGT is an important diagnosis in the differential for a pediatric patient presenting with nonspecific neurological signs, concerns for hydrocephalus, leptomeningeal enhancement on neuroimaging, and a presumptive diagnosis of meningitis not responding to antimicrobials.

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Abstract: 369
Beyond Mortality: Assessing Pediatric Palliative Needs
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Background Pediatric palliative care is an interdisciplinary service that works to enhance the quality of life for children with serious illness. Unfortunately, the need for palliative care is difficult to ascertain and is often inaccurately based on mortality data, specifically the incidence of complex chronic conditions at the time of death. Currently, it is estimated that palliative care is appropriate in 27-60% of pediatric deaths nationally.
Objective This study seeks to understand the palliative care needs of an inpatient pediatric population.
Design/Methods A cross-sectional survey of pediatric inpatients was performed using a palliative care referral questionnaire, identifying the following characteristics: 1) serious, life-limiting diagnosis, 2) frequent admissions and escalating care requirements, 3) persistent, poor symptom control, 4) need to clarify the goals of care, or 5) none of the above apply. The survey was administered by senior pediatric residents upon admission to Yale New Haven Children's Hospital in the Fall of 2015. Patients admitted to the pediatric intensive care unit (PICU), hematology, oncology, and bone marrow transplant unit (Heme/Onc/BMT), and to general medical units under hospitalist, primary care physician, or subspecialty physician were included.
Results 273 questionnaires were completed. Nearly half of patients (122/273) met at least one palliative care referral criterion. 74% of patients were identified as having a serious illness, with 70% meeting additional palliative care referral criteria (63/90). 21% of patients with a serious, life-limiting diagnosis met all four criteria. Poor symptom control was reported in 55% of patients with positive surveys, comprising 25% of all patients surveyed (67/273). Needs varied based on location of admission, with 75% of PICU patients, 56% of Heme/Onc/BMT patients, and 31% of general/subspecialty patients meeting at least one palliative care referral criterion.
Conclusion(s) This study identifies a considerable need for palliative care among pediatric inpatients at a tertiary care children's hospital. The results are consistent with national trends among dying patients, but expands our understanding of palliative medicine needs based on morbidity among living patients. This approach allowed for recognition of the 25% of pediatric inpatients suffering from poor symptom control who could benefit from palliative care consultation. Furthermore, these data help to clarify where palliative care services are most urgently needed within the hospital, and can guide the distribution of resources.

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Abstract: 370
Driving Process reliability from K-card to Key card - A family centered approach to promoting Central line safety in Pediatric Oncology patients
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Background Engaging the frontline and family are two primary key drivers in our journey towards reducing Hospital Acquired Conditions (HAC). The NYU Winthrop Children's Medical Center's QI team developed Kamishibai cards (Kcards) for CLABSI

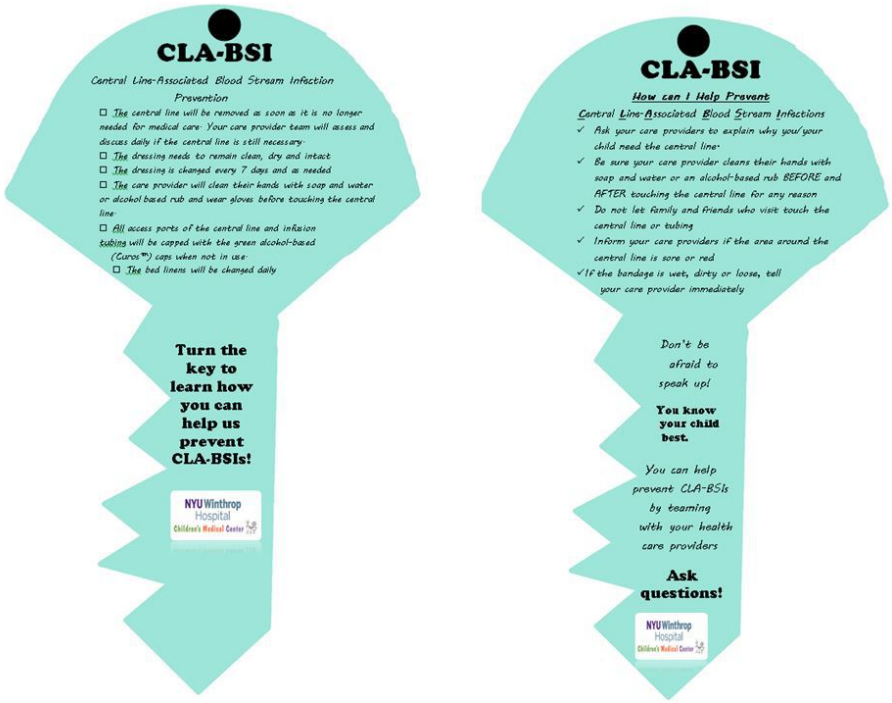
reduction using the framework from Children's Hospitals Solutions for Patient Safety (SPS) program to improve frontline engagement, and thereby bundle compliance. Real-time discussion of bundle elements using K-card audits provided direct feedback, and opportunities to discuss barriers to execution while influencing behavior. We extended the same concept to engage families using an innovative Key card program.

Objective To improve parental engagement with the use of specifically designed Key cards and improving process reliability for CLABSI.

Design/Methods In addition to K-cards, Key cards were developed using Central line bundle elements translated into simple language that can be easily understood by our patients and families (Fig 1). These were presented to our Patient and Family Advisory council and rolled out for CLABSI HAC team with our Oncology patient population. The Key cards underwent final revisions and Spanish translations based on feedback from families. The family of every oncology patient with a central line received a CLABSI Key card with detailed explanation. Since the last CLABSI in our oncology unit was more than 2 years ago, CLABSI rate could not be used for evaluating outcomes. We continued to measure existing Central line process measures for bundle compliance. A family engagement survey was also conducted using an anonymous parent questionnaire to evaluate our Key card program (Fig 2).

Results Since the implementation of K-card audit our process reliability for the CLABSI improved to >90% consistently. Family engagement survey showed that 100% of the parents believed it helped them understand the central line processes better. Of the survey respondents, 94% (15/16) strongly agreed with improved patient satisfaction from the Key cards.

Conclusion(s) Use of Key cards improves family engagement in oncology patients, thereby improving patient satisfaction scores. It is akin to using K-cards with the front line staff which reinforces positive behavior, thereby improving safe practices. The key card serves as a tool to educate families, facilitating discussion around safety and empowers families to ask questions. Our Key card program has now expanded to other HACs (CAUTI, Falls/Newborn Drops and Breast Milk Safety).



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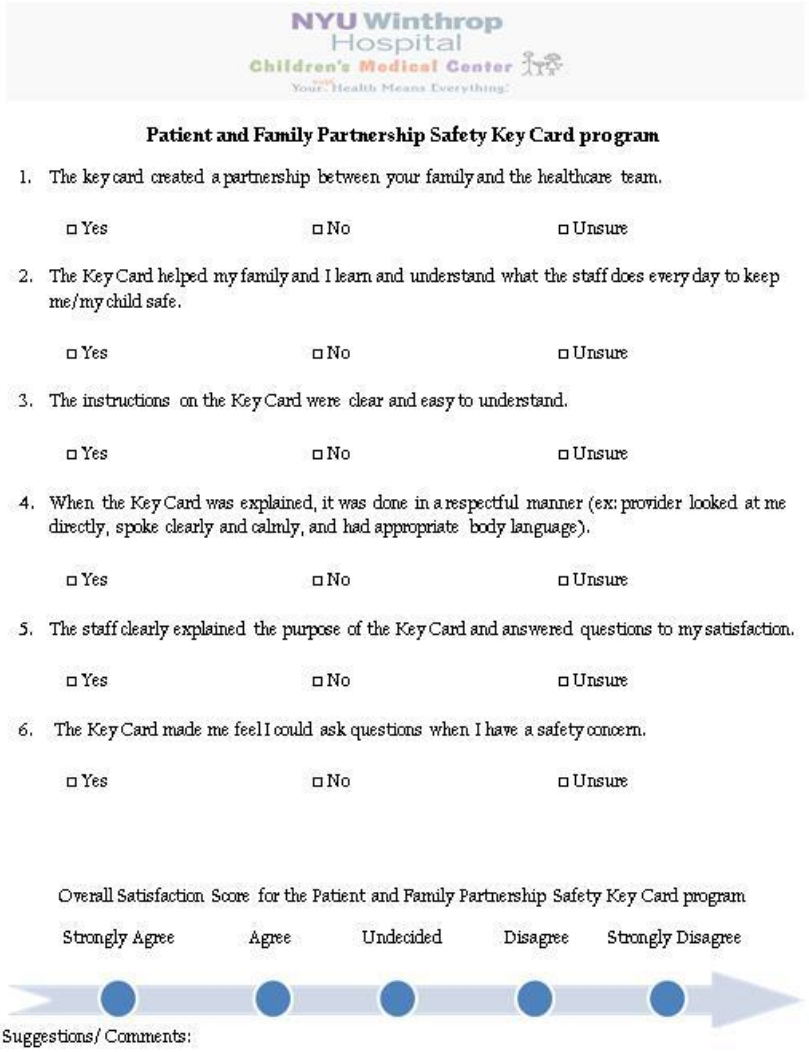
Key Card for CLABSI. These cards use a plain language summary of the questions from central line checklists to educate the family and patient (when applicable).



Family engagement survey. This questionnaire was used to obtain input from the family members about the Key cards.

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Abstract: 371

Biomarkers to Predict Severity of Vaso-occlusive Crisis in the Pediatric Age Group

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Background Vaso-occlusive crisis (VOC) is a major cause of hospital admissions in children with Sickle Cell Disease (SCD). Although the use of clinical biomarkers in VOC has been studied, especially with regards to Acute Chest Syndrome (ACS), there is less data regarding overall VOC severity prediction. In addition new biomarkers such as platelet to lymphocyte ratio (PLR), neutrophil to lymphocyte ratio (NLR), and lymphocyte to monocyte ratio (LMR) have been little studied with regards to SCD.
Objective To identify whether admission laboratory values, changes from well baseline laboratory values, and new biomarkers such as PLR, NLR, and LMR could predict severity of Vaso-occlusive crisis in children with Sickle Cell Disease admitted with VOC.
Design/Methods This was a retrospective single center observational study of admissions of VOC in children aged 1 - 21 years with HbSS or HbS-b0thal from September 2014 to November 2017 excluding those on hyper-transfusion protocol or having an admission diagnosis of ACS. Univariate analysis was done using Student's T-test, Mann-Whitney non parametric test, or Fischer's exact test as appropriate depending on the distribution between admission laboratory data of complete blood count (CBC), reticulocyte count, comprehensive metabolic panel, lactate
dehydrogenase (LDH), PLR, NLR, LMR, change from well baseline CBC values within 6 months previously and the development of complicated VOC. Complicated VOC was defined as the development of secondary acute chest syndrome, prolonged admission duration > 5 days (120 hours), requirement of blood transfusion, and readmission within 30 days.
Results A total of 110 admissions were studied. Sixty (54.5%) were female. Of the 110, 49 (44.5%) were complicated with no significant differences in sex (p 0.338) or age (p 0.502). Univariate analysis revealed significant elevations in total bilirubin (p 0.025), LDH (p 0.009), and platelet count (p 0.020) in those with complicated VOC. There is also significant difference in the percentage change of platelet count from baseline with greater decline in uncomplicated VOC (p 0.005). There were no significant differences in PLR (p 0.190), NLR (p 0.883), or LMR (p 0.536).

