Midwest Society for Pediatric Research

PROGRAM

October 12-13, 2017

Ann & Robert H. Lurie
Children’s Hospital of Chicago, Department of Pediatrics
Northwestern University Feinberg School of Medicine
Chicago, Illinois

Photo credit: Nick Merrick/Hedrich Blessing
## PROGRAM-AT-A-GLANCE

### 58th Annual Midwest Society for Pediatric Research Scientific Meeting
**Ann & Robert H. Lurie Children's Hospital of Chicago**  
**Chicago, Illinois**

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<th>TIME</th>
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<td><strong>WEDNESDAY, OCTOBER 11, 2017</strong></td>
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| 4:45 pm – 6:15 pm | **MWSPR Council Meeting**  
Conference Room 12-481  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
| 6:30 pm – 9:30 pm | **MWSPR Council Dinner**  
*Sponsored by Abbott Nutrition*  
Green River Restaurant  
259 E. Erie 18th Floor |
| **THURSDAY, OCTOBER 12, 2017** |                                                                                       |
| 7:00 am – 8:00 am | **MWSPR Registration**  
**Continental Breakfast**  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
| 7:00 am – 8:00 am | **Poster Set Up**  
Prentice Women’s Hospital, Atrium – 3rd Floor |
| 8:00 am – 11:45 am | **MWSPR Plenary Session I**  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
| 11:45 am – 12:00 pm | **MWSPR Business Meeting for Members**  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
| 12:15 pm – 1:30 pm | **Founder and Sutherland Award Luncheon**  
The Robert R. McCormick Foundation Auditorium  
*Sponsored by Mead Johnson Nutrition*  
11th Floor, Lurie Children’s |
| 1:30 pm – 4:30 pm | **MWSPR Plenary Session II**  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
| 4:30 pm – 6:00 pm | **Reception and Combined Poster Session**  
Prentice Women’s Hospital, Atrium – 3rd Floor |
| 6:00 pm | **Poster Take Down**  
*(immediately following Session)* |
| **FRIDAY, OCTOBER 13, 2017** |                                                                                       |
| 7:00 am – 8:00 am | **MWSPR Registration**  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
| 7:00 am – 8:00 am | **Continental Breakfast**  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
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| 7:00 am – 8:00 am| **Trainee Breakfast**  
Professional Societies and Networking  
*Thomas Shanley, Chair, Pediatrics*  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
| 8:00 am – 12:00 pm| **MWSPR Plenary Session III**  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |
| 12:15 pm – 1:30 pm| **Kenny and Metcoff Student Research Award Luncheon**  
*Sponsored by Abbott Nutrition*  
The Robert R. McCormick Foundation Auditorium  
11th Floor, Lurie Children’s |

This meeting has been made possible in part through the generosity of our supporters and the research efforts of the faculty, fellows, residents, medical and graduate students. We are very proud of the extent and breadth of our research programs and activities, and we trust that you will enjoy the activities of the meeting. We would like to thank the abstract reviewers for their time and effort in the review process in this important endeavor.

Campus Map:

**MWSPR Planning Committee**
Jeffrey Segar, MD – President  
Laura Haneline, MD – President-Elect  
Patrick Brophy, MD – Secretary  
Noah Hillman, MD - Treasurer  
Aaron Hamvas, MD – Meeting Chair

**Acknowledgements**
The Midwest Society for Pediatric Research would like to thank the following organizations for their generous support:

Abbott Nutrition  
Mead Johnson Nutrition  
Ann & Robert H. Lurie Children’s Hospital of Chicago  
University of Wisconsin  
University of Minnesota Masonic Children’s Hospital
58th Annual Midwest Society for Pediatric Research Scientific Meeting

THURSDAY, OCTOBER 12, 2017
8:00 am - 6:00 pm

Ann & Robert H. Lurie Children’s Hospital of Chicago
The Robert R. McCormick Foundation Auditorium
11th Floor, Lurie Children’s

7:00-8:00 am REGISTRATION AND CONTINENTAL BREAKFAST

8:00-8:05 WELCOME AND INTRODUCTION
Jeffrey Segar, President

8:05 State-of-the-Art Speaker
CFTR IMPACTS BETA-CELLS: DIGGING UP THE MANY ROOTS OF CYSTIC FIBROSIS RELATED DIABETES
Andrew Norris, MD, PhD
Stead Family Department of Pediatrics
University of Iowa Carver College of Medicine

MWSPR PLENARY SESSION I
The Robert R. McCormick Foundation Auditorium
11th Floor, Lurie Children’s

Craig Garfield, Presiding

9:00 CHANGES IN MYELIN ULTRASTRUCTURE AND WHITE MATTER DIFFUSIVITY IN A MOUSE MODEL OF INTRAUTERINE GROWTH RESTRICTION WITH HYPEROXIA.
JL Chang, D Procissi, and ML Dizon, Chicago, IL. Northwestern University

9:15 ANTENATAL STEROIDS AND THYROID HORMONE FUNCTION IN PRETERM INFANTS
DC Kaluarachchi, Q Zhao, and TT Colaizy, Madison, WI and Iowa City, IA. University of Wisconsin

9:30 INCREASED BIOLOGIC USE AND LOWER SURGICAL RATES IN PEDIATRIC VERSUS ADULT-ONSET CROHN’S DISEASE AT A LARGE TERTIARY-CARE CENTER OVER A 6-YEAR FOLLOW-UP.
JA Kurowski, A Milinovich, K Chagin, X Ji, J Bauman, D Sugano, M Kattan, and JP Achkar, Cleveland, OH. Cleveland Clinic

Abstract 1

Abstract 2

Abstract 3
9:45  INFANTS EXPOSED TO MATERNAL CHORIOAMNIONITIS: DO WE NEED TO TREAT THEM ALL?  
V Sharma, K Gupta, K Amon, A Siddappa, and A Constance, Minneapolis, MN.  
Hennepin County Medical Center  
Abstract 4

10:00 – 10:15 am BREAK

10:15  EXPOSURE TO MATERNAL HYPERGLYCEMIA CAUSES IMPAIRED OFFSPRING PANCREATIC BETA CELL FUNCTION EARLY IN LIFE.  
K Kua and Y Jo, Indianapolis, IN. Indiana University School of Medicine  
Abstract 5

10:30  IDENTIFICATION OF NOVEL THERAPEUTIC TARGETS IN EWING SARCOMA USING A HUMAN STEM CELL TUMOR MODEL.  
DJ Gordon, KL Goss, SL Koppenhafer, KM Harmany, and WW Terry, Iowa City, IA. University of Iowa  
Abstract 6

10:45  CHORIOAMNIONITIS EXPOSURE REMODELS THE NEONATAL MONOCYTE HISTONE MODIFICATION LANDSCAPE.  
JR Bermick, K Gallagher, W Carson, S Kunkel, N Lukacs, and M Schaller, Ann Arbor, MI. University of Michigan  
Abstract 7

11:00  THE IMPACT OF PULMONARY HYPERTENSION IN PRETERM INFANTS WITH SEVERE BPD: A MULTI-CENTER COMPARISON OF NICU AND READMISSION OUTCOMES.  
Abstract 8

11:15  SEPSIS RISK CALCULATOR IN DECREASING ANTIMICROBIAL USAGE RATE IN A LEVEL-3 NICU.  
V Sharma, K Gupta, K Amon, A Siddappa, and A Constance, Minneapolis, MN. Hennepin County Medical Center  
Abstract 9

11:30  ROLE OF NOVEL SPHINGOSINE KINASE-1 INHIBITOR, PF543 IN THERAPY OF BRONCHOPULMONARY DYSPLASIA.  
AK Harijith, AW Ha, DL Ebenezer, P Fu, E Berdyshiev, P Kanteti, and V Natarajan, City, IL and Chicago, IL. University of Illinois, Chicago  
Abstract 10

11:45  MWSPR BUSINESS MEETING FOR NON-TRAINEES

12:15  FOUNDER AND SUTHERLAND AWARD LUNCHEON

Founder Award Recipient  
Valerie Opipari, MD  
Chair, Pediatrics and Communicable Diseases  
University of Michigan

Introduction by: David Kershaw, MD
MWSPR PLENARY SESSION II

Neal Blatt, Presiding

1:30 RELATIONSHIP BETWEEN ADIPONECTIN LEVELS AND BODY COMPOSITION DURING INFANCY IN PRETERM INFANTS.
SE Ramel, L Zhang, H Gray, B Davern, and EW Demerath, Shoreview, MN and Minneapolis, MN. University of Minnesota

1:45 EARLY VS LATE 23 WEEK GESTATION NEONATAL OUTCOMES.
BN Montavon, E Ambrecht, and M Al-Hosni, St. Louis, MO. Saint Louis University

2:00 MATERNAL AND NEONATAL RETINOL STATUS IN A MIDWEST ACADEMIC MEDICAL CENTER IS ASSOCIATED WITH RACE AND FOOD SECURITY INDEX.
M VanOrmer, AL Anderson Berry, E Lyden, D Su, M Schumacher, and C Hanson, Omaha, NE. University of Nebraska Medical Center

2:15 IMPLEMENTATION OF UPDATED HEARING SCREEN GUIDELINES IN A LEVEL IV NICU.
L George, W Manimtim, and N Park, Kansas City, MO. Children’s Mercy

2:45 GROWTH OUTCOMES IN VLBW INFANTS RECEIVING EPO AND AGGRESSIVE IRON THERAPY.
RM Olson, T Zamora, and A Siddappa, Excelsior, MN and Minneapolis, MN. University of Minnesota

3:00 – 3:15 pm BREAK

3:15 THE ASSOCIATION BETWEEN SMALL FOR GESTATIONAL AGE (SGA) AND FUTURE EDUCATIONAL PERFORMANCE.
K Murthy, K Karbownik, CF Garfield, GH Falciglia, J Roth, and D Figlio, Chicago, IL, Evanston, IL, and Gainesville, FL. Northwestern University