Conclusion(s) Elevations in total bilirubin, LDH, and platelet count in admission laboratory values are associated with developing complicated VOC. In addition those with complicated VOC present with significantly less decline in platelet count from baseline well CBC. PLR, NLR, and LMR do not seem to be useful predictive biomarkers for severity of VOC.

Selected Laboratory Parameters

Parameter		Complicated	Non Complicated	Significance
LDH (IU/L)	N	46	52	p=0.009
	Mean	1348.91	1072.21	
	Std	503.54	519.03	
PLT (x10^9/L)	N	49	61	p=0.020
	Mean	352.10	300.43	
	Std	126.99	95.22	
T.bili (µmol/L)	N	38	43	p=0.025
	Median	3.00	1.90	
	Q1	1.95	1.30	
	Q3	3.95	3.20	
Delta Platelet (%)	N	29	32	p=0.005
	Median	0.25	-23.81	
	Q1	-16.68	-31.99	
	Q3	11.28	-2.50	
PLR	N	49	61	p=0.190
	Mean	127.54	107.19	
	Std	92.78	60.91	
NLR	N	49	61	p=0.883
	Median	2.74	2.20	
	Q1	1.14	1.28	
	Q3	5.25	4.49	
LMR	N	49	61	p=0.536
	Median	2.00	2.80	
	Q1	1.46	1.78	
	Q3	4.99	4.08	

LDH = Lactate dehydrogenase; PLT=Platelet count; T. bili = Total bilirubin; Delta platelet= % change in platelet from baseline, PLR= Platelet to lymphocyte ratio(platelet count/lymphocyte count); NLR= Neutrophil to lymphocyte ratio(neutrophil count/lymphocyte count); LMR= Lymphocyte to monocyte ratio(lymphocyte count/monocyte count)

Demographics

Parameter		Complicated	Non Complicated	Significance
Sex (N / %)	Female	24 (21.82%)	36 (32.73%)	p=0.338
	Male	25 (22.73%)	25 (22.73%)	
Age (Years)	N	49	61	p=0.502

	Mean	14.122	13.541	
	Std	4.055	4.995	

N= number of cases, %= percent of total number of cases studied (110)

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Abstract: 372

Pica and Neuroimaging in Sickle Cell Disease

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Background Silent cerebral infarct (SCI) is an important complication of sickle cell disease (SCD) with majority of children developing them in the first decade of life. MRI brain is the best diagnostic modality for SCI. Pica is described as persistent eating of food substances for ≥1 month in individuals ≥2 years of age. Pica has been associated with iron deficiency, lead poisoning and with mental and developmental delay including autism spectrum disorder, schizophrenia, obsessive-compulsive disorder and psychosocial problems. There is an increased incidence of pica in children with SCD. These abnormal eating patterns are associated with an increased number of episodes of sickle cell crises and hospitalizations in children with SCD.

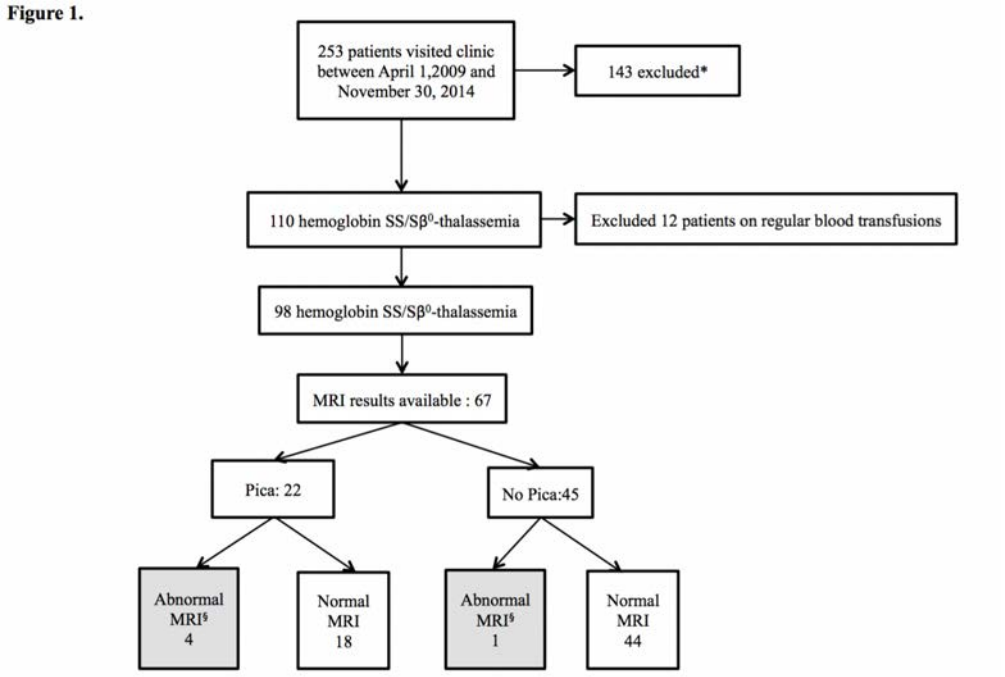
Objective To explore the relationship of pica and SCI in children with hemoglobin-SS/Sβ^0-thalassemia.

Design/Methods A retrospective chart review was conducted of patients with SCD. 2-21 years old patients with hemoglobin-SS disease and Sβ^0-thalassemia who were not on regular blood transfusions, who had ≥2 visits AND with a history of pica were included. Patients were considered to have pica if there was history of eating nonfood substances at ≥1 visit. Screening MRIs were available on a subset of patients. Analysis of the data was performed using a z test.

Results Of the 98 children (48 females and 50 males, mean age 10.5 years) included, 33(33.7%) had pica (Figure 1). None were thought to be iron deficient based on history, a normal MCV or normal iron studies. Screening for lead poisoning was negative. MRIs were performed in 67/98 children. Of these, 22 had a history of pica and 45 did not. Of the 22 children with pica, 4(18.2%) showed SCI on MRI, while only 1(2.2%) of 45 children without pica had SCI (p=0.0195, z=2.335). All five patients had normal neurological examination without focal neurological deficits.

Conclusion(s) Children with SCD are at high risk of developing SCI. The incidence of pica is high in children with SCD. Pica may be an indicator of organic brain disease in children with SCD who are at risk of developing/have developed SCI. A positive history of pica may be a marker to identify children who need a MRI. Prospectively evaluating history of pica in a larger cohort of patients and evaluating MRI findings, school performance, formal neurocognitive testing and neurological examination would help to better understand the correlation between SCI and pica in children with SCD.

Figure 1.



Summary of Main Results

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Abstract: 373
A Comparison of Immune Reconstitution following Human Placenta-Derived Stem Cells (HPDSC) with Umbilical Cord Blood Transplantation (UCBT) vs. UCBT alone in Pediatric Recipients with Malignant and Non-malignant Diseases
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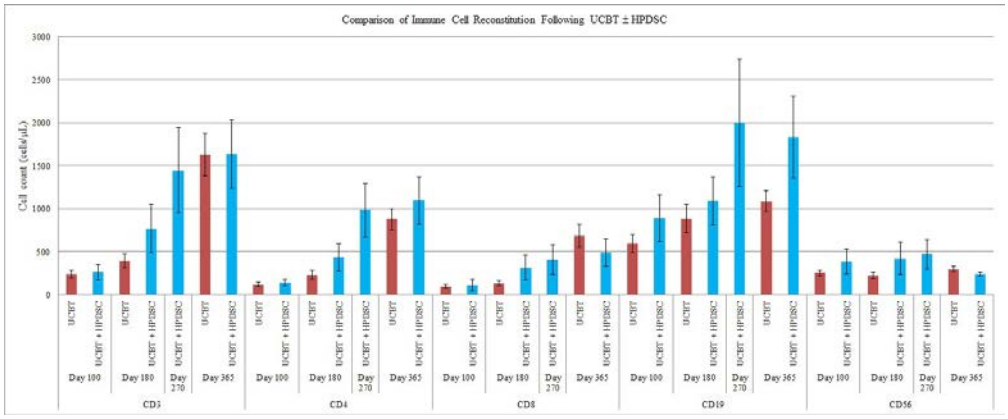
Background UCBT is a safe and effective treatment in children (Geyer/Cairo et. al BJH, 2011). However, due to a limited concentration of hematopoietic progenitor cells (CD34+) in UCB, UCBT has been associated with delayed hematopoietic reconstitution and a higher incidence of engraftment failure. HPDSCs contain a rich population of HPCs, are low in HLA Class I/II expression and T-cells, and have regenerative, anti-inflammatory, and immunosuppressive properties (Cairo et. al BMT, 2015).
Objective To determine whether UCBT + HPDSC (vs. UCBT alone) is associated with enhanced hematopoietic and immune cell reconstitution in children with malignant and non-malignant diseases.
Design/Methods Immune cell reconstitution at days +100, 180, 270 and 365 was assessed in children who received UCBT with HPDSCs at NYMC (NCT01586455, IND#14949). Minimum TNC was $\geq 5 \times 10^7$/kg (4/6 HLA match) or $\geq 3.5 \times 10^7$/kg (5-6/6 HLA match). Immune cell subset counts at these time points were compared to those from a historical population of pediatric recipients of UCBT alone (Geyer/Cairo et. al BJH, 2011).
Results Twenty four patients ≤18 years were enrolled. Mean age was 6 (range, 0.3-17) years. Malignant diseases =14, non-malignant diseases =10. Fourteen patients received myeloablative conditioning (MAC) and ten patients received reduced toxicity conditioning (RTC). There were no severe adverse events associated with HPDSC infusion. Two patients with non-malignant disease receiving RTC using alemtuzumab experienced primary graft failure. Probability of neutrophil engraftment was 91.6 %, median day 22 (13-53). Of evaluable patients at day 100, the probability of platelet engraftment in neutrophil engrafted patients was 100%, median day 43.5 (20-98). At days 30, 60, 100 and 180, mean percent donor chimerism in whole blood was 94, 98, 95, and 99%, respectively. Average percent of whole blood HPDSC chimerism was 1% at day 30 and <1% at beyond day 60. One patient with malignant disease relapsed. 12 month overall survival was 83.3%. There was no significant difference in CD3, CD4, CD8, CD19 and CD56 immune cell reconstitution following UCBT ± HPDSC vs. UCBT alone (Image 1).
Conclusion(s) These results suggest that UCBT ± HPDSC results in similar immune cell reconstitution. A larger cohort with extended follow-up would be required to confirm these preliminary findings.
Supported by a grant from Celgene Cellular Therapeutics.



Comparison of Immune Cell Counts (Mean ± SEM) of Evaluable Patients Who Received RTC or MAC Treated with UCBT ± HPDSC at Days +100, 180, 270, 365.

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Abstract: 374
Etiology And Outcomes Of Neonatal Thrombocytopenia: A Single Institution Experience
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Background Thrombocytopenia is the most common hematological abnormality encountered in the neonatal intensive care unit (NICU). However, incidence varies among neonatal populations because of its numerous etiologies. Thrombocytopenia can result in significant adverse events due to blood loss if not managed appropriately.
Objective To analyze the incidence, causes, treatment and outcomes of thrombocytopenia in neonates admitted to a Level 3 NICU.
Design/Methods Medical records of 1606 neonates admitted to our NICU between Jan 2014 and Dec 2016 were retrospectively reviewed. Neonates with at least 1 episode of thrombocytopenia, defined as a platelet count <150 x 10^9/L, were included. Data on gestational age, gender, birth weight, bleeding event(s), platelet transfusion requirements, and post-transfusion outcomes were collected. Thrombocytopenia was stratified according to: severity [Mild (100-149 x 10^9/L), Moderate (50-99 x 10^9/L), or Severe (<50 x 10^9/L)]; and time of onset [Early-onset thrombocytopenia (EOT) (within the 1st 72hrs of life) and Late-onset thrombocytopenia (LOT) (after 72hrs)]. Statistical analyses were performed using chi-square and Fisher's exact test. A p value of ≤ 0.05 was considered statistically significant.
Results The study population comprised 811 preterm and 795 term infants. 115 episodes of thrombocytopenia were identified in 108 (6.7%) infants, and 7 (6.5%) had one recurrent episode. Incidence of thrombocytopenia was significantly higher in neonates who were: preterm [71 (66%); p<0.001], of low birth weight (<2.5 kg) [75 (69%); p<0.001], and male [63 (58%); p=0.045]. Maternal hypertensive disorders (34%) and intrauterine growth retardation (IUGR) (26%) were identified as the most common causes of EOT. Sepsis (35%) was the most common LOT cause. Severe thrombocytopenia was found in 41 (36%) infants, and of those, 10 (32%) had bleeding events (p=0.25). Platelet transfusion was required in 33 (31%) neonates, of those 26 (79%)(p=0.045) were preterm and 6 (18%) of these neonates had thrombocytopenia due to sepsis (p=0.38). The rate of mortality post-transfusion was 12% (n=4; p=0.05).
Conclusion(s) The higher incidence of thrombocytopenia in preterm, low birth weight, and male neonates was statistically significant. There was a statistically significant correlation between prematurity and the need for platelet transfusion. Although it didn't reach statistical significance, required platelet transfusion was associated with increased mortality and higher bleeding events was observed with severe thrombocytopenia.

Causes Stratified as Early-Onset Thrombocytopenia (EOT) And Late-Onset Thrombocytopenia (LOT)

Causes Of Early-Onset Thrombocytopenia	n	Causes Of Late-Onset Thrombocytopenia	n
Maternal Hypertension	17	Maternal Hypertension	1
Maternal ITP	2	IUGR	2
Gestational Thrombocytopenia	3	NEC	1
NAIT	2	Clinical Sepsis	3
GDM	6	Confirmed Sepsis	5
IUGR	8	Congenital CMV	1
NEC	1	Perinatal Asphyxia with HIE	1
Trisomy 21	5	Placental Abruption	2
Polycythemia	1	Polycythemia	2
Perinatal Asphyxia with HIE	3	Idiopathic	6
Clinical Sepsis	1	Placental Abruptiom, NEC	2
Confirmed Sepsis	1	Total	26
Congenital CMV	1		
DIC	1		
SGA	3		
Placental Pathology (Abruption, Calcification)	8		
Idiopathic	8		
Preeclampsia/HELLP , Severe IUGR	10		
Placental Abruption, IUGR	2		
Placental Abruption, NEC	1		
GDM, Trisomy 21	1		

GDM, SGA, Trisomy 21	1		
Maternal Hypertension, GDM, IUGR	3		
Total	89		

Most common causes of EOT: Maternal hypertensive disorders (34%) and IUGR (26%); Most common cause of LOT Sepsis (35%).
Abbreviations: ITP - Idiopathic thrombocytopenic purpura, NAIT - Neonatal Alloimmune Thrombocytopenia, GDM - Gestational Diabetes Mellitus, IUGR - Intrauterine Growth Restriction, NEC - Necrotizing Enterocolitis, HIE- Hypoxic ischemic encephalopathy, CMV- Cytomegalovirus, DIC - Disseminated Intravascular Coagulation, SGA - Small for gestational age, HELLP- Hemolysis, Elevated liver enzymes, low platelets.

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Abstract: 375

Comparison of End Tidal Carbon Monoxide versus Direct Antibody Test in the management of NeonatalHyperbilirubinemia

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Background Hemolysis in the newborn is a risk factor for bilirubin induced neurological dysfunction (BIND), and the AAP recommends beginning phototherapy at lower levels of bilirubin in the presence of hemolysis. It is recommended that infants that are direct antibody test (DAT) positive should be managed as if they are hemolyzing. However, positive DAT is not always associated with evidence of hemolysis. End tidal carbon monoxide (ETCO) levels are a more direct measurement of the degree of hemolysis and can be quickly and easily performed at the bedside. In our urban predominantly African-American population, only about 25% of DAT positive infants hemolyze
Objective Compare ETCO vs direct antibody testing (DAT) as an indicator of hemolysis, and as a guide to the management of jaundice
Design/Methods Retrospective chart review of all infants >35 weeks gestation whose ETCO was measured, between July 2016 and October 2017. Bilirubin screening was performed as per hospital protocol. ETCO was performed on all infants who were DAT + or were in the high-intermediate or high risk zone of the Bhutani nomogram. ETCO was measured with a CoSense ETCO monitor (Capnia, Inc., Redwood City, CA). An ETCO level of ≥2.5PPM (>95%) was considered positive for hemolysis. Exclusion criteria included infants <35 weeks, history of maternal smoking during 3rd trimester and infants with congenital anomalies.
Results 104 infants met entry criteria. 40 were DAT positive of whom 10(25%) were ETCO positive, 42 were DAT negative and 22 presumed DAT negative. ETCO was >2.5 PPM in 26 infants, with only 10 (38.5%) being DAT positive. Comparing a positive ETCO (≥2.5PPM) with a significant rate of rise in bilirubin (≥0.2mg/dL/hr), no statistical significance was detected, P= 0.365. However, when ETCO and rate of rise were examined as continuous variables, there was significant positive correlation, p= .00002. DAT and ETCO were not statistically correlated, p= 0.203. When taking ETCO into account, 12/104 infants (11.5%) had a change in management plans compared to treatment based on bilirubin levels and DAT.
Conclusion(s) 11.5% of infants had a change in management plans when using ETCO as a measure of hemolysis as opposed to just DAT results. There was a highly significant correlation between ETCO levels and rate of rise of bilirubin level. Further studies on a larger sample are recommended to elucidate the plausible role of ETCO as an important tool in management of neonatal jaundice.

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Abstract: 376

Astrocyte Function and Glutamine Synthesis in the Hypoxic Piglet Brain.

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Background Astrocytes form glio-neuro-vascular networks that organize structure and function of the brain. It has been shown that most the astroglial membrane is stretched into thin lamellipodia that enwrap synapses and prevent neurotransmitter (NT) spill-over to surrounding cells, both mechanically and by transporters which scavenge NTs from synaptic space and accumulate them in astrocytes. Glutamine synthetase, an enzyme exclusively located in the cytoplasm of astrocytes, converts ammonia and glutamate into glutamine that is then transported into neurons, maintaining metabolic supply and preventing toxicity. Unlike neurons, astrocytes are known to adapt to anaerobic conditions by increasing affinity to glucose, which can help neurons survive transient periods of hypoxia.
Objective To test the hypothesis that glutamine synthesis, as indicator of astrocyte function, is preserved after hypoxia in the piglet brain.
Design/Methods Piglets (3-5 days old) were ventilated with FiO2 0.06 x1hr then returned to FiO2 0.21 x4hrs (Hx; n=8). ATP levels were measured biochemically in cerebral cortical tissue (CC) to determine energy status. Glutamine and glutamate (μMol/g tissue) in cytosolic extracts of CC were determined using HPLC, and compared to normoxic controls (Nx; n=4; M±SD).
Results Exposure to hypoxia resulted in significant hypoxemia (PaO2 24.5±4.9 mmHg), 59% decrease in systolic BP ($p<0.05$ vs baseline) and 70% reduction in cerebral ATP compared to Nx ($p<0.01$) indicating energy failure. Glutamine levels were 5.07±1.71 in

Nx and 8.94±4.48 in Hx. Glutamate levels were 8.22±1.17 in Nx and 6.08±1.29 in Hx ($p<0.05$ vs Nx). The data show significant increase in glutamine relative to glutamate in Hx brains after reoxygenation compared to Nx ($p<0.05$).
Conclusion(s) We conclude that glutamine synthesis is preserved in the hypoxic piglet brain. The observed reductions in glutamate after hypoxia are consistent with neuronal glutamate release and its subsequent uptake and metabolism by astrocytes. Hypoxia is known to cause cytotoxic edema and swelling of the astrocytes with retraction of astroglial processes off their neuronal contacts, which could impede transport of metabolites from astrocytes to neurons. We propose that mechanisms for glutamine transport into neurons to replenish their stores may be impaired after hypoxia, resulting in accumulation of glutamine in astrocytes. Understanding the effects of hypoxia on astrocytes can provide insight into novel mechanisms of brain injury that can be targeted with interventions to improve outcomes after hypoxia.

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Abstract: 377

Cerebro-Cerebellar Diaschisis in Preterm Infants following Unilateral Cerebral Parenchymal lnjury

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Background Brain injury in very preterm infants remains a major risk factor for later neurodevelopmental disabilities. The developmental relationship between early life cerebral parenchymal brain lesions on the immature cerebellum in preterm infants remains unclear.
Objective To determine whether early life unilateral cerebral parenchymal injury in preterm infants is associated with decreased ipsilateral cerebral tissue and contralateral cerebellar volumes at term equivalent age (TEA) in preterm infants versus healthy term controls using advanced, 3D volumetric MRI.
Design/Methods We prospectively recruited preterm infants (< 32 wks at birth, birthweight < 1500g) with isolated unilateral/asymmetric cerebral parenchymal injury on preterm MRI and healthy control term infants and performed term equivalent 3D volumetric MRI studies. We created 3D high-resolution reconstructions of the brain and calculated volumes through manual segmentation for cortical grey matter, white matter, deep grey structures, brainstem, cerebellum and cerebrospinal fluid using ITK-SNAP and Convert3D. The cerebral and cerebellar segmentations were then parcellated into left and right hemispheres. Paired t-test were used to compare left and right hemisphere volumes among the preterm group. A two-sample t-test was used to compare volumes of each region in both groups.
Results We studied 46 infants, 20 preterm with unilateral cerebral parenchymal injury and 26 term healthy controls (Table 1). Term infants had significantly higher cerebral and cerebellar volumes compared to preterm infants at TEA ($p < 0.05$ for all regions of interest). In preterm infants with unilateral cerebral parenchymal injury, intraventricular CSF volume was significantly higher on the injured cerebral hemisphere, while white and deep grey matter volume ipsilateral to the injury were significantly decreased. Contralateral cerebellar volumes were significantly reduced compared to the ipsilateral cerebellar hemispheric volume (Table 2).
Conclusion(s) We report that unilateral cerebral parenchymal injury is associated with increased CSF volume and decreased white and deep gray matter volumes ipsilateral to the cerebral injury, with concomitant cerebellar volume loss contralateral to the the cerebral injury by term MRI. These data provide evidence of diaschisis through interruption of cerebro-cerebellar connectivity in preterm infants by term equivalent age suggesting a potential window of therapeutic opportunity.