3:30 COMPARISON OF PREVALENCE, CLINICAL AND LABORATORY CHARACTERISTICS OF ENTEROVIRUS (EV) AND HUMAN PARECHOVIRUS (HPEV) INFECTIONS IN INFANTS LESS THAN TWO MONTHS OF AGE IN COLUMBUS, OHIO.
J Feister, C Tomatis Souverbielle, A Medoro, J Campbell, O Ramilo, D Salamon, A Leber, and G Erdem, Chicago, IL and Columbus, OH. Northwestern University

3:45 RHO-KINASE INHIBITION REDUCES PULMONARY HYPERTENSION IN A GENETIC MODEL OF CONGENITAL DIAPHRAGMATIC HERNIA.
H Bremer, M Brix, M Wienhold, and D McCulley, Madison, WI. University of Wisconsin – Madison
4:00  CLINICAL RISK FACTORS FOR IRON DEFICIENCY, 1-MONTH FERRITIN AND PREDICTION OF IRON STATUS IN THE NICU.
ME Zywicki, S Norlin, SE Blohowiak, and PJ Kling, Madison, WI.  University of Wisconsin-Madison

4:15  SIN3A GENE MUTATION IS RESPONSIBLE FOR CONGENITAL DIAPHRAGMATIC HERNIA IN HUMANS AND MICE.
M Brix, H Bremer, Y Shen, W Chung, and D McCulley, Madison, WI and New York, NY.  University of Wisconsin – Madison

4:30  RECEPTION AND COMBINED POSTER SESSION - Prentice Women’s Hospital, Room TBD

See page 8 for posters

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FRIDAY, OCTOBER 13, 2017
The Robert R. McCormick Foundation Auditorium - 11th Floor, Lurie Children’s
7:00 am – 1:30 pm

7:00  MWSPR Registration

7:00  TRAINEE BREAKFAST SESSION

Professional Societies and Networking
Thomas Shanley, MD
Chair, Pediatrics
The Robert R. McCormick Foundation Auditorium
11th Floor, Lurie Children’s

MWSPR PLENARY SESSION III
8:00 am – 12:00 pm

David McCulley, Presiding

8:00  State-of-the-Art Speaker/Grand Rounds
The high costs of human brain development: insights into the evolution of childhood and links with metabolic disease.
Christopher Kuzawa, PhD
Professor, Department of Anthropology
Northwestern University
9:00 PANETH CELL DISRUPTION SIGNIFICANTLY DECREASES INTESTINAL PERFUSION.
JN Berger, H Gong, and SJ McElroy, Iowa City, IA. University of Iowa  Abstract 21

9:15 PREVALENCE, GENOTYPES, CLINICAL MANIFESTATIONS, AND OUTCOMES ASSOCIATED WITH HUMAN PARECHOVIRUS (HPEV) INFECTIONS IN INFANTS UP TO TWO MONTHS OLD IN CENTRAL OHIO.
C Tomatis Souverbielle, H Wang, J Feister, J Campbell, A Medoro, A Mejias, O Ramilo, D Salamon, A Leber, and G Erdem, Chicago, IL and Columbus, OH. Northwestern University  Abstract 22

9:30 SURGERY TYPES AND COMPLICATIONS AS RELATED TO TIMING OF REPAIR OF TETRALOGY OF FALLOT.
P Mahajan, K Borsheim, E Ebenroth, S Hussain, J Herrmann, and J Patel, Greenwood, IN and Indianapolis, IN. Riley Children’s Hospital, Indiana University School  Abstract 23

9:45 PRETERM BIRTH RESULTS IN NEONATAL LEPTIN DEFICIENCY.
B Steinbrekra and RD Roghair, Iowa City, IA. University of Iowa  Abstract 24

10:00-10:15 Break

10:15 MILD HYPERBILIRUBINEMIA MAY PROTECT AGAINST OXIDATIVE STRESS AND CYTOKINE UPREGULATION CAUSED BY NEONATAL HYPERGLYCEMIA IN THE DEVELOPING HIPPOCAMPUS OF RAT PUPS.
KM Satrom, K Ennis, and R Rao, Saint Paul, MN and Minneapolis, MN. University of Minnesota  Abstract 25

10:30 ARE EPIDEMIC STRAINS OF PSEUDOMONAS AERUGINOSA PRESENT IN NEWLY INFECTED CYSTIC FIBROSIS PATIENTS IN THE UNITED STATES?
M Soneji, C Forsberg, E Ozer, N Mayer-Hamblett, P Singh, and AR Hauser, Chicago, IL and Seattle, WA. Northwestern University  Abstract 26

10:45 EARLY INFANCY BODY COMPOSITION OF VLBW PRETERM INFANTS IS NOT ASSOCIATED WITH HIGHER BLOOD PRESSURE AT FOUR MONTHS CGA.
EC Ingolfsson, L Zhang, E Demerath, and SE Ramel, Brooklyn Park, MN and Minneapolis, MN. University of Minnesota  Abstract 27

11:00 NEC-LIKE INJURY FOLLOWING PANETH CELL DISRUPTION OCCURS THROUGH AUTOPHAGY PATHWAYS.
SL Kern, M Frey, H Gong, D Myerholz, MH Wong, and SJ McElroy, North Liberty, IA, Los Angeles, CA, Iowa City, IA, and Portland, OR. University of Iowa  Abstract 28
### 11:15  FEMALE BIASED NEUROTROPHIN MEDIATED NEUROPROTECTION IS ESTROGEN RECEPTOR ALPHA DEPENDENT AFTER NEONATAL HYPOXIA ISCHEMIA.
R Al Subu, D Zafer, S Abdul Kareem, V Chanana, D Hanalioglu, L Mellengic, K Freeman, A Otles, J Chandrashekhar, P Ferrazzano, and P Cengiz, Madison, WI.  
*University of Wisconsin*

### 11:30  THE TEST OF INFANT MOTOR PERFORMANCE IS RELATED TO COGNITIVE AND LANGUAGE OUTCOMES AT 2 YEARS OF AGE IN HIGH-RISK, PRETERM INFANTS.
CD Peyton, MD Schreiber, and ME Msall, Wilmette, IL and Chicago, IL.  
*University of Chicago*

### 11:45  HUMAN MILK (HM) BIOMARKERS IN PUMP-DEPENDENT MOTHERS OF PRETERM INFANTS.
AL Patel, R Hoban, CT Lai, J Janes, C Medina Poeliniz, D Geddes, and PP Meier, Chicago, IL, Toronto, ON, and Perth, WA.  
*Rush University Children’s Hospital*