TABLE 2: TERM EQUIVALENT MRI OF PRETERM SUBJECTS WITH UNILATERAL CEREBRAL PARENCHYMAL INJURY

Regions of Interest	Injured Hemisphere Volume (mm3)	Non-Injured Hemisphere Volume (mm3)	*p* value
White Matter	68342 (+/- 16807)	70493 (+/-17288)	0.012
Internal CSF	39739 (+/- 69122)	26684 (+/- 40493)	0.047
Cortical Grey Matter	59394 (+/- 14037)	59192 (+/- 13879)	0.82
Deep Grey Matter	9822 (+/- 2705)	10381 (+/- 3063)	0.12
Cerebellum	6830 (+/- 2395)	6159 (+/- 2617)	0.0035
Brainstem	2557 (+/- 585)	2444 (+/- 461)	0.069

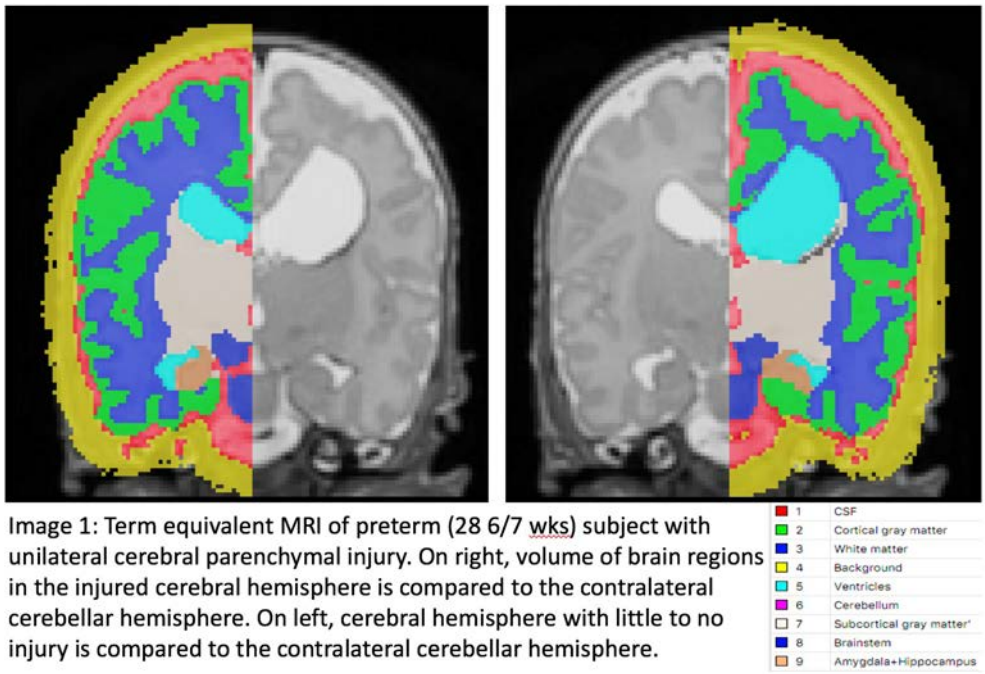

Image 1: Term equivalent MRI of preterm (28 6/7 wks) subject with unilateral cerebral parenchymal injury. On right, volume of brain regions in the injured cerebral hemisphere is compared to the contralateral cerebellar hemisphere. On left, cerebral hemisphere with little to no injury is compared to the contralateral cerebellar hemisphere.

Table 1: Preterm Injury and Term Healthy Control Demographics

Subjects	Mean Birthweight (grams)	Mean GA at Birth (weeks)	Mean PCA at MRI (weeks)
Injured	809 (+/- 300)	25.5 (+/- 2.5)	40.1 (+/- 1.7)
Controls	3281 (+/- 410)	39.5 (+/- 0.7)	40.1 (+/- 0.7)
p value	< 0.001	< 0.001	0.82

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Abstract: 378

Buprenorphine for Treatment of Neonatal Abstinence Syndrome Following In Utero Exposure to Opioids and Benzodiazepines
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Susan C. Adeniyi-Jones[1], Jay Greenspan[1], Diane Abatemarco[1], Heather Aldridge[2], Michelle Ehrlich[3], Walter Kraft[1]

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Background Infants exposed to opioids in utero experience the Neonatal Abstinence Syndrome (NAS), often requiring prolonged therapy with opiods. Dual exposure to opioids and benzodiazepines (BZD) results in more severe and prolonged postnatal NAS. The Blinded Buprenorphine OR Neonatal morphine trial (BBORN Trial; Kraft et al. NEJM 2017) and 2 earlier RCTs showed that sublingual Buprenorphine (BUP) shortened the length of treatment (LOT) and length of stay (LOS) for NAS by ~ 46% compared to oral morphine. However, these studies excluded infants who had concomitant in utero exposure to opioids and benzodiazepines (BZD) for safety concerns of potential BUP-BZD interaction. The efficacy and safety of BUP for NAS after dual exposure to BZDs and opiates in utero is not known.

Objective To explore the safety and efficacy of sublingual BUP as treatment for NAS in infants with in utero exposure to opioids and BZDs.

Design/Methods This was an IRB- approved, prospective, randomized study of open-label BUP or oral morphine for NAS in infants co-exposed to opioids and BZDs in last 30 days of pregnancy (NCT01671410). Exclusion criteria: < 37 wks GA, Bwt < 2.2 Kg, medical illness, bilirubin > 20 mg/ml, hypoglycemia or major congenital malformations. After informed consent, enrolled infants were assessed every 3 hours using a modified Finnegan NAS scoring tool (FNAS). Infants with an FNAS score of ≥ 12 or sum of 3 scores ≥ 24 were admitted to the NICU and randomized to receive sublingual BUP or morphine. Doses were increased by 25% until symptoms were controlled. Phenobarbital was added if symptoms persisted at maximum doses of opioid (BUP 60 mcg/k/day; Morphine 1.2 mg/k/day). Weaning occurred in 10% decrements. All infants received standard non-pharmacologic interventions. Groups were compared for LOT and LOS.

Results Eleven infants were enrolled (MOR = 5, BUP = 5, after 1 BUP withdrew). All infants received formula. As shown in the table

below, demographic data were similar for both groups. There were no significant differences in LOT or LOS, however there was a trend towards shorter LOT and LOS in the BUP group. There were no serious adverse events noted in either group.
Conclusion(s) In the small number of infants studied, BUP treatment was a safe and effective treatment for NAS in infants co-exposed to opioids and BZDs, however, a larger study is needed to confirm this finding.
There was a strong trend towards

	Buprenorphine (n=5)	Morphine (n=6)	P value (95% CI)
Gestational Age (wks)	39.5 ± 1.3	39.5 ± 1.3	0.95 (-1.98 to 1.86)
Birth Wt (Kg)	2.98 ± 0.42	3.23 ± 0.38	0.37 (-0.31 to 0.74)
Length of Treatment (days)	20.4 ± 11.2	33.4 ± 12.9	0.12 (-30.6 to - 4.6)
Length of Stay (days)	26.0 ± 11	37.6 ± 13.2	0.17 (-29.3 to 6.1)
Phenobarbital (n)	0	1	
Low lactose formula (n, %)	3, 60	4, 67	
Diaper rash (n, %)	2, 40	0	

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Abstract: 379
Respiratory and Hemodynamic changes in Neonates with Hypoxic Ischemic Encephalopathy during and after Whole Body Hypothermia
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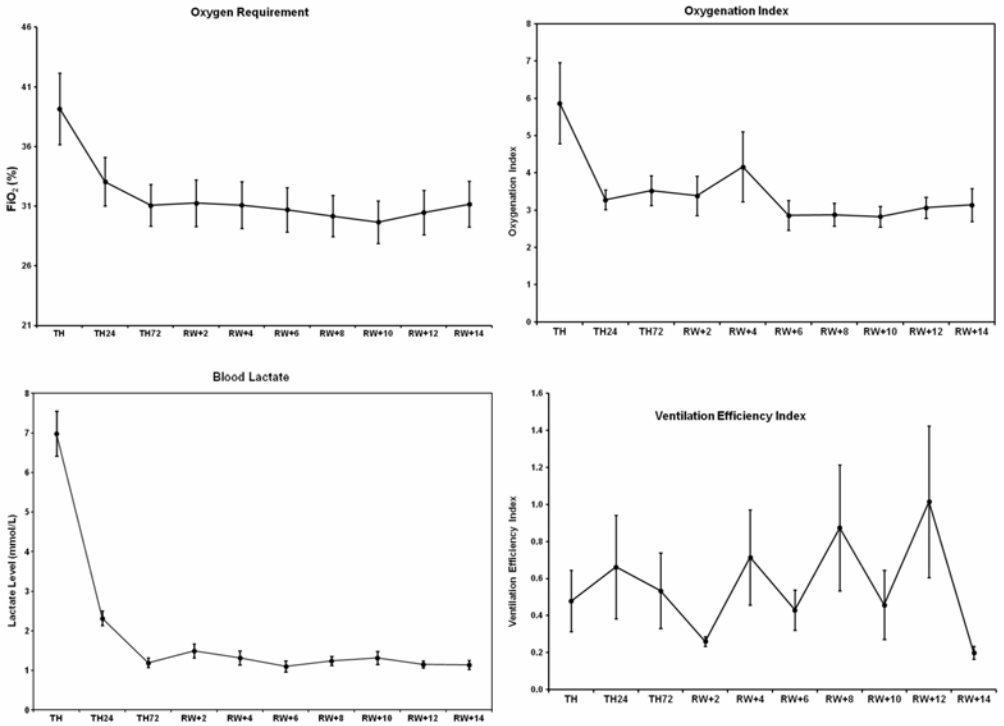
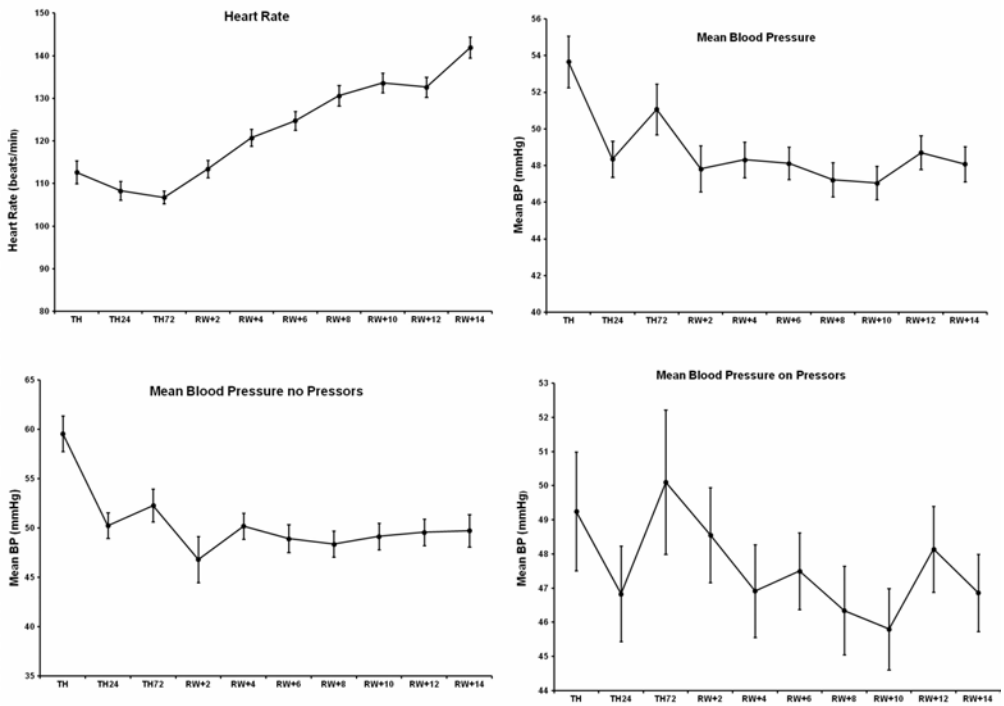
Background Whole body hypothermia (WBH) has become the standard of care for neonates with moderate to severe hypoxic ischemic encephalopathy (HIE) to improve neurodevelopmental outcomes. Much of the interest on WBH has focused on brain function and there is less information on the effect of WBH on other body organs such as the lungs. There is concern that WBH, by reducing metabolic demand, can reduce the need for respiratory support during cooling because of decreased oxygen consumption and carbon dioxide production; but with return to normal body temperature, there may be an increase in metabolic demand with subsequent need for increase in respiratory support. Previous studies have looked at post-operative cardiac patients and showed an increase in metabolic demand after rewarming, but these patients were also under general anesthesia which can add on to the effects of hypothermia. Little data exists examining changes in metabolic demand in newborn infants undergoing WBH without the effect of general anesthesia.
Objective To determine the degree to which WBH impacts metabolic demand and need for respiratory support during cooling and the subsequent rewarming period as measured by oxygenation index (OI), ventilation efficiency index (VEI), fraction of inspired oxygen (FiO_2), blood lactate level, heart rate (HR), and mean blood pressure (MBP).
Design/Methods The medical records of infants treated with WBH for HIE at MedStar Georgetown University Hospital were reviewed. Data for OI, VEI, FiO_2, blood lactate level, HR and MBP were collected from defined time points from the beginning, middle, and end of WBH, and then every 2 hours from the beginning of rewarming for 14hrs. Sixty five infants were included, while 10 infants, all who required ECMO while still undergoing WBH, were excluded from analysis. Data were analyzed using Chi square analysis. P value < 0.05 was considered as significant.
Results Heart rate significantly decreased during WBH and slowly increased during rewarming. Lactate level, OI, VEI, FiO_2, and MBP all decreased during WBH, but there was no significant increase noted in these parameters during rewarming.
Conclusion(s) As expected, there was a decrease in metabolic demand as measured by oxygen requirement, OI, HR and MBP during WBH, but the anticipated increase in support during and after rewarming was not significant. Some of this effect may be explained by expected improvement in the respiratory condition over time.



Changes in Oxygen requirement, OI, blood lactate level and VEI during WBH and rewarming



Changes in Heart Rate and Blood Pressure during WBH and rewarming

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Abstract: 380

Temporal changes in Calbindin-1 expression within the hippocampus following neonatal hypoxia-ischemia and therapeutic hypothermia.

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Background Neonatal hypoxia-ischemia (HI) produces hippocampal injury leading to memory impairment despite treatment with hypothermia (TH). In the hippocampus, the expression of Calbindin-1 (Calb1), a Ca^{2+} buffering protein, increases with post-natal development and decreases with aging and in neurodegenerative disorders. Since impaired Ca^{2+} homeostasis is one of the main mechanisms leading to cell death, changes in the pattern of regional Calb1 expression may explain the vulnerability of the hippocampus to HI injury and partial response to TH.
Objective To study the expression of hippocampal Calb1 following HI and TH and the link with memory outcomes in a mouse model.
Design/Methods We induced cerebral HI in C57B6 mice at p10 with right carotid ligation and 45m of hypoxia (FiO_2=0.08), followed by normothermia (36°C, NT) or TH (30°C) for 4h with anesthesia-shams as controls. A subset of mice performed hippocampal-dependent memory behavior task (Y-Maze) at p22-26 before harvesting the brain at p40. Nissl staining and GFAP immunohistochemistry (IHC) was used to confirm brain injury at p11, p18, and p40 prior to assessment of Calb-1 expression by IHC. ImageJ software and IBM SPSS was used to analyze optical density and correlation with memory outcomes.
Results Within the ventral hippocampus, Calb1 expression of sham mice increased by 45% (ANOVA F=3.4, p=0.02) between p11 and p40. This post-natal increase in hippocampal Calb1 expression was prevented by HI, but preserved by TH (ANOVA F=8.8, p=0.02). Calb1 expression was unchanged in the dorsal hippocampus of sham mice between p11 and p40. However, HI produced an early and transient decrease in Calb1 expression by 47% (ANOVA F=7.7, p= 0.004) in NT mice and 33% (p = 0.04) in TH mice at p11, which recovered by p40. Thus, as expected, the expression of Calb1 at p40 in the whole hippocampus (ventral or dorsal) was not correlated with Y-maze memory outcomes. The analysis of the isolated dentate gyrus, the hippocampal region with the greatest Calb1 expression, demonstrated no differences.
Conclusion(s) Late expression of calb1 within the hippocampus do not correlate with memory outcomes in this mouse model of HI and TH. The implication of the early and transient decrease in Calb1 produced by HI and not addressed by TH during a critical period of synaptic development is unclear.

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Abstract: 381

The Relationship Between Low-Grade Intraventricular Hemorrhage and Neurodevelopmental Outcomes at 24-42 Months of Age

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Background Low-grade (LG) (grade I,II) intraventricular hemorrhage (IVH) may occur in preterm infants below 32 weeks gestational age (GA) due to fragility of the germinal matrix. Its reported impact on neurodevelopmental outcomes (ND) is mixed.
Objective To assess the relationship between LG IVH in infants ≤32 weeks with ND outcomes as measured by the Bayley Scales of Infant Development, third edition (BSID-III) at 24-42 months chronological age.
Design/Methods This is a retrospective cohort study of former ≤32 weeks GA infants who were followed at the Regional Neonatal Follow-Up Program of Westchester Medical Center (Valhalla, New York). Subjects with a neonatal intensive care unit diagnosis of IVH were compared to those with no IVH. Infants with ventriculoperitoneal shunts, genetic anomalies, or a history of meningitis were excluded. Primary outcomes included cognitive, motor, and speech results of the BSID-III. Secondary outcomes included enrollment in early intervention services or a diagnosis of cerebral palsy (CP). Antenatal, demographic, and neonatal factors were compared between groups. Chi-squared test, t-tests, and Mann-Whitney U tests were used for categorical, continuous, and non-parametric continuous variables, respectively. Multivariate linear regression was used to adjust for potential confounders for primary outcomes. SPSS v16.0 was used. P<0.05 was statistically significant.
Results 198 infants had BSID-III testing. Of those, 39 had a diagnosis of LG IVH. These infants had a lower GA in weeks at birth (26.6 ± 2.6 v 28.2 ± 3), were more likely to be born vaginally (56.4% v 25.8%), and have bronchopulmonary dysplasia (BPD) (55% v 30.3%) (Table 1). Infants with LG IVH were more likely to have a lower cognitive score and expressive and receptive speech score. Adjusting for insurance type, GA at birth, BPD, and necrotizing enterocolitis, LG IVH was associated with a 5.7 point decrease in receptive language BSID-III score (95% CI: -10, -1.3) and a 4.8 point decrease in expressive language score (95% CI: -8.5, -1.0). IVH infants had a higher rate of CP (12.8% v 3.1%; p = 0.013), enrollment in special education (17.9% v 42.1%; p= 0.012) and speech therapy (58% v 22%; p=0.03) (Table 2).
Conclusion(s) LG IVH is independently associated with lower BSID-III language scores. It is associated with an increased rate of CP and therapeutic services. Its occurrence in very preterm infants should be recognized as a significant risk for neurodevelopmental delay through 42 months of age.

Categorical Variables	No IVH n (%)	Low Grade IVH n (%)	*p*
Primary language at home			0.741
English	107 (64.1)	25 (62.5)	
Spanish	18 (10.1)	6 (15)	
Mixed	42 (25.1)	9 (19.3)	
Insurance type			
Medicaid only	61 (39.4)	19 (48.7)	0.288
Delivery			
NSVD*	41 (25.8)	22 (56.4)	<0.001
Receipt of antenatal steroids	131 (85.1)	33 (91.7)	0.299
Apgar score			
1 minute (median, (IQR))	6 (3-8)	5 (2-8)	0.442
5 minute (median, (IQR))	8 (6-9)	8 (6-8)	0.098
Female	99 (55.6)	16 (40)	0.074
Receipt of postnatal steroids	17 (9.6)	7 (17.5)	0.147
Retinopathy of prematurity*	36 (22.6)	16 (41)	0.019
Hemodynamically significant PDA requiring treatment	51 (32.1)	18 (46.2)	0.98
Bronchopulmonary Dysplasia*	54 (30.3)	22 (55)	0.012
Sepsis	24 (15.1)	5 (17.2)	0.719
Necrotizing enterocolitis (>stage IIA)	10 (6.3)	2 (5.1)	0.785
Continuous Variables	(mean ± SD)	(mean ± SD)	*p*
Length of stay (days)*	69.07 ± 36.5	90.03 ± 45.1	0.002
Gestational age (weeks)*	28.2 ± 3.0	26.7 ± 2.6	0.004
Chronological age at evaluation (months)	37.1 ± 3.8	35.8 ± 5.5	0.093
Birth weight (grams)	1191.8 ± 471.3	1054.5 ± 356.4	0.090

*p-value <0.05
IQR: Inter quartile range

Table 1: Demographic, Antenatal, and Neonatal Characteristics

Primary Outcome Measures: BSID-III Scores					
	No IVH (mean ± SD)	Low Grade IVH (mean ± SD)	Linear Regression Results**		
			B	Confidence Interval	*p*
Composite cognitive score	94.8 ± 10.5	89.4 ± 12.9	-2.9	[-1.8, .073]	0.073
Composite expressive language score*	90.7 ± 9.4	87.2 ± 9.9	-4.8	[-8.5, -1.9]	0.013
Composite receptive language score*	88.4 ± 11.2	85.2 ± 11.7	-5.7	[-10, -1.3]	0.011
Composite fine motor score	96.2 ± 12.5	87.2 ± 17.6	-1.4	[-4.6, 1.7]	0.357
Composite gross motor score	93.2 ± 11.8	85 ± 15.1	-0.4	[-4.3, 3.5]	0.826
Secondary Outcomes Measures	n (%)	n (%)	*p*		
Cerebral palsy*	5 (3.1)	5 (12.8)	0.013		
Speech therapy*	58 (38.4)	22 (57.9)	0.030		
Occupational therapy	44 (29.1)	17 (44.7)	0.066		
Physical therapy	50 (33.1)	18 (47.4)	0.102		
Early intervention*	71 (47)	26 (68.4)	0.018		
Special education*	27 (17.9)	16 (42.1)	0.001		