### 12:15 pm–1:30 pm  MWSPR Kenny, Metcalf, and Student Research Award Luncheon  
*Sponsored by Abbott Nutrition*

The Robert R. McCormick Foundation Auditorium, 11th Floor, Lurie Children’s

### RECEPTION AND COMBINED POSTER SESSION  
THURSDAY, OCTOBER 12, 2017  
Prentice Women’s Hospital, Atrium – 3rd Floor

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| 1  | AGE-DEPENDENT DIFFERENCES IN MICROGLIA IN RESPONSE TO HYPOXIA ISCHEMIA IN THE DEVELOPING BRAIN.  
*S Abdul Kareem, D Zafer, R Al-Subu, B Novak, J Chandrashekhar, V Chanana, P Cengiz, and P Ferrazzano, Madison, WI.  
*University of Wisconsin* |
| 2  | THYROID CANCER DETECTION BY THYROID ULTRASOUND IN PEDIATRIC PATIENTS.  
*A Al Nofal, A Creo, and F Alahdab, Sioux Falls, SD and Rochester, MN.  
*University of South Dakota* |
| 3  | THE NEGATIVES OF BEING POSITIVE: INCIDENCE OF CONVERSION TO CMV POSITIVITY AMONGST PREMATURE INFANTS GIVEN OROPHARYNGEAL ADMINISTRATION OF THEIR MOTHER’S MILK.  
*MG Andrianov, N Rodriguez, IS Wolf, and M Caplan, Chicago, IL.  
*University of Chicago* |
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<td>4</td>
<td>DURATION OF HOME OXYGEN USE IN PRETERM INFANTS AND THE PHYSIOLOGIC DEFINITION OF BRONCHOPULMONARY DYSPLASIA.</td>
<td>P Arora, A Dahlgren, J Engel, and J Lagatta, Brookfield, WI, Chicago, IL, and Milwaukee, WI.</td>
<td>Children's Hospital of Wisconsin</td>
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<td>ADDITIVE MANUFACTURING FOR THE HEALTH PROFESSIONAL: A STEP-BY-STEP MANUAL UTILIZING FREE, OPEN SOURCE SOFTWARE TO 3D PRINT PEDIATRIC HEART MODELS WITH CONGENITAL HEART DISEASE FROM CT IMAGING.</td>
<td>JP Bowens, Omaha, NE. Creighton University</td>
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<td>ENHANCING MORNING REPORT AT A PEDIATRIC ACADEMIC INSTITUTION.</td>
<td>JN Buehler, E Bergamini, M Schildz, P Buchanan, D Halloran, and A Tanios, St. Louis, MO.</td>
<td>Saint Louis University</td>
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<td>Cancelled URGENT CARE EMPLOYEES ASSESS SUICIDE SCREENING.</td>
<td>AE Burris, C Watts, R Donegan, M Moran, AT Patel, and K Couch, Overland Park, KS and Kansas City, MO.</td>
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<td>SLEEP LOSS IN AN URBAN GENERAL PEDIATRIC WARD: CAUSES OF SLEEP DISRUPTION AND DIFFERENCES BY RACE.</td>
<td>M Chamberlain, N Orlov, S Anderson, S Fishbach, D Gozal, and V Arora, Chicago, IL.</td>
<td>University of Chicago</td>
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<td>VARIANT CLASSIFICATION CONFLICT AMONGST GENES SUBJECT TO REPORTING OF SECONDARY FINDINGS.</td>
<td>BP Chaudhari, L Rasmussen, F Wehbe, and J Starren, Chicago, IL.</td>
<td>Northwestern University</td>
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<td>ANALGESIC EFFECT OF BREAST MILK COMPARED TO ORAL SACROSE SOLUTION ON PRETERM NEONATES UNDERGOING MINOR PAINFUL PROCEDURES: A RANDOMIZED, SINGLE-BLIND TRIAL.</td>
<td>P Dina, MG Weiss, CH Sajous, PA Hummel, and MM Naber, Maywood, IL. Loyola University Medical Center</td>
<td>Loyola University Medical Center</td>
<td>Abstract 41</td>
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<td>EFFECTIVE TREATMENT OF FOCAL SEGMENTAL GLOMERULOSCLEROSIS RELAPSE IN RENAL TRANSPLANT PATIENTS.</td>
<td>R ElChaki, SL Tarsi, A AlDughiem, and M Kallash, Buffalo, NY.</td>
<td>University at Buffalo</td>
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<td>Abstract 43</td>
<td>USE OF FLOWCHARTS AND TEMPLATED CLINIC NOTES TO IMPROVE TYPE 2 DIABETES COMORBIDITY SCREENING.</td>
<td>SP Engle, D Wyatt, and P Wolfgram, Wauwatosa, WI and Milwaukee, WI. Medical College of Wisconsin Affiliated Hospitals-</td>
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<td>PEDIATRIC RESIDENTSÍ PERCEPTIONS AND PRACTICES ON ABUSIVE HEAD TRAUMA PREVENTION IN INFANTS.</td>
<td>MH Farhat and J Brar, Ann Arbor, MI and East Lansing, MI. Michigan State University</td>
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<td>Abstract 45</td>
<td>ENTEROVIRUS INFECTION IN YOUNG INFANTS: PREVALENCE, CLINICAL, AND LABORATORY CHARACTERISTICS IN COLUMBUS, OHIO.</td>
<td>J Feister, A Medoro, C Tomatis Souverbielle, J Campbell, G Akkoc, O Ramilo, D Salamon, A Leber, and G Erdem, Chicago, IL, Columbus, OH, and Istanbul, Turkey. Northwestern University</td>
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<td>15</td>
<td>Abstract 46</td>
<td>IMPROVING SAFE SLEEP FOR HOSPITALIZED INFANTS.</td>
<td>EE Frey, NP Hamp, and NM Orlov, Chicago, IL. University of Chicago</td>
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<td>Abstract 47</td>
<td>RARE PRESENTATION OF HOLOPROSENCEPHALY AND CEBOCERPHALY IN INFANT OF DIABETIC MOTHER.</td>
<td>J Garisa, S Sharma, S Mahajan, and T Balaji, Chicago, IL. Sinai Children’s Hospital</td>
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<td>Abstract 48</td>
<td>INTEGRIN β2 IMMUNOMODULATORY GENE VARIANTS IN PREMATURE INFANTS WITH NECROTIZING ENTEROCOLITIS.</td>
<td>L George, A Holmes, V Sampath, H Menden, and S Xia, Kansas City, MO. Children's Mercy</td>
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<td>Abstract 49</td>
<td>ANOGENITAL DISTANCE (AGD) IS DETERMINED DURING MALE PROGRAMMING WINDOW (MPW) IN HUMAN NEWBORN, SERVING AS A BIO-MARKER OF PRENATAL ANDROGEN ACTION.</td>
<td>V Goyal, V Chowdhary, V Jain, A Davis, and P Shekhawat, Westlake, OH, Cleveland, OH, and Cincinnati, OH. Case Western Reserve University</td>
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<td>19</td>
<td>Abstract 50</td>
<td>IMPROVING CONSTIPATION CARE: A UNIQUE PEDIATRIC GASTROENTEROLOGY-PRIMARY CARE CHILDHOOD CONSTIPATION COLLABORATIVE FOR DEVELOPMENT OF A CONSTIPATION TOOL KIT TO ENHANCE DETECTION AND STANDARDIZE MANAGEMENT OF CONSTIPATION IN CHILDREN IN THE AMBULATORY PED.</td>
<td>KP Hospattankar, R Gulati, D Super, and RD Needlman, North Aurora, OH and Cleveland, OH. Case Western Reserve University-Metrohealth</td>
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<td>FUNCTIONAL CHARACTERIZATION OF 4 ABCA3 MUTATIONS IDENTIFIED AMONG INFANTS WITH RESPIRATORY DISTRESS SYNDROME.</td>
<td>JY Hu, P Yang, H Heins, D Wegner, B Hackett, J Wambach, and F Cole, St. Louis, MO. Washington University in St. Louis School of Medicine</td>
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<td>A COMPARATIVE STUDY OF CLINICAL PARAMETERS IN NEWBORNS WITH HYPOXIC ISCHEMIC ENCEPHALOPATHY IN PRESENCE AND ABSENCE OF SEVERE MRI ABNORMALITIES.</td>
<td>SA Irani, D Mamilla, A Jain, and N Chouthai, Farmington Hills, MI and Detroit, MI. Wayne State University</td>
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<td>TIMING OF DIAGNOSIS OF COARCTATION OF AORTA/INTERRUPTED AORTIC ARCH IN NEWBORNS IN A HOSPITAL IN MIDWEST REGION.</td>
<td>I Jagadesan, N Parashar, L Gopineti, and H Srinivasan, Chicago, IL. Mount Sinai Hospital</td>
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<td>23</td>
<td>Abstract 54</td>
<td>CONGENITAL HYPOTHYROIDISM IN PREMATURE INFANTS.</td>
<td>DC Kaluarachchi, J Eickhoff, S Dawe, DB Allen, and MW Baker, Madison, WI. University of Wisconsin</td>
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<td>Abstract 55</td>
<td>ELUCIDATING THE ROLE OF MIR-1253, A CANDIDATE TUMOR-RELATED GENE IN MEDULLOBLASTOMA.</td>
<td>RK Kanchan, S Mahapatra, and SK Batra, Omaha, NE. University of Nebraska Medical Center</td>
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<td>Abstract 56</td>
<td>PERINATAL-NEONATAL IODINE STATUS: LONGITUDINAL ASSESSMENT OF IODINE AND THYROID STATUS IN PRETERM INFANTS.</td>
<td>N Kanike, M Thomas, S Groh-Wargo, P Shekhawat, and D Kumar, Saint Clair Shores, MI and Cleveland, OH. Case Western Reserve University</td>
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<td>Abstract 57</td>
<td>VITAMIN D STATUS IN A LARGE COHORT OF PRETERM AND TERM INFANTS.</td>
<td>N Kanike, S Groh-Wargo, and KG Hospattankar, Saint Clair Shores, MI and Cleveland, OH. Case Western Reserve University</td>
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1
CHANGES IN MYELIN ULTRASTRUCTURE AND WHITE MATTER DIFFUSIVITY IN A MOUSE MODEL OF INTRAUTERINE GROWTH RESTRICTION WITH HYPEROXIA

Jill Chang1, 2, Daniele Procissi1 and Maria L.V. Dizon1, 2
Northwestern University1, Chicago, IL; Lurie Children's Hospital of Chicago2

Background: Intrauterine growth restriction (IUGR) is defined as a significant reduction in fetal growth rate resulting in birth weight <10th percentile for gestational age. It results in an increased risk of mortality and morbidities including pulmonary hypertension, bronchopulmonary dysplasia, and cerebral palsy. Previously we found that a novel murine model of IUGR, using a thromboxane A2 (TXA2) analog, results in impaired motor function, changes in the oligodendroglial lineage, and myelin protein expression that were compounded by hyperoxia. There is currently little known about the effect of IUGR and hyperoxia on myelin structure, integrity or connectivity within different white matter areas of the brain. Purpose/Objectives: We tested the hypothesis that myelin ultrastructure and white matter diffusivity are affected in IUGR with and without exposure to hyperoxia. Methods: Pregnant C57Bl6 mice were implanted with micro-osmotic pumps containing TXA2 analog (U-46619) or 0.5% EtOH at E12.5. After spontaneous birth, pups were weighed and those <10th percentile at birth were considered IUGR. Vehicle and IUGR pups were cross-fostered and placed into 75% FiO2 or room air from birth to 14 days. Diffusion tensor MRI of the brain was performed at P28 to examine apparent diffusion coefficient (ADC) and fractional anisotropy (FA). Following MRI, tissue was obtained for transmission electron microscopy from the internal capsule using FEI Tecnai Spirit G2 TEM and FEI Eagle camera. Unpaired t-tests were used to analyze all data, p<0.05 level of significance. Results: Significant decreases in FA were found in the midbrain, pons, and striatum in hyperoxia and IUGR/hyperoxia compared to the vehicle normoxia group (n = 4-8). A significant increase in ADC was found in the pons in the hyperoxia group compared to the control group. Significantly decreased myelin thickness was found in the IUGR group compared to the control group. Increased g-ratio and percent non-compacted axons were found in the IUGR/hyperoxia group compared to the control group (n = 4-8). Conclusions: IUGR and hyperoxia result in changes in myelin thickness, compaction, and microstructural integrity. The changes appear to impact the corticospinal tract as evidenced by findings specific to the midbrain and pons. These results lead insight into the pathogenesis of functional motor deficits seen in this model and can result in more targeted future studies and interventions.

2
Antenatal steroids and thyroid hormone function in preterm infants

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Background. Antenatal steroids are used widely for women at risk of preterm delivery. Incidence of congenital hypothyroidism among preterm infants has increased. The evidence on the effect of antenatal steroids on thyroid hormone function in preterm infants is limited. Objectives. To determine the effect of antenatal steroids on thyroid hormone function in preterm infants. Methods. This is a retrospective cohort study of preterm infants born before 30 weeks gestation admitted to University of Iowa Neonatal Intensive Care Unit between 1 July 2012 to 30 June 2015. Infants were divided in to three groups of no antenatal steroids, partial (1 dose) and complete (2 doses). Thyroid function tests at day of life 30 were compared between the three groups. Results. 260 infants met inclusion/ exclusion criteria and included in the study. 40 Infants were in no steroid group, 49 were in partial steroid group and 171 were in complete steroid group. Median T4 and TSH were not
significantly different between the groups. Abnormal TSH (>6) was 23%, 12% and 9% in no steroids, partial and complete steroids groups respectively (p 0.05). Significantly higher proportion of patients were started on levothyroxine supplementation in no steroid group (15%) and partial steroid group (10%) compared to complete steroid group (5%) (p 0.04). **Conclusion.** Higher proportion of infants in no steroids or partial steroid groups had TSH>6 and were started on levothyroxine supplementation compared to complete steroid group. Antenatal steroid might play a role in acceleration of hypothalamus-pituitary-thyroid axis in preterm infants.