*p-value <0.05
**Adjusted for Medicaid insurance, gestational age at birth, bronchopulmonary dysplasia, and necrotizing enterocolitis

Table 2: Outcome Measures

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Abstract: 382

Uncovering the molecular mechanism of action by which galantamine reduces hyperoxia-induced brain injury in neonatal mice

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Background Hyperoxia affects brain development in premature infants leading to excess free radical production with subsequent inflammation, astrogliosis, microgliosis and apoptosis. Galantamine, an acetylcholinesterase inhibitor, showed a protective role in hypoxic brain injury through its anti-inflammatory effects.
Objective To explore the mechanism by which galantamine reduces hyperoxic brain injury in neonatal mice.
Design/Methods WT mouse pups were housed in a hyperoxia chamber (FiO2 95%) for 7 days. Half were injected daily with galantamine intraperitoneally (IP) (5mg/kg/dose) and the other half were injected with saline. After exposure, brain tissue was studied for : IF staining for ChAT, NeuN, Iba-1, CD68, CNPase and GFAP; multiplex ELISA for Pro-inflammatory markers and HMGB1; western blot for NF-κB activity; fluorometric assay for Caspase 3, ROS assay and acetylcholinesterase activity. MicroRNA profile panel was studied using a custom designed microarray plate. All results were compared to control group housed in room air (RA).
Results IF staining showed a significant increase of ChAT expression accompanied by a significant reduction in acetylcholinesterase activity in the hyperoxic groups treated with galantamine vs. saline group. In galantamine treated hyperoxia groups, oligodendrocytes were preserved and therefore myelination. Also, CD68 was decreased, indicating less microglial activation which leads to a reduction of neuronal apoptosis (caspase 3). Both inflammatory markers (HMGB1, IL 12p70, IL6, KC GRO and IL10, pP65), and ROS, showed a significant decrease among hyperoxia galantamine treated group compared to the saline group. MicroRNA profile showed a significant >3 fold increase of the following: mir181a-3p; mir185-3p and mir146a-5p; and a significant reduction by >5 fold decrease for both mir21a-3p and mir494-5p among saline treated hyperoxia group in comparison to control RA. All these findings were reversed in galantamine hyperoxia treated group: mir181a-3p; mir185-3p and mir146a-5p were significantly downregulated and mir21a-3p and mir494-5p were upregulated as compared to saline group.
Conclusion(s) Galantamine has potent anti-inflammatory and antioxidant effects in hyperoxia-induced brain injured neonatal mice. Hyperoxia exposure has a specific impact on microRNA profile expression in neonatal brain tissue. Treating neonatal animals exposed to hyperoxia with galantamine leads to a specific modification of microRNA expression which could be a new therapeutic target

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Abstract: 383

Neurodevelopmental and visual outcomes in infants with Retinopathy of Prematurity treated with Bevacizumab and /or Laser Therapy

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Background Retinopathy of prematurity (ROP), a vasculopathy of the developing vessels of the retina in preterm neonates is a well-recognized cause of pediatric blindness. ROP is associated with high levels of vascular endothelial growth factor (VEGF) in the retina in later phases of the disease. Laser photo ablation (LPA) of the avascular retina is the standard of care for treatment of ROP. The anti-VEGF agent, Bevacizumab (BVB) is a new treatment for this disease. There is limited long term data on the potential systemic and neurodevelopmental effects after anti-VEGF use for ROP treatment
Objective This study aims to compare the outcomes of babies with severe ROP treated with LPA compared to those treated with BVB as well as compare the outcomes of babies with severe ROP who were treated with both LPA and BVB compared to those who were treated with either only LPA or only BVB therapy.
We hypothesized that the neurodevelopmental outcomes would be better in neonates treated with BVB alone compared to those who received LPA alone or BVB therapy followed by LPA
Design/Methods Retrospective observational case series through chart review of 86 patients with severe ROP treated at a referral center from January 1, 2010 to December 31, 2016. The infant characteristics including medical diagnoses, stage of ROP, treatment received and neurodevelopmental and visual outcomes were compared between the groups.
Results Thirty-nine patients were treated with LPA only, 20 with BVB only and 27 were treated with BVB therapy followed by LPA. There was no statistical differences in the demographic characteristics between the groups. Infants who required a combination of LPA and BVB treatments were more likely to have suffered late onset sepsis ($p = 0.05$). There was no statistical difference between the groups (LPA alone, BVB alone, BVB followed by LPA) with regards to developmental findings at 18-22 months of age as well as vision findings or blindness
Conclusion(s) We conclude that the use of Bevacizumab as treatment for ROP is not associated with adverse vision or neurodevelopmental outcomes at 18-22 months of age. Longer follow up of these infants is indicated

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Abstract: 384

Are Genetic Variations of TGF-β Associated with BPD and PDA in ELBW Infants?

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Background Bronchopulmonary Dysplasia (BPD) is a chronic lung condition in ELBW infants that results in alveolar simplification and has strong genetic foundations (~80%). TGF-β is an excellent gene candidate for mediating susceptibility to BPD as TGF-β

signaling plays a dual role in alveolarization-through the regulation of branching and septation in developing lungs; as well as during its role as a prominent pro-inflammatory mediator. Genetic polymorphisms of TGF-β are involved in inflammatory conditions such as allergic rhinitis and in the remodeling associated with chronic obstructive pulmonary disease. In our previous study one SNP of TGF-β (rs1800470) was found to be associated with BPD in ELBW infants (p=0.046), while four other SNPS (rs1800469, rs1700471, rs1984072, rs12029576) were not. TGF-β also plays a role in cardiovascular remodeling and has been shown to influence the susceptibility and treatment outcomes of Kawasaki disease. The closure of the ductus arteriosus has also been found to be regulated by TGF-β through its effects on vascular smooth muscle.
Objective We sought to determine whether SNPs of TGF-β are associated with increased susceptibility to PDA in ELBW infants.
Design/Methods This is an ongoing cohort study of ELBW infants without congenital or chromosomal abnormalities. BPD is defined as supplemental oxygen requirement at 36 weeks post-menstrual age. PDA is defined as requiring medical or surgical treatment for closure. IRB-approved parental consent was obtained prior to DNA (buccal swabs) collections (n=207). DNA was isolated and subjected to allelic discrimination using Taqman probes for rs1800469, rs1800470, rs1700471, rs1984072, and rs12029576 during RT-PCR. Chi-squared, Mann-Whitney, t-, and z-tests were performed, with $p<0.05$ denoting statistical significance.
Results ELBW patients with BPD and PDA were born earlier ($p< 0.001$) and at a lower birth weight ($p< 0.001$), than those without. For rs1800470 there is a statistically different genotype distribution between ELBW infants who progress to BPD and those who do not (p=0.046). For this polymorphism an association with PDA was not seen (p=0.074).
Conclusion(s) A genetic variation of TGF-β is associated with the development of BPD in ELBW infants. We speculate that the promoter variant alters transcription of TGF-β-affecting alveolarization from direct changes in pulmonary remodeling, as well as from changes following a dysregulated inflammatory response.

Demographic characteristics in the study population for BPD

	No BPD (n=89)	BPD (n=118)	p value
Birth Weight (g) (mean +/- SD)	836+/-134	716+/-151	p<0.001
Gestational Age (weeks) median (25%,75%)	26 (25,27)	25 (24,26)	p<0.001
Male Gender	34 (38%)	60 (51%)	p=0.1
Race			
Caucasian	28 (31%)	30 (25%)	p=0.7
Black	25 (28%)	40 (34%)	
Hispanic	30 (34%)	39 (33%)	
Other	5 (6%)	9 (8%)	

Genotype distribution in the study population for PDA and BPD

rs1800470			
PDA (n=206)			
	No PDA (n=77)	PDA (n=129)	p=0.07
AA	34 (44%)	57 (44%)	
Ag	20 (26%)	49 (38%)	
gg	23 (30%)	23 (18%)	
BPD (n=207)			
	No BPD (n=89)	BPD (n=118)	p=0.046
AA	42 (47%)	50 (42%)	
Ag	22 (25%)	47 (40%)	
gg	25 (28%)	21 (18%)	

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Abstract: 385

Predicting Response to Diuretic Therapy in Chronic Lung Disease in ELBW Infants

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Background For preterm infants, optimizing pulmonary function is critically important. Of available therapies, diuretics are one of the most commonly used classes of medication. This study focuses on the current protocol at the Children's Hospital Of New York (CHONY) NICU which implements a 3-day furosemide trial for management of ELBW infants with chronic lung disease. At the end of the trial a clinical decision is made whether the infant has responded to furosemide. Based on this clinical decision, an appropriate therapy is initiated.

Objective Develop a novel predictive Respiratory Metric (RM) algorithm that can be used to predict whether an infant has responded to furosemide at the end of a 3-day trial.

Design/Methods This is a retrospective chart review of all ELBW infants admitted to CHONY NICU between January 1, 2014 and Dec 31, 2015 who received a 3-day trial of furosemide. Bedside vital signs from a continuous data collection system were used to generate a table with the ratio of time spent in specific oxygen saturation ranges. Using these values, a RM is calculated as a ratio of time spent below 89% to time spent greater than 90%. A RM greater than 0 is defined as an infant who has responded. Additionally, a database was created using the Electronic Medical Record with the clinical decision made at the end of the 3-day trial along with length of hospitalization. The length of hospitalization was then analyzed in infants who received appropriate therapy versus those that did not receive the appropriate therapy.

Results Clinical data was available seven days before and after the start of the furosemide trial in 41 infants. Infants who responded showed an increase in RM of 3.50 (SD 7.27), while infants who did not respond showed a decrease of 3.25 (SD 6.62) (Table 1, Figure 1). Length of hospitalization in infants who responded and received correct therapy was 97.3 (SD 55.2) days versus 229.5 (SD 90.3) days for infants who responded and received incorrect therapy. Length of hospitalization in infants who did not respond and received correct therapy was 105.0 (SD 21.7) days versus 156.1 (SD 88.5) days in infants who did not respond and received incorrect therapy (Table 2, Figure 2).

Conclusion(s) The RM can be used to aid clinicians in administering appropriate diuretic therapy in ELBW infants with chronic lung disease. An appropriate decision using the RM will lead to a lower length of hospitalization. The future direction of this study is to develop a supervised machine learning algorithm to better predict response to furosemide.

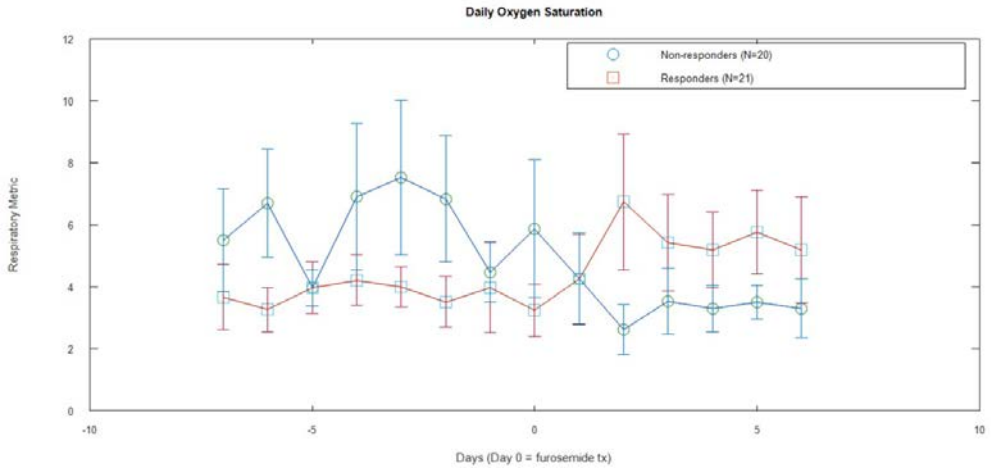

Figure 1: RM in responding versus nonresponding infants. Furosemide therapy is initiated Day 0, and Day 2 is when a clinical decision is made whether to continue or discontinue the use of diuretics. Each point on the graph represents the RM of that particular day calculated from the ratio of time spent in specific oxygen saturation ranges in a twenty four hour period.

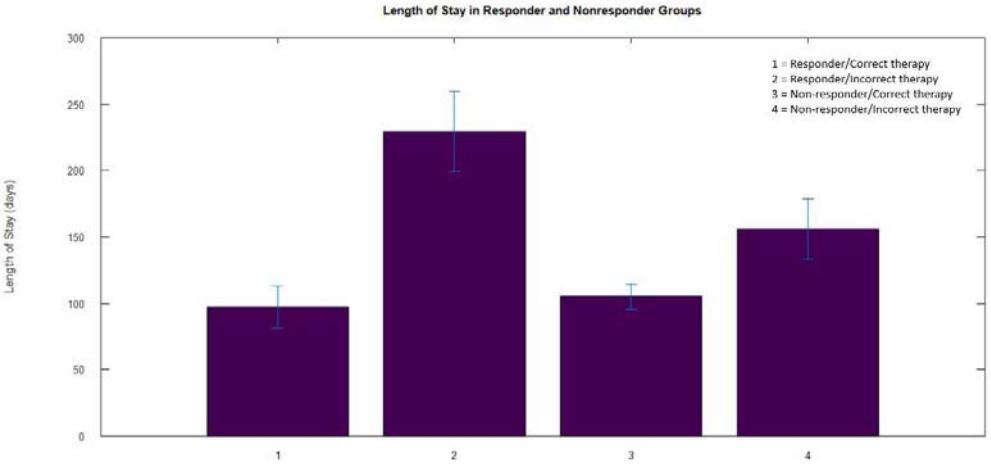

Figure 2: Length of hospitalization in responding and nonresponding infants. Length of hospitalization is increased when incorrect therapy is initiated, highlighting the importance of making the correct clinical decision at the end of a furosemide trial.

Respiratory Metric in Infants

	Mean Change in RM	SD
Responding Infants (N=21)	3.5	7.2718
Non-responding Infants (N=20)	-3.25	6.6159

Table 1

Length of Hospitalization in Infants

	Mean Length of Hospitilization	SD
Responding Infants/Correct Therapy	97.292	55.211
Responding Infants/Incorrect Therapy	229.536	90.334
Non-responding infants/Correct Therapy	105.031	21.714
Non-responding Infants/Incorrect Therapy	156.068	88.482

Table 2

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Abstract: 386

The Role of ASB3 Gene Single Nucleotide Polymorphism in the Progression to Bronchopulmonary Dysplasia in Extremely Low Birth Weight Infants.

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Background Bronchopulmonary dysplasia (BPD) is a major cause of neonatal morbidity and mortality in extremely low birth weight (ELBW) infants. The pathogenesis of BPD has a number of various mechanisms: it is associated with smooth muscle proliferation; there is airway epithelial and vascular endothelial cell dysregulation; these changes occur under the influence of hyperoxia, barotrauma and inflammation; and, there is a strong genetic foundation. Among the candidate genes that may influence these smooth muscle cell changes is the ASB3 gene, located on chromosome 2-a member of the ankyrin repeat and SOCS box-containing family of proteins. ASB-related genes are expressed in smooth muscle cells and play a role in protein turnover, smooth muscle cell differentiation, and

induction of hypertrophy. Genetic variants of ASB3 are associated with asthma and bronchodilator responsiveness to inhaled β2-agonists.
Objective To investigate the hypothesis that ASB3 variants are associated with the development of BPD in ELBW infants.
Design/Methods After obtaining IRB approved parental consents, DNA from buccal swabs of ELBW infants was isolated and subjected to allelic discrimination by RT-PCR for 5 specific ASB3 SNPs (rs350729, rs1840321, rs1384918, rs1319797 and rs10205606). An ASB3 protein specific ELISA assay was performed on tracheal aspirates of ELBW infants. BPD was defined as oxygen dependence at 36 weeks PMA. X^2, t-test, z-test, and multiple logistic regression analyses were performed. A p value of <0.05 was considered statistically significant.
Results Patients with BPD were born earlier (p=0.001) and weighed less (p<0.001) when compared to infants without BPD. There were also more patients with BPD who were also small for gestational age (SGA; p=0.02). One SNP (rs1319797; p<0.01) showed a statistically significant association with the progression to BPD. This association remained significant when corrected for gestational age, birth weight and SGA status at birth after multiple logistic regression analysis. Patients with BPD had higher ASB3 protein concentrations in their tracheal aspirates compared to patients without BPD (309 pg/ml +/- 57 vs 297 pg/ml +/- 53; p=0.58).
Conclusion(s) Genetic variations of ASB3 are associated with the development of BPD in ELBW infants. We speculate that these genetic variants influence smooth muscle cell differentiation, hypertrophy, and the responsiveness to bronchodilators; and, that they increase the susceptibility to BPD in ELBW infants.

Demographics of Enrolled ELBW Infants

	No BPD	BPD	P value
BW (grams: median; IQR)	840 (730;910)	690 (610;810)	< 0.001 *
GA (weeks: median; IQR)	26 (25;27)	25 (24;26)	0.001 *
Male	27 (38%)	51 (50%)	0.16
SGA	4 (6%)	19 (19%)	0.02 *
Race			
Non-Hispanic White	21 (35%)	27 (25%)	
Non-Hispanic Black	15 (25%)	34 (31%)	
Hispanic	21 (35%)	42 (38%)	0.56
Other	3 (5%)	6 (6%)	

Results

Genotypic Distribution of ASB3 SNPs for the Presence of BPD										
	rs1384918 p= 0.07		rs1840321 p= 0.19		rs350729 p= 0.07		rs1319797 p= 0.02 *		rs10205606 p= 0.83	
	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD
Wild type	39 (56%)	48 (47%)	25 (38%)	53 (47%)	24 (39%)	36 (49%)	18 (28%)	45 (49%)	8 (31%)	14 (33%)
Heterozygous	27 (38%)	37 (36%)	27 (41%)	31 (28%)	33 (53%)	25 (34%)	36 (56%)	40 (43%)	8 (31%)	16 (38%)
Minor Allele	4 (6%)	18 (17%)	14 (21%)	28 (25%)	5 (8%)	13 (17%)	10 (16%)	7 (8%)	10 (38%)	12 (29%)
The Presence of Minor Allele Between the Two Groups for ASB3 SNPs										
	rs1384918 p= 0.24		rs1840321 p= 0.22		rs350729 p= 0.24		rs1319797 p< 0.01*		rs10205606 p= 0.83	
	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD	No BPD	BPD
Wild type	31 (44%)	55 (53%)	41 (62%)	59 (53%)	38 (61%)	38 (51%)	46 (72%)	47 (51%)	18 (69%)	28 (67%)

Any minor allele	39 (56%)	48 (47%)	25 (38%)	53 (47%)	24 (39%)	36 (49%)	18 (28%)	45 (49%)	8 (31%)	14 (33%)

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Abstract: 387

Bronchopulmonary dysplasia and its effects on medical treatment for asthma in prematurity

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Background Infants with BPD are more likely to be diagnosed with wheezing and asthma. It is unclear if premature infants without BPD are at a similarly increased risk and if there are differences in treatment for asthma care.

Objective

Design/Methods We retrospectively abstracted information from an electronic medical record from 1/1/2006 to 12/31/2015 of primary care patients in the 34 site CHOP network born at less than 30 weeks gestational age. Eligible subjects included infants that presented to care in the first 4 months of life, had at least 1 well visit after 1 year of life, and remained in the CHOP network for a minimum of 3 years since birth. Our cohort included 317 patients with CLD or BPD (ICD9 code 518.89 or 770.7) which were validated through chart review and 495 patients without these diagnoses. In this cohort, 285 patients without BPD and 218 patients with BPD were diagnosed with asthma. Outcomes included a diagnosis of asthma or wheezing, respiratory medications, subspecialty care visits, and ED use or hospitalizations for asthma. Multivariate poisson and logistic regression models determined the impact of BPD on each outcome in patients diagnosed with asthma while controlling for race, insurance, gestational age, and gender.

Results Infants with BPD were significantly more likely to be diagnosed with asthma as compared to infants without BPD (OR 1.6, 95% CI 1.14 – 2.23). Infants with BPD were more likely to be prescribed an inhaled corticosteroid (OR 2.32, 95 %CI 1.48 – 3.66). The majority of patients in both cohorts were prescribed albuterol. There was not a statistically significant difference in prescribing of asthma equipment (OR 0.82, 95% CI 0.51 – 1.35) or oral steroids (OR 1.23, 95% CI 0.78 – 1.93). Patients with BPD were more likely to be referred to a pulmonologist (RR 12.34, 95% CI 10.82 – 14.07) and be hospitalized for asthma (RR 1.48, 95% CI 1.2 – 1.82). There was no significant difference in ED visits (RR 0.98, 95% CI 0.77 – 1.25).

Conclusion(s) Infants with BPD were more likely to be diagnosed with asthma. However, both cohorts have similar rates of prescriptions for albuterol and oral steroids suggesting that infants born premature without BPD are just as likely to have a wheezing related illness. It is possible that having a diagnosis of BPD induces providers to be more aggressive in their treatment of infants with BPD when in reality it may be prematurity that is the risk factor for a wheezing related illness. More objective measures of asthma severity are needed to assess this disparity.