3

**INCREASED BIOLOGIC USE AND LOWER SURGICAL RATES IN PEDIATRIC VERSUS ADULT-ONSET CROHN’S DISEASE AT A LARGE TERTIARY-CARE CENTER OVER A 6-YEAR FOLLOW-UP**

**Kurowski, Jacob A.**1; Milinovich, Alex2; Chagin, Kevin2; Ji, Xinge2; Bauman, Janine2; Sugano, David2; Kattan, Michael2; Achkar, Jean-Paul3

1. Pediatric Gastroenterology, Cleveland Clinic, Cleveland, OH, United States. 2. Quantitative Health Sciences, The Lerner Research Institute, Cleveland Clinic, Cleveland, OH, United States. 3. Digestive Disease and Surgery Institute, Cleveland Clinic, Cleveland, OH, United States.

**Introduction:** With the increasing use of the electronic medical record (EMR), it will be essential to develop methods to extract accurate clinical information to define disease course in chronic illness. To date, use of codified data has been a difficult and imprecise task in assessing disease course in patients with inflammatory bowel disease. Our aims were to: 1. Use natural language processing (NLP) in combination with codified data to establish a well-defined cohort of pediatric and adult-onset Crohn’s disease (CD) from a large EMR, and 2. Extract meaningful data to evaluate treatment and outcomes over the course of CD. **Methods:** We identified 27,138 patients with at least 1 billing diagnosis of CD from 2000-2016 at a tertiary center. Patients were identified as pediatric-onset CD if they were less than 18 years of age at time of first EMR diagnosis. We then applied a previously described EMR based statistical prediction model that uses a combination of NLP and codified data to accurately identify patients with confirmed CD (IBD 2013;19:1411-20). Model refitting and determination of cutoff points to maximize specificity were conducted after two clinicians performed chart reviews of 407 patients as a gold standard. This cohort was then analyzed using NLP to search all relevant outpatient and inpatient records for medications and specific outcomes including hospitalization and surgery during follow-up. **Results:** Our refitted model had sensitivity/specificity of 90%/98% in pediatrics and 73%/94% in adults. We identified 2270 children (<18 years) and 6246 adults (≥18 years) with CD followed over a median of 72 (IQR 21-136) and 72 (IQR 21-145) months respectively. Significantly higher rates of immunosuppression were utilized in children than adults including biologics 48.6% vs 30.9% (p<0.001), thiopurines 48.7% vs 33.8% (p<0.001), and methotrexate 15.7% vs 7.0% (p<0.001). The overall rate of CD-related abdominal surgeries were significantly lower in pediatrics vs adult (29.8% vs 38.1%, p<0.001). The 10-year CD-related abdominal surgery rate was significantly lower in patients on biologics vs not on a biologic (16.2% vs 29.6%; p<0.001). **Conclusion:** The use of modeling incorporating NLP and codified data is valuable in establishing a well-defined large EMR cohort of patients with CD with a high degree of specificity. We also used NLP to map disease course and our findings highlight significant differences in treatment of pediatric versus adult CD. There were significantly higher rates of immunosuppression utilization and lower rates of CD-related abdominal surgeries in the pediatric vs adult cohorts.
INFANTS EXPOSED TO MATERNAL CHORIOAMNIONITIS: DO WE NEED TO TREAT THEM ALL?

Vinay Sharma MD, Kunal Gupta MD, Kolleen Amon CNP, Asha Siddappa MD and Constance Adkisson MD. Hennepin County Medical Center, Minneapolis, MN

Background: Diagnosis of Maternal Chorioamnionitis (MC) has serious implications for the management of the newborn. The CDC guidelines recommend treatment with antibiotics for all neonates born to women with suspected or proven MC. This has resulted in antibiotic overuse and separation of baby from mother, especially in well appearing infants with MC. Sepsis risk calculator (SRC) is a validated tool to predict the probability of Early Onset Sepsis (EOS) in infants ≥ 34 weeks gestational age (GA). However there is a dearth of studies evaluating the use of SRC in infants with MC. Aim: To reduce antibiotic use and separation of baby from mother in ≥34 weeks GA infants exposed to MC through application of SRC. Methods: All infants with MC were admitted to the NICU for observation and laboratory evaluation per our unit protocol before the study period (May 2016 to April 2016). Laboratory evaluation included blood culture, CBC, CRP at birth, repeat CBC and CRP at 12 hrs and again CRP at 24 hrs. Infants with clinical or laboratory evidence of sepsis were treated with antibiotics. SRC was implemented during the study to guide the need for NICU admission, lab evaluation and treatment with antibiotics for ≥34 weeks GA infants and exposed to MC. Laboratory evaluation rate (LER) was defined as the number of labs sent in first 48 hours of life/100 patient days in infants with MC. LER was calculated for each of the labs CBC, CRP and blood culture. Rate of NICU admission, LER and antibiotic usage were then compared between year 2015 and the study period. Results: NICU admission rate for infants ≥34 weeks exposed to MC was reduced by 65% during the study period. 23% (16/69) infants were started on antibiotics, while 77% infants were managed without antibiotics and were able to stay with Mother. Amongst the infants who received antibiotics, received a median of 4 (IQR 4-7) antibiotic doses which was 7 (IQR 5-14) before intervention. There was a significant drop in LER (Labs/100 patient of MC) for blood culture (33 vs. 106), CBC (49 vs. 207), and CRP (51vs. 295). Infants with SRS have significantly shorter median length of NICU stay (10 vs. 36 hrs.). No increase in readmission rate and/or increase in antibiotic usage rate 28 days after discharge was seen. Conclusion: Use of SRC significantly decreases the rate of NICU admission, laboratory evaluation and antibiotic treatment, without increasing readmission rates and late antibiotic use.

EXPOSURE TO MATERNAL HYPERGLYCEMIA CAUSES IMPAIRED OFFSPRING PANCREATIC BETA CELL FUNCTION EARLY IN LIFE.

K Kua and Y Jo, Indiana University School of Medicine, Indianapolis, IN

Background: Offspring of diabetic mothers have higher risks of neonatal hypoglycemia secondary to dysregulated insulin secretion. Furthermore, they have increased risk of pancreatic islet dysfunction, insulin resistance and type 2 diabetes in later life. These findings strongly indicate the role of perturbed fetal environment in modulating offspring pancreatic islet health. Due to the complicated nature of maternal diabetes, the exact contribution of hyperglycemia alone has been uncertain. We hypothesize that isolated maternal hyperglycemia during late gestation causes early perturbation in offspring islet function, thereby increasing the risk of type 2 diabetes in ODM. Methods: On E19, a left femoral artery catheter with tip located above the uterine artery, followed by ligation of both the hypogastric and superior gluteal artery to deliver glucose infusion directly into the left uterine artery. Upon completing 48 hours of 4mg/min glucose infusion, glucose induced calcium influx of fetal islets were measured using Fura-2AM live cell calcium imaging. Expression of proximal glucose sensors of fetal pancreata/islets was measured via qPCR. Results: We found that maternal glucose remained similar during 4mg/min glucose infusion, with left uterine vein blood glucose level significantly higher than right uterine vein (264±30 mg/dL vs 131±10 mg/dL, n=8 dams, p<0.05). Fetal rats in the left uterine horn (HG) had higher blood glucose levels compared to
fetal rats in the right uterine horn (88±9 mg/dL vs 51±5 mg/dL, n=20-30 pups/group, 9 mothers). The HG fetal rats had higher pancreatic beta cell area (66±37% increased compared to control, n=3-5 pups/group, 3 mothers) and had lower blood glucose at 1 hour of postnatal life (69±10 mg/dL vs 106±12 mg/dL, n=8-11 pups/group, 5 mothers). Interestingly, we found that HG fetal islets had decreased glucose induced calcium influx but no difference was detected during arginine stimulation. While fetal pancreata exhibited higher glucokinase expression, lower Slc2A2 (Glut2) and PDX1 expression, HG fetal islets have higher glucokinase and PDX1, but similar Slc2a2 expression compared to control. **Conclusion:** Our model closely recapitulates the evolution of pancreatic islet dysfunction in human ODM – where newborn pups developed neonatal hypoglycemia and pancreatic islet beta cell hyperplasia. Decrease in HG fetal islet glucose responsiveness may be secondary to proximal glucose sensor perturbation. We have cross-fostered pups to determine if such perturbation contributes to future risks of pancreatic dysfunction at weaning and adulthood.

6
IDENTIFICATION OF NOVEL THERAPEUTIC TARGETS IN EWING SARCOMA USING A HUMAN STEM CELL TUMOR MODEL.
K Goss, S Koppenhafer, K Harmoney, W Terry, and D Gordon, University of Iowa Stead Family Children’s Hospital, University of Iowa, Iowa City, IA

**Background and Purpose:** Ewing sarcoma is an aggressive bone and soft tissue sarcoma that is treated with highly intensive, cytotoxic chemotherapy in combination with surgery and radiation. The driver oncogene in most Ewing sarcoma tumors is the EWS-FLI1 gene fusion, which is generated by a chromosomal translocation between the **EWSR1** and **FLI1** genes. EWS-FLI1 is an attractive therapeutic target because it is both required for tumorigenesis and specific for tumor cells. However, in direct contrast to other oncogenes that can be directly inhibited using targeted therapies, EWS-FLI1 has proven to be a challenging molecular target. As a result, the treatment of Ewing sarcoma has changed very little in the past two decades, despite the identification of EWS-FLI1 nearly twenty-five years ago. **Methods:** In order to identify novel therapeutic targets in Ewing sarcoma, we used human embryonic stem cells that express inducible EWS-FLI1 to model the initiation and development of Ewing sarcoma in a genetically defined system. We then used this model system and a gene expression based approach to identify that Ewing sarcoma cells are uniquely vulnerable to inhibitors of ribonucleotide reductase (RNR), which impair DNA replication by blocking the synthesis of deoxyribonucleotides. **Results:** We report that the treatment of Ewing sarcoma cells with gemcitabine, an irreversible inhibitor of RNR, results in impaired DNA replication, cell cycle arrest, and apoptosis. Inhibition of RNR in Ewing sarcoma cells also results in activation of checkpoint kinase 1 (CHK1), which is a critical mediator of cell survival in the setting of impaired DNA replication. Notably, inhibition of CHK1 function with a small-molecule inhibitor, or siRNA knockdown, is synergistic with gemcitabine in vitro and significantly prolongs mouse survival in an Ewing sarcoma xenograft experiment. **Conclusions and Clinical Correlation:** In summary, we have identified that Ewing sarcoma cells are uniquely sensitive to gemcitabine, an irreversible inhibitor of RNR. Moreover, combining gemcitabine with a CHK1 inhibitor is synergistic in vitro and significantly prolongs mouse survival in a xenograft experiment. Overall, these results provide a rationale for the potential clinical translation of this drug combination for the treatment of Ewing sarcoma.

7
CHORIOAMNIONITIS EXPOSURE REMODELS THE NEONATAL MONOCYTE HISTONE MODIFICATION LANDSCAPE.
J Bermick, K Gallagher, W Carson, S Kunkel, N Lukacs, M Schaller, Michigan Medicine, Ann Arbor, MI.
Chorioamnionitis, a condition involving infection and inflammation of the chorion, amnion and placenta, can lead to a fetal systemic inflammatory response that can change the neonatal immune transcriptosome and alter the developing immune system. We have previously shown that neonatal monocytes gain the activating histone tail modification H3K4me3 at promoter sites of immunologically important genes as development progresses from preterm neonate to adult, and that this contributes to neonatal-specific immune responses that leaves them vulnerable to infection. It is currently unknown how exposures in the perinatal period, including chorioamnionitis, alter the normal developmental progression of the histone modification landscape in the neonatal immune system and contribute to this infection risk. In this study we sought to determine the impact of chorioamnionitis exposure on the neonatal monocyte H3K4me3 histone modification landscape as development progressed from extremely preterm neonate to term neonate using chromatin immunoprecipitation followed by massively parallel DNA sequencing (ChIP-seq). H3K4me3 ChIP-seq was performed on umbilical cord blood purified CD14+ monocytes from healthy and chorioamnionitis-exposed extremely preterm neonates (under 30 weeks gestation), late preterm neonates (30-36 weeks gestation), and term neonates (37+ weeks gestation). Chorioamnionitis exposure in both preterm and term monocytes resulted in both removal and placement of the activating mark H3K4me3, with a net increase in total monocyte H3K4me3 peaks. The H3K4me3 peaks were most often gained in intronic locations. This finding is particularly interesting as H3K4me3 is primarily located at promoter regions of actively transcribed genes in adult cells without a known function at introns. These findings reveal that chorioamnionitis exposure results in a global remodeling of the neonatal monocyte H3K4me3 landscape, which likely has both short- and long-term effects on monocyte function and innate immune development.

8

The IMPACT OF PULMONARY HYPERTENSION IN PRETERM INFANTS WITH SEVERE BPD: A MULTI-CENTER COMPARISON OF NICU AND READMISSION OUTCOMES

JM Lagatta5, EB Hysinger9, I Zaniletti2, E Wymore7, S Vyas-Read4, LD Nelin6, WE Truog3, MA Padula1, NFMPorta10, S Yallapragada8, RC. Savani8, TR Grover7, K Murthy10 from 1Children's Hospital of Philadelphia, Philadelphia, PA, 2Children’s Hospitals Association, Overland Park, KS; 3Pediatrics, Children's Mercy-Kansas City and the University of Missouri-Kansas City School of Medicine, Kansas City, MO; 4Pediatrics, Emory University, Atlanta, GA; 5Medical College of Wisconsin, Milwaukee, WI; 6Neonatology, Nationwide Children’s Hospital, Columbus, OH; 7Neonatology, University of Colorado, Aurora, CO; 8Pediatrics, University of Texas Southwestern Medical Center, Dallas, TX; 9Cincinnati Children’s Hospital Medical Center, Cincinnati, OH; 10Northwestern University, Chicago, IL.

Purpose of Study: Pulmonary hypertension (PH) is associated with severe bronchopulmonary dysplasia (sBPD); however, the impact of PH on clinical outcomes in or after the NICU is uncertain. Our objective was to compare clinical outcomes among infants with sBPD with and without PH.

Methods: Using the Children’s Hospitals Neonatal Database (CHND) linked with patient records from the Pediatric Health Information Systems (PHIS), we identified all infants born <32 weeks’ gestation without anomalies who had sBPD (receipt of >2 L/min flow, supplemental F.O₂ ≥0.3, or positive pressure ventilation at 36 weeks’ post-menstrual age (PMA)). PH was identified by diagnoses recorded by trained abstractors. The primary outcome was hospital readmission, with secondary outcomes of mortality, tracheostomy, gastrostomy, ICU readmission, and length of stay. Multivariable analyses adjusted for neonatal illness severity and center. Results: Of 2806 infants with sBPD in 29 NICUs, 401 (14%) had PH. Infants with PH more often experienced SGA (38% vs. 19%), greater receipt of mechanical ventilation at 36 weeks’ PMA or admission (61% vs 31%), and higher products of higher mean airway pressure x F.O₂ score at 36 weeks’ PMA (3.6 vs 0.5 cm H₂O) among those receiving ventilation. Also, PH was associated with hospitalization through 1 year of age (6% vs 1%), tracheostomy with ventilator dependence (17% vs 6%), and gastrostomy tube
feedings (51% vs 30%, p<0.001 for all). Conversely, PH was related to lower growth velocity after referral (7.6 vs 11.1 g/kg/d, p<0.001 for all). PH was significantly associated with mortality in unadjusted analyses (21% vs 4%, p<0.001) and after adjustment for age at referral, center, duration of mechanical ventilation, systemic steroid receipt, and blood stream infection (OR 4.2, 95% confidence interval (CI): 2.9, 6.1). A secondary model including center rate of echocardiogram and center rate of PH diagnosis did not change the association between PH and mortality. Among survivors with subsequent encounters in PHIS (n=1925, PH in 199), infants with had more inpatient readmissions in unadjusted analyses (50% vs 39%, p=0.003), although this was not significant after adjustment for illness severity, center, tracheostomy and gastrostomy tube (OR 1.1, 95% CI 0.8,1.6).

**Conclusion(s) & Clinical Correlations:** In infants with sBPD born < 32 weeks' gestation, PH is independently associated with in-hospital mortality. The frequency of tracheostomy, gastrostomy, and after-NICU encounters was striking, and amplifies the adverse outcomes experienced after discharge.

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9
**SEPSIS RISK CALCULATOR IN DECREASING ANTIMICROBIAL USAGE RATE IN A LEVEL-3 NICU.**

*Vinay Sharma* MD, Kunal Gupta MD, Kolleen Amon CNP, Asha Siddappa MD and Constance Adkisson MD. Hennepin County Medical Center, Minneapolis, MN

**Background:** There is multifold variation in antibiotic prescribing policy amongst NICU in newborns with Early Onset Sepsis (EOS). It is known that under usage of antibiotics can cause serious morbidity and mortality while its overuse is linked with antimicrobial resistance, alteration in gut microbiome, increased health care costs and unnecessary separation of mother and baby. Known biochemical markers of infection in infants lack sensitivity, specificity and are not cost effective. Sepsis risk scoring (SRS) is a validated tool that predicts the probability of EOS by entering values for the specified maternal risk factors along with the infant’s clinical presentation in ≥34 weeks neonates. **Aim:** To decrease Antibiotic Utilization Rate (AUR) by 10% in 6 months with the use SRS. **Methods:** Sepsis risk scoring (SRS) was used to guide antibiotic therapy in all newborns ≥34 weeks gestational age admitted to our NICU during the study period i.e. May 2016 to November 2016. Our primary outcome was AUR calculated as antibiotic usage/100 patient days. Laboratory evaluation rate (LER) defined as number of labs (CBC, CRP and blood culture)/100 patient days were also calculated. **Results:** 251 infants met inclusion criteria during the study period of 11 months. The AUR in our NICU dropped by 19% from 14.37 in 2015 to 11.5 (P=0.64) after implementation of SRS. In infants ≥34 weeks GA, AUR decreased by 33% from 16.4 in 2015 to 10.9 (p 0.07). Our LER for Blood culture dropped from 5.3 to 3.6 (p=0.005), for CRP dropped from 14.7 to 5.7 (p=0.0001) while for CBC showed a slight increase from 4.6 to 7.6 (p= 0.06). **Conclusion:** SRC is an excellent tool to decrease AUR and can also help to keep a check on lab evaluation rate in NICU.

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**Role of novel Sphingosine Kinase-1 inhibitor, PF543 in therapy of Bronchopulmonary Dysplasia.**

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**Background:** We have earlier demonstrated in our murine model that genetic knock out of Sphingosine Kinase1 (SphK1) ameliorates hyperoxia (75%) induced neonatal lung injury. SphK1 catalyzes formation of Sphingosine 1 phosphate (S1P), which acts through G protein coupled receptors S1P1-5 and promotes formation of reactive oxygen species. This was accompanied by reduced expression of reactive oxygen species (ROS) generating enzymes Nox 2 and 4. PF543 is the most specific inhibitor of SphK1 yet. In vitro experiments using hyperoxia in human lung microvascular endothelial cells (HLMVECs) showed that PF543 reduced activation of p47phox, a
component of Nox proteins accompanied by reduced ROS production. **Hypothesis:** PF 543 protects neonatal lungs from hyperoxia induced BPD. **Methods:** Neonatal mice were administered PF543 (5 mg/kg/dose as intraperitoneal injection) starting on postnatal day 3 (PN3) and exposed to hyperoxia or normoxia from postnatal day 4 (PN 4) to 75% hyperoxia for 7 days. 3 more doses of PF543 were administered on alternate days and the sacrificed on PN 11. Broncho alveolar lavage fluid and lung tissue were collected. Markers of inflammation and lung histology were studied. Plasma S1P was measured to study the impact of PF543 administration on S1P levels. Appropriate controls were administered vehicles and exposed to hyperoxia or normoxia. **Results:** SphK1 inhibition by PF543 caused amelioration of hyperoxia induced BPD as evidenced by improved alveolarization characterized by decreased mean linear intercept compared to controls. Pups given PF543 also showed decreased inflammatory cell infiltrate and lower levels of protein concentration in BAL fluid compared to controls. Administration of PF543 was accompanied by reduced plasma S1P levels. **Conclusions:** SphK1 inhibitor, PF543 plays a significant role in ameliorating hyperoxia induced lung injury in newborn mice. PF543 can serve as a potential new drug to treat BPD.