Outcome	No BPD	BPD	p-value
Race			
White	96 (34%)	59 (27%)	0.59
Black	161 (56%)	134 (61%)	
Hispanic	10 (3.5%)	10 (5%)	
Other	10 (3.5%)	9 (4%)	
Unknown	8 (2.8%)	6 (3%)	
Gestational age (weeks)			
23	2 (0.7%)	12 (6%)	0.00
24	10 (3.5%)	42 (19%)	
25	18 (6.3%)	37 (17%)	
26	29 (10%)	30 (14%)	
27	47 (16%)	40 (18%)	
28	80 (28%)	35 (16%)	
29	99 (35%)	21 (10%)	
Unknown	0	1 (0.5%)	
Diagnosis of asthma	285	218	0.0007
Prescriptions			

Asthma equipment	216 (76%)	166 (76%)	0.93
Albuterol	283 (99%)	217 (99%)	0.73
Inhaled corticosteroid	174 (61%)	169 (78%)	0.00
Oral steroid	190 (67%)	162 (74%)	0.06
Number of patients seen by a pulmonologist	46 (16%)	122 (56%)	0.00
Hospitalizations for asthma	79 (28%)	97 (44%)	0.06
ED visits for asthma	76 (27%)	65 (30%)	0.24

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Abstract: 388

Association Between Postnatal Weight Change and Bronchopulmonary Dysplasia or Death in Extremely Low Birth Weight Infants

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Background Previous studies have suggested that the weight gain secondary to excessive fluid intake early in life is associated with bronchopulmonary dysplasia (BPD) or death in extremely low birth weight (ELBW) infants. ELBW infants are now managed with fluid restriction and aggressive nutrition during early postnatal period. The impact of these strategies on postnatal weight change, and association with BPD and death is unknown.

Objective To determine the association between postnatal weight changes and BPD or death in ELBW infants.

Design/Methods This study is a retrospective data analysis from the Alere Neonatal Database for infants born between 1/1/2010 and 11/30/2016, weighing ≤ 1,000 grams. BPD was defined as oxygen requirement at 36 weeks post-menstrual age. Percent weight change from the birth weight was calculated at days 3, 5, 7, 10, 14, 30 and 42. The baseline demographics, clinical characteristics, and neonatal outcomes including death or BPD were compared between the ELBW infants who survived without BPD (Control Group) and those who died or developed BPD. Multivariate regression analysis was performed to control for the variables that differed in bivariate analysis.

Results A total of 1889 ELBW infants met the inclusion criteria. 1187 infants (62.8%) were in the BPD or died group (BW 722±154 g, GA 25.8±1.8w) and 702 (37.2%) infants in the control group (BW 838±131g, GA 27.3±2.2w). There was no difference in percent weight change on days 3, 5, 7, 10, 14 and 30 between the two groups (Table 1). The infants in control group had better weight gain at day 42 but this difference was not significant after adjusting for the confounding variables. The two groups differed in bivariate analysis in gestational age, birth weight, male sex, apgar 5 minutes <5, ventilation at any time, and surfactant use, late onset sepsis, NEC, PDA and post-natal steroid use. After adjusting for these variables, % weight change at all time points was not associated with BPD or death (Table 2).

Conclusion(s) In this study of ELBW infants, postnatal weight changes were not associated with the BPD or death.

Comparison of weight change by age for those with BPD or death and those who survived without BPD

Age (Days)	BPD or Death (n=1187, 67.8%) % (SD)	Survival without BPD (n=702, 37.2%) % (SD)	P-value
3	-3.1 (8.7)	-3.3 (8.7)	0.10
5	-2.4 (27.5)	-3.5 (12.7)	0.11
7	-0.4 (27.7)	-1.5 (13.1)	0.40
10	3.4 (12.2)	3.3 (14.3)	0.97
14	10.5 (14.0)	9.5 (14.5)	0.35
30	43.4 (41.4)	43.2 (20.8)	0.07
42	73.6 (29.9)	76.7 (25.6)	0.001

Odds of BPD or death for various patient characteristics and percent weight change

Variable	Adj OR	95% CI	P-value
Birth weight	0.996	0.995, 0.996	<0.001
Gestational age	0.889	0.834, 0.945	<0.001
Male Sex	1.840	1.474, 2.295	<0.001
Surfactant	1.347	1.063, 1.706	0.014
Ventilator ever	2.322	1.725, 3.128	<0.001
Sepsis	1.386	1.072, 1.793	0.013
NEC	1.641	1.018, 2.645	0.042
PDA	1.458	1.137, 1.869	0.003
Steroids	3.015	2.077, 4.375	<0.001
% wt change day 3	0.993	0.980, 1.005	0.255
% wt change day 5	1.000	0.996, 1.005	0.852
% wt change day 7	1.000	0.995, 1.005	0.980
% wt change day 10	0.991	0.981, 1.001	0.089
% wt change day 14	1.000	0.989, 1.011	0.954
% wt change day 30	1.000	0.997, 1.005	0.676
% wt change day 42	0.998	0.993, 1.003	0.452

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Abstract: 389

An increased neonatal oxygen saturation target range correlates with decreased lability in attained oxygenation

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Background The set of randomized controlled trials collectively known as NeoPROM revealed increased mortality in premature neonates randomized to a lower target oxygen saturation (SpO2) range (85-89% vs 91-95%). Infants in the lower target group were shown to have more frequent intermittent hypoxic events in addition to lower SpO2 overall. Other studies in neonates and animal models have also suggested an independent link between SpO2 “swings” of hypoxia or hyperoxia and an increased risk of mortality and other neonatal morbidities, suggesting that decreasing SpO2 lability may be a worthwhile clinical goal.

Objective To determine whether an increase in target SpO2 range for extremely low birthweight infants correlated with decreased SpO2 lability.

Design/Methods Vital sign data was retrospectively reviewed for 77 ELBW infants (birth weight ≤ 1000g) admitted to the level IIIC neonatal ICU at the Columbia Presbyterian Medical Center during the 8 months prior to (Period 1) and following (Period 2) a unit change in target SpO2 for infants on supplemental oxygen from 85-93% to 90-95%. Data was collected and stored using the Bedmaster system, which interfaces with bedside monitors to sample and store vital signs at 0.5 Hz. Algorithmic SpO2 artifact reduction was performed by comparing pulse rate from the pulse oximeter with heart rate from EKG. Daily SpO2 medians and interquartile ranges (IQR) were calculated for all infants and weekly averages by corrected gestational age (cGA) were compared between Periods 1 and 2. SpO2 median and IQR were compared between groups using paired two-sample t-tests.

Results 45 infants were born and had SpO2 data available during Period 1 and 32 infants during Period 2, with a total of 4573 patient-days of data. Mean gestational age was similar (26.6 ± 2.2 vs 26.7 ± 2.0 weeks, ns), though the infants in Period 2 had a higher mean birth weight (715 ± 166 vs 791 ± 147 g, $p < 0.05$). Median SpO2 was higher during Period 2 by an average of 0.93% during a given week ($p < 0.01$, Figure 1). For a given cGA SpO2 IQR was smaller during Period 2 by an absolute value of 1.0%, equating to a 21% relative decrease ($p < 0.01$, Figure 2).

Conclusion(s) Transitioning to a higher and narrower SpO2 target range was associated with an increased median SpO2 and decreased SpO2 variability, which may in turn be associated with an altered risk of important neonatal morbidities and mortality. High fidelity vital sign monitoring can be a valuable tool for evaluating the effectiveness of unit policy changes.

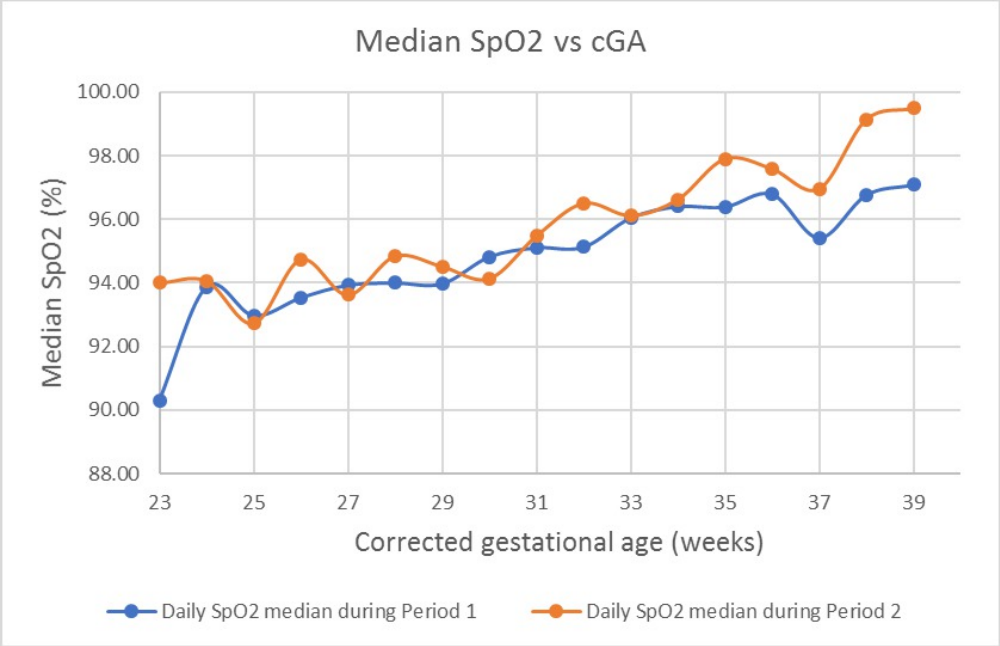

Figure 1

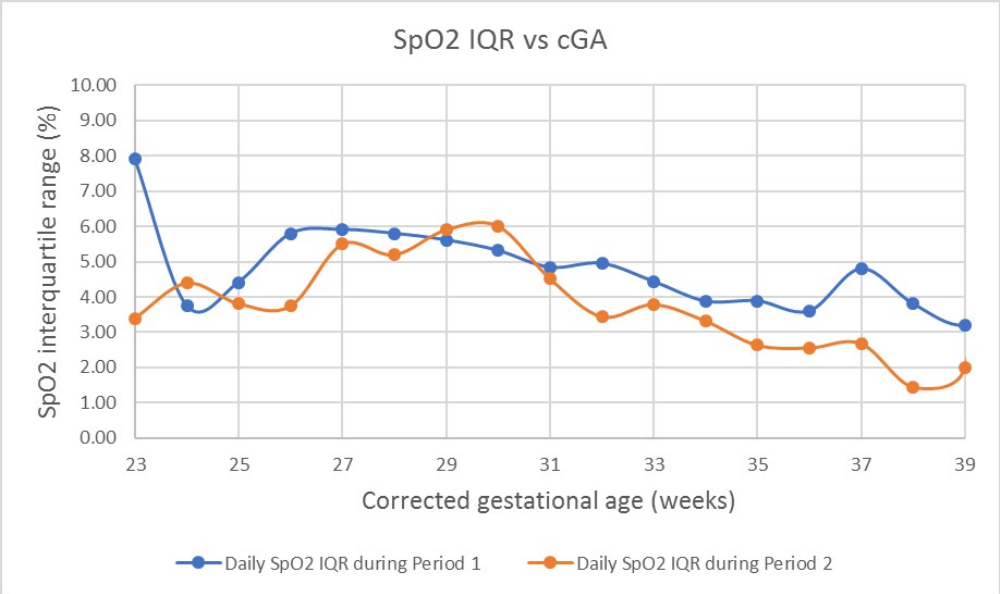

Figure 2

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