**MWSPR Plenary Session II**

11

**RELATIONSHIP BETWEEN ADIPONECTIN LEVELS AND BODY COMPOSITION DURING INFANCY IN PRETERM INFANTS**

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**Background:** Preterm infants have increased amounts of fat mass and decreased amounts of fat-free mass at term corrected age (CA) when compared to their term counterparts. These differences dissipate over time, with several studies showing no significant differences by 3-4 months CA. The long term implications of these differences in body composition (BC) remain unclear, however there is concern in other populations that early rapid catch-up growth can have long-term effects on metabolic risk in adulthood. Adiponectin is secreted by adipocytes, is involved in fetal and postnatal growth and also enhances insulin sensitivity. Circulating Adiponectin levels have been associated with post-natal weight gain in preterm infants, but little is known about the relationship between adiponectin and BC in this vulnerable population. **Objective:** Examine the relationship between neonatal blood adiponectin levels and BC at 4 months CA in preterm infants born <32 weeks gestation. **Design/Methods:** In this prospective study, Adiponectin levels were measured at 1 week of age and before hospital discharge from the NICU (~35-37 weeks CA) CA in 22 preterm infants born <32 weeks gestation (mean 27.9 ±2.3 weeks; Birth Weight 1105.7± 323.4 grams). BC (using Air Displacement Plethysmography) and anthropometric measurements (weight, length and head circumference) were also obtained at 4 months CA. The association between adiponectin and infant growth and BC outcomes was assessed using partial correlation coefficients. Covariates included age in weeks at time of measurement, with statistical significance defined at p=0.05. **Results:** Adiponectin levels increased from 1 week (mean= 24521.67 ng/ml) of age to 35-37 weeks CA (mean= 28043.64ng/ml). Adiponectin levels drawn at 1 week of age did not correlate with 4 month growth or BC measurements (p>0.1 for all). Adiponectin levels drawn at 35-37 weeks CA were positively correlated with weight (p=0.03), fat mass (p=0.01) and percent body fat (p=0.03) measured at 4 months CA. **Conclusions:** In contrast to the negative association of adiponectin with adiposity in older individuals, adiponectin levels measured prior to hospital discharge were positively associated with weight and adiposity during early infancy among preterm infants. Larger studies with control for illness and nutrient intake are needed to determine whether adiponectin levels could be used as a biomarker to predict infants at risk of either slow or excessive gains in weight and specifically fat mass.
EARLY VS LATE 23 WEEK GESTATION NEONATAL OUTCOME.

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Background: The decision to initiate or forgo potentially lifesaving treatment in infants born near the limit of viability is extremely difficult. Current national available data on 23-week infant morbidity and mortality is assessed using complete gestational week not fractionated week proportions. We identified a cohort of 23-week infants born over a 15-year period at a single perinatal center to examine the difference in mortality and morbidity outcomes between infants born early versus late during week 23. Objective: Determine the difference in mortality and morbidity outcomes between early (23 0/7 to 23 3/7 weeks) versus late (23 4/7 to 23 6/7 weeks) gestation infants at a single perinatal center. Methods: Using the Vermont Oxford Network Database, we examined all live born 23 week gestation infants between 2001 and 2015 at one urban perinatal center in St. Louis, MO USA. Neonates devoid of delivery room interventions (e.g., oxygen, bag mask ventilation, epinephrine, chest compression) were designated as “comfort care” and excluded from outcomes analysis. Statistical comparisons of mortality and morbidity outcomes were made using chi-square and t-tests as appropriate (P<0.05). A logistic regression model was employed to calculate odds ratios for survival. Results: 182 live born infants were examined; 99 in the early and 83 in the late periods. Exclusion criteria for “comfort care” were applied to 21 infants. Overall 43% of the included infants survived; a lower survival in the early group (24% vs 58%, p < 0.01). No difference was found between the two groups regarding neonatal morbidities (Intra-Ventricular Hemorrhage, Chronic Lung Disease, Retinopathy of Prematurity, Necrotizing Enterocolitis and late bacterial sepsis). Using a logistic regression method, two variables were independently associated with mortality: early 23 week birth (OR: 3.3, 95% CI: 1.7-6.4) and antenatal steroid use (OR: 0.46, 95% CI 0.2-0.9). In the multi-variable model the odds ratio of early 23 week birth was associated with high mortality risk (OR 2.97, 95% CI: 1.5-5.8), adjusting for antenatal steroid use. Conclusions: Significantly higher survival in the late 23 weeks group was seen in our cohort. Birth at early 23 week gestation was associated with three times higher mortality, after adjustment for antenatal steroid use. Neurodevelopmental outcomes for this cohort are being investigated in a follow-up project.

MATERNAL AND NEONATAL RETINOL STATUS IN A MIDWEST ACADEMIC MEDICAL CENTER IS ASSOCIATED WITH RACE AND FOOD SECURITY INDEX.

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Background: Vitamin A deficiency is a priority nutritional public health problem in many developing countries. Satisfactory maternal levels of vitamin A are essential for fetal growth, immune system, lung and eye maturation. Associations between newborn vitamin A deficiency (VAD) and higher risk of negative clinical outcomes have been reported. The US is assumed to be vitamin A sufficient in general; however, very little is known about vitamin A status in US pregnant women, newborn infants and related disparities. Methods: Maternal serum and cord blood was collected from patients delivering at an inner city Midwest medical center, and a Food Frequency Questionnaire (FFQ) was administered to the mother. 185 mother infant pairs were included. Statistical analysis was performed according to serum retinol (SR) level as classified by the World Health Organization (WHO): ≤0.35 μmol/L (severely deficient); >0.35-0.7μmol/L (deficient); >0.7-1.05 (insufficient); >1.05μmol/L (adequate). Descriptive statistics include means, standard deviations, medians, minimums and maximums for continuous data and counts and percentages for categorical data. Fisher’s exact test was used for associations of vitamin A levels with race and food
security categories. The Mann-Whitney test was used to compare serum and intake levels between health equity groups. P<0.05 was considered statistically significant. **Results:** On evaluation of retinol status, significant associations were demonstrated between: maternal serum retinol level and maternal race (white/non-white) p=0.02 and 6 Item Food Security Questionnaire status (High + Marginal/Low + Very Low) and cord retinol level p=0.02. Insurance status (private/public) and cord retinol level approached significance p=0.055. Retinol Activity Equivalent (RAE) maternal intake on FFQ and insurance status also approached significance p=0.06. **Conclusions:** Although retinol status is not thought to be at risk in the United States, there are segments of this population where risk may be elevated. Social and diversity markers such as insurance status, food security screening and race may help to identify at risk groups for targeted diet interventions. There may be enhanced benefit in these programs during pregnancy as retinol status impacts neonatal outcomes.

**14**
 Implementation of Updated Hearing Screen Guidelines in a Level IV NICU

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**Background:** Hearing loss is the most common congenital birth defect. Early interventions improve developmental outcome. 2007 AAP guidelines recommend hearing screen by 1 month of age, diagnostic evaluation by 3 months and early interventions by 6 months. NICU infants are at higher risk for hearing loss. For infants born before 34 weeks gestation, there are no guidelines for initial hearing screen, and although ABR can be reliably performed at 34 weeks, in our NICU they are screened prior to discharge per universal hearing screen guidelines. In high risk infants, often with prolonged hospitalization, this leads to missed opportunity for early detection and implementation of early intervention services. **Methodology:** 1) Reviewed current process, performed literature reviews, staff education, proposed updated hearing screen algorithm. 2) First PDSA cycle: Focused on improving compliance with updated AAP guidelines for hearing screen in infants born at GA > 34 weeks. Compliance increased from 66% to more than 90% at end of first PDSA cycle. 3) Second PDSA cycle: Continue tracking improvements in the first group and proposed updated recommendations for infants < 34 weeks to have initial hearing screen at 34-38 weeks or before discharge, whichever comes first. Implemented an EMR tool to improve the current paper process to identify neonates meeting criteria for hearing screen. **Goal:** Improve compliance for completion of hearing screen by 34-38 weeks corrected gestational age for infants born at < 34 weeks from 60 % to 80 % by September 2017. **Measures:** Outcome: Percent Hearing screen completed at 34-38 weeks corrected gestational age or before discharge, whichever comes first. Process: Percent diagnostic hearing test completed/scheduled before discharge in infants < 34 weeks who fail initial hearing screen; Balancing: Audiology utilization, Missed hearing screens, Delayed discharge. **Conclusions:** Delaying hearing screen until prior to discharge in high risk NICU infants, often with prolonged hospital stays, present a missed opportunity for early detection and implementation of early intervention. Using QI methodology, updated hearing screen algorithm was developed and implemented in our level IV NICU along with an EMR tool to improve the process of identifying patients for hearing screen. **Future plans:** 1) Discontinue paper process if EMR tool validated 2) PDSA cycles focusing on timely performance of diagnostic hearing tests 3) Implement updated guidelines in our collaborating NICUs.

**15**
 GROWTH OUTCOMES IN VLBW INFANTS RECEIVING EPO AND AGGRESSIVE IRON THERAPY.

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**Introduction:** Very low birth weight (VLBW) infants are at risk for developing symptomatic anemia and iron deficiency anemia. Erythropoietin (EPO) has been used to stimulate erythropoiesis in at risk infants, and more recent literature suggests a possible neuroprotective effect. However, the impact of EPO and more aggressive iron supplementation on overall growth
has not been previously described. **Aim**: Describe how erythropoietin and aggressive iron supplementation affect growth parameters in VLBW infants. **Methods**: This is a retrospective chart review of infants born <28 weeks gestational age and treated with early EPO and aggressive iron supplementation according to a single institution protocol (n=112). Average iron supplementation during EPO therapy was 6-12 mg/kg and adjusted according to lab monitoring of iron indices during hospitalization. Total iron needs, red blood cell indices, and growth parameters were extracted over the course of hospitalization. Results were then compared to national averages as reported in the 2015 Vermont Oxford Network (VON) of infants born between 22 and 29 weeks gestational age (n=40,846). **Results**: The proportion of VLBW infants whose weight was less than the tenth percentile on the Fenton growth chart at time of discharge was significantly less in our cohort treated with EPO and aggressive iron therapy when compared to those reported by VON averages (p=0.036). Similarly, the proportion of VLBW infants in our cohort whose weight was less than the third percentile on the Fenton growth chart at time of discharge was significantly less than VON averages (p=0.002). However, the overall discharge weights and discharge head circumferences did not differ significantly. **Conclusions**: In our study, the proportion of infants treated with EPO and aggressive iron therapy who experienced growth failure was significantly less than growth failure reported by VON averages. EPO and aggressive iron therapy may affect the growth trajectory of treated VLBW infants, decreasing the overall rate of growth failure. Further study is warranted into the effect of EPO and aggressive iron supplementation on growth.

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THE ASSOCIATION BETWEEN SMALL FOR GESTATIONAL AGE (SGA) AND FUTURE EDUCATIONAL PERFORMANCE.

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**Purpose of Study**: To estimate the associations between educational performance and SGA using varied definitions (3rd–25th percentile) independent of family characteristics. **Methods**: Florida birth certificate and schooling data were linked for surviving, singleton infants born 1992 – 2002, exclusive of multiple births and those attending private schools. Outcomes analyzed were the Florida Comprehensive Achievement Test (FCAT, mean=0, SD=1) scores over 3rd–8th grades, and secondarily, disabilities (physical, behavioral, and cognitive) and gifted status. SGA was defined 23 ways (3rd – 25th percentile) using sex- and gestation-specific percentiles. Unadjusted and multivariable analyses related SGA to the outcomes accounting for maternal and infant characteristics (caption of figure). Analyses of families with ≥2 siblings born from 1994–2002 (sibling cohort (SC)) were conducted using maternal fixed effects to account for static, household characteristics. **Results**: The sample included 1,276,943 eligible (SC = 384,171) infants; SGA prevalences were predictable for 23 definitions in both cohorts. Relative to non-SGA children, FCAT scores were lower in SGA infants in Analyses accounted for maternal (race, ethnicity, age, education, language spoken at home, marital and immigration status, health problems, start of prenatal care in first trimester and parity) and infant (sex, abnormal conditions, congenital anomalies, birth month and year) characteristics.
unadjusted (Figure: 3rd%ile: -0.3SD to 25th%ile: -0.2SD, black squares) and in multivariable analyses (3rd%ile: -0.13SD to 25th%ile: -0.07SD, blue circles). With maternal fixed effect analyses, the full SC cohort (data not shown) and its subset with two discordant siblings show further reduced magnitudes of associations between SGA and FCAT (3rd%ile: -0.07SD to 25th%ile: -0.04SD, orange circles). In secondary analyses, physical [adjusted odds ratio (aOR), 3rd%ile, aOR=1.07; 25th%ile, aOR=1.05]), behavioral (1.1 to 1.01) and cognitive (1.5 to1.2, p<0.001 for all) disabilities were associated with SGA status across the definitional continuum. Moreover, gifted status was inversely associated with SGA. (0.67 to 0.82, p<0.001).

**Conclusion & Clinical Correlation:** While SGA infants’ educational performance through middle school was consistently lower relative to non-SGA infants, these magnitudes were smaller than expected. Much of the observed variance appears related to familial and environmental influences. Performance varied minimally between the 23 SGA definitions suggesting SGA itself may be an insensitive marker of poor educational performance.

**17 COMPARISON OF PREVALENCE, CLINICAL AND LABORATORY CHARACTERISTICS OF ENTEROVIRUS (EV) AND HUMAN PARECHOVIRUS (HPEV) INFECTIONS IN INFANTS LESS THAN TWO MONTHS OF AGE IN COLUMBUS, OHIO.**

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**Background:** EV and HPeV are known to cause febrile illness in young infants. The differences in epidemiologic and clinical features between these infections are not well studied. We analyzed the prevalence, clinical manifestations, virologic data and outcomes of EV and HPeV in infants aged 4-60 days evaluated at Nationwide Children’s Hospital. **Methods:** We retrospectively reviewed EMRs of all infants aged 4-60 days undergoing sepsis evaluation with a positive EV and/or HPeV PCR from any site between January 2015 and September 2016. EV and HPeV were detected by in-house developed Real-time PCR. We analyzed cycle threshold values for positive samples. **Results:** Of 713 patients tested, 151 (21%) were positive for EV and 77 (11%) were positive for HPeV in at least one site. Median age was 24 days (IQR 16-37) in EV+ group and 29 days (IQR 18-41.5) in the HPeV+ group. The proportion of EV infection increased in early summer to early fall while HPeV infection peaked during mid spring to early fall months. HPeV infection was associated with higher and longer duration of fevers (HPeV and EV maximum T median=102.2F and 101.8F respectively, p<0.01); HPeV and EV median fever duration=2 days and 1 day respectively, p<0.01). HPeV patients had lower WBC, absolute neutrophil and lymphocyte counts (HPeV WBC median=5.8, IQR 4.1-7.5; EV WBC median=9.5, IQR 6.8-12.4; p<0.01). Meningitis was common in both infections: 75 patients had a positive CSF for EV (49.7%) and 32 patients for HPeV (41%), p=0.26. Patients who were EV+ in CSF had more CSF pleocytosis than those HPeV+ in CSF (median CSF WBC=50 vs 4.5, respectively; p<0.0001). Unlike EV patients, 43% of HPeV patients with positive CSF testing did not have CSF pleocytosis. PICU admitted patients had higher viral load in CSF HPeV+ patients (p<0.01). All patients recovered fully at the time of discharge. EV patients had coinfection in 36% vs. 28.6% in HPeV patients (p=0.3). **Conclusions:** EV and HPeV had overlapping features as both were common causes of infection in infants undergoing sepsis evaluation with similar seasonality. Although meningitis was common in both infections, EV patients had more CSF pleocytosis.
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RHO-KINASE INHIBITION REDUCES PULMONARY HYPERTENSION IN A GENETIC MODEL OF CONGENITAL DIAPHRAGMATIC HERNIA.

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Background: Congenital diaphragmatic hernia (CDH) is a common and frequently lethal congenital malformation. Despite advances in the care of CDH patients, the mortality rate associated with the disease has been fixed at 10-20%. This persistently high mortality rate is due to pulmonary hypertension that is often not responsive to available medications. Our hypothesis is that a core group of genes is required for both diaphragm formation and development of the lungs and pulmonary vasculature. Mutation of these genes or disruption of their downstream signals may be responsible for pulmonary hypertension in CDH patients. Deletion of the Pre-B-cell leukemia factor 1 (Pbx1) was recently demonstrated to cause diaphragmatic hernia in mice and we recently showed that lung-specific deletion of the Pbx1 causes lethal pulmonary hypertension. We found that several factors that control pulmonary vascular smooth muscle tone are mis-regulated by the deletion of Pbx. **Objective:** Using the molecular pathway that controls pulmonary vascular smooth muscle tone as a guide, we sought to identify a pharmacological treatment approach that would reduce pulmonary hypertension and mortality in Pbx1/2 mutant mice. **Method:** Using a lung mesenchyme-specific knockout approach, we generated Pbx1/2 mutant mice that survive after birth but develop lethal pulmonary hypertension and die between 2-4 weeks of age. Using gene expression and pathway analysis we identified a treatment approach. We evaluated the efficacy of this treatment using assays of enzyme function, histology, echocardiography, and invasive right ventricular pressure measurements. **Results:** We found that treatment with a Rho-kinase inhibitor resulted in reduced pulmonary hypertension and improved survival in Pbx1/2 CKO mice. **Conclusion:** Improved understanding of the roles played by genetic defects in patients with CDH will help to identify effective treatment strategies that address pulmonary hypertension and reduce mortality.

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CLINICAL RISK FACTORS FOR IRON DEFICIENCY, 1-MONTH FERRITIN AND PREDICTION OF IRON STATUS IN THE NICU.

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Background: Iron deficiency anemia (IDA) in infancy can result in long-term cognitive and behavioral deficits. Most healthy term infants are born with an iron endowment to meet their first 6 months of life, but premature infants are at high-risk due to poor endowment and increased demands for rapid growth. For a NICU quality improvement project, ferritin levels are measured at 1 month of age and outpatient ferritin screening at 6 months of life is recommended. **Objective:** To examine the relationship between NICU ferritin levels, historical risk factors for developing IDA and compliance with recommended ferritin follow-up. **Methods:** We obtained quality data from 102 NICU graduates, including the number of risk factors and other moderators, the 1-month ferritin screening data, and compliance with recommendations for 6th month ferritin screening in NICU graduates. Risk factors included prematurity, 1st ferritin level \( \leq 70 \) mcg/dL (below a cutoff that predicts IDA), small or large for gestational age, maternal obesity (BMI \( \geq 35 \) at birth), maternal anemia, multiple gestation, infants of diabetic mothers, Medicaid status and maternal minority status. Unpaired t-tests, \( \beta^2 \) and simple regression were performed. **Results:** First month ferritin levels were demarcated as "low" (\( \leq 70 \) mcg/dL) or normal. Mean 1st month ferritin was 51.7 mcg/dL in low infants and 175 mcg/dL in normal infants (\( p<0.0001 \)). Mean number of risk factors was 2.68 (range of 1-6); as risk factor number increased, the likelihood of low 1st month ferritin level also increased (\( p<0.01 \)). Individual risk factors did not impact 1st month ferritin, except a trend for low ferritin in multiple gestation. Ferritin levels at the 1st month were unrelated to levels at the 6th
month. Of those reaching 6 months, only 32.4% received the recommended ferritin screening; although none were below 15 mcg/dL (abnormal @ 6th month). **Conclusion:** Although any single risk factor did not predict 1st month ferritin, increasing risk factor number predicted lower 1st month ferritin level. Discharge recommendations for 6th month ferritin were not consistently followed, but this lack of relationship between 1st and 6th month ferritin levels in this small cohort supports the possibility that nutritional interventions may effectively prevent IDA. Further studies could investigate best practice alerts or other interventions to address barriers to screening and improve 6th month screening compliance. Developing and validating a risk factor tool may also be effective at screening premature infants at high-risk of IDA.

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**SIN3A GENE MUTATION IS RESPONSIBLE FOR CONGENITAL DIAPHRAGMATIC HERNIA IN HUMANS AND MICE**

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**Background:** Congenital diaphragmatic hernia (CDH) is among the most common, lethal congenital malformations. The high mortality rate of patients with CDH is due to lack of normal development of the lungs and pulmonary vasculature causing a frequently lethal combination of pulmonary hypoplasia and pulmonary hypertension. The severity of these defects is highly variable between patients and their developmental origins are unclear. Our hypothesis is that a core group of genes is required for both diaphragm formation and development of the lungs and pulmonary vasculature. Mutation of these genes or disruption of their downstream signals may be responsible for pulmonary hypoplasia and pulmonary hypertension in CDH patients. Using whole exome sequencing, mutations in the *SIN3A* gene have recently been identified in patients with CDH; however its role in diaphragm, lung, or pulmonary vascular development has not been explored.

**Objective:** To determine the role of *Sin3a* in the developing diaphragm and lung mesenchyme while focusing on developmental mechanisms of pulmonary hypertension. **Method:** Using a conditional knockout approach in a mouse model, we deleted *Sin3a* in either the developing diaphragm or the developing lung mesenchyme. We used a combination of histology, gene expression analysis, and physiology to analyze the mutant phenotype. **Results:** We found that deletion of *Sin3a* in the developing diaphragm muscle results in a mouse model of diaphragmatic hernia. Furthermore we found that deletion of *Sin3a* in the developing lung mesenchyme results in lethal pulmonary hypoplasia. **Conclusion:** Mutation of the *SIN3A* gene results in CDH in humans. Tissue-specific deletion of *Sin3a* results in a new mouse model of CDH and *Sin3a* is required in the developing diaphragm muscle. Furthermore, we found that *Sin3a* is also required in the developing lung mesenchyme and that lung-specific deletion of *Sin3a* results in lethal pulmonary hypoplasia. These data support the model that genetic defects in patients with CDH can cause abnormal development of the lung, independent of the associated diaphragm defect.

**MWSPR PLENARY SESSION III**

**21**

**PANETH CELL DISRUPTION SIGNIFICANTLY DECREASES INTESTINAL PERFUSION**

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**Purpose:** Necrotizing enterocolitis (NEC) is the most devastating cause of gastrointestinal morbidity and mortality in the premature infant. NEC affects over 4000 infants every year in the United States and carries a mortality of 30%. Several studies have implicated alterations of the intestinal microvasculature inducing regional hypoxia and ischemia as playing a role in the development of tissue damage seen in NEC. Studies in both infants and animal models have
suggested that disruption of Paneth cells may play a role in the pathogenesis of NEC. Paneth cells, located within the base of the small intestinal crypts, contain dense granules containing antimicrobial peptides and vasoactive mediators that are secreted constitutively and as a consequence of cellular stress. We hypothesized that Paneth cell disruption in immature intestine would alter the blood flow through the intestinal microvasculature. **Methods:** Td tomato mice were generated on a C57Bl/6 background. P7, 14, and 28 mice were injected with dithizone (75mg/kg) or equal amounts of buffer into the peritoneal cavity. Six hours later, the mice were anesthetized and a midline chest wall incision was made to visualize heart. Fifty microliters of 20mg/mL of dylight 488 was injected into the left ventricle over 10 seconds and allowed to perfuse for 5 minutes. Intestinal sections were harvested, opened longitudinally, and fixed. Intestinal segments were evaluated with Image-J using confocal fluorescence microscopy to quantify intestinal microvasculature perfusion. Statistical significance was determined using non-parametric, unpaired T-test. **Results:** Cross section of intestinal tissue with Paneth cell disruption showed a significant decrease in the relative fluorescence unit of each villi compared with controls (p=0.0115, n=10). The whole mount intestine with Paneth cell disruption also showed a trend towards decrease in relative fluorescence compared to controls (p=0.333, n=2). **Conclusions:** Disruption of Paneth cells decreases blood flow through the immature intestinal microvasculature in immature small intestine. **Clinical correlation:** Paneth cells have previously been shown to play a role in regulating the intestinal microvasculature through alterations of the microbiome. However, our data suggests that disruption of Paneth cells may directly alter blood flow through the intestinal microvasculature resulting in tissue hypoxia and ischemia that is classically seen with NEC.

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**PREVALENCE, GENOTYPES, CLINICAL MANIFESTATIONS, AND OUTCOMES ASSOCIATED WITH HUMAN PARECHOVIRUS (HPEV) INFECTIONS IN INFANTS UP TO TWO MONTHS OLD IN CENTRAL OHIO.**

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**Background:** HPeV has been associated with severe disease in young infants. Of the 17 genotypes described, HPeV 1 and 3 have been the most frequently reported. The epidemiology and clinical features associated with different genotypes have not been well defined. We analyzed the prevalence, genotypes, and clinical manifestations and outcomes of HPeV in infants ≤ 60 days evaluated at Nationwide Children's Hospital, Columbus, Ohio. **Methods:** We retrospectively reviewed EMRs of all infants ≤ 60 days undergoing sepsis evaluation with a positive HPeV PCR from any site between July 2013 and September 2016. All available HPeV CSF, blood, and superficial site specimens were typed by PCR or Sanger sequencing (types assigned per GenBank®). **Results:** Of 1,265 patients tested, 131 (10%) were positive for HPeV in at least one site, of which 100 had available isolates for genotyping. Median age was 30 days (IQR 19-39), 55% were male. HPeV3 was identified in 87 (87%), HPeV4 in 6, HPeV1 in 5, and HPeV5 and 6 were identified in one infant each. For comparisons we grouped types 1, 4, 5 and 6 into HPeV0 (n=13). The circulation of HPeV peaked in the months of July to October independent of the type. However, while HPeV0 were identified only in second half of the year, HPeV3 was detected year round. HPeV3 patients had higher temperatures (p<0.05). There were no significant differences between HPeV3 vs. HPeV0 in age, gender, presenting symptoms, length of stay, PICU admission and CBC. ALT values were higher in HPeV0 patients (p<0.01). CSF indices were also similar in both groups. Of the positive CSF isolates for HPeV, 43% had no pleocytosis; all CSF isolates typed were HPeV3. HPeV4 was found in blood and superficial sites. HPeV1, 5 and 6 were only found in superficial sites and more commonly with coinfections (enterovirus [EV], rhinovirus, group B streptococcus). There were 4 PICU admissions, 3 of them had HPeV3 and 1 had HPeV1 (patient also had Rhinovirus/EV bronchiolitis). All patients
recovered at the time of discharge. Conclusion: HPeV was commonly identified in infants ≤ 60 days undergoing sepsis evaluation. HPeV3 was the most common type in this age group. HPeV4 also caused viremia, while other infrequent types were identified with coinfections.

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SURGERY TYPES AND COMPLICATIONS AS RELATED TO TIMING OF REPAIR OF TETRALOGY OF FALLOT
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Background: Controversy exists for cyanotic infants with Tetralogy of Fallot (TOF) who require surgical intervention at a young age. While these infants had traditionally been palliated with initial systemic to pulmonary shunts with subsequent complete repair, studies have shown the feasibility of early complete repairs. Overall outcomes are less clear, as early complete repairs may have higher rates of transannular patches and more frequent reoperations. There have been limited reports on the modern experience of two staged repairs. Methods: We conducted a retrospective study of all Tetralogy of Fallot patients with pulmonary stenosis at our institution who underwent two stage repair from 2009 to 2017. Surgical timing, type of repair, post-operative course, and reoperation or interventional catheterization were noted. Echocardiographic measurements of main, right, and left pulmonary arteries as well as pulmonary valve annulus were evaluated prior to palliative shunt placement and again prior to complete repair. Z-scores were obtained for measured diameters and compared. Results: Thirty-one patients underwent palliative shunt at median age of 54 (IQR 26-84) days and complete repair at median age of 337 (IQR 279-367) days. Valve sparing repairs were done in 17 (55%) patients with the remaining 14 (45%) patients undergoing transannular patch repair. The z-score of the right pulmonary artery was significantly higher prior to complete repair than prior to palliative shunt (p=0.006). There was also a trend toward higher z-score of the left pulmonary artery prior to complete repair (p=0.06). Two patients (6%) had arrhythmias in the post-operative period following complete repair. During median follow up of 398 days after complete repair (IQR 24-1331), six (19%) patients underwent total of six reoperations and five interventional cardiac catheterization procedures. There were three deaths between palliative shunt and complete repair; two due to perforated nasojejunal tubes and one due to suspected non-accidental trauma. Conclusion: Staged repair of Tetralogy of Fallot patients may result in branch pulmonary artery growth, higher rates of valve sparing repairs, and fewer post-operative arrhythmias with a fairly low rate of reoperation in intermediate follow up.

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PRETERM BIRTH RESULTS IN NEONATAL LEPTIN DEFICIENCY.
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Background: Cord blood leptin levels increase with advancing gestational age and leptin exerts critical neurotrophic effects during the final weeks of human gestation. Preterm delivery leads to premature separation from the maternal and placental supply of leptin, and preterm infants may not have enough adipose tissue to compensate for this acute leptin supply cessation. Therefore, we hypothesized that premature birth results in leptin deficiency. Method: This is a prospective study involving 114 preterm infants born at 22 to 32 week gestation. Blood leptin levels were measured within 24 hours of delivery, then daily for 3 days, followed by a weekly measurement until 36 6/7 weeks postmenstrual age. Cord blood was obtained at time of delivery. Additionally, cord blood was obtained from 14 infants born between 33 and 36 week gestation. Cord blood leptin levels were utilized to define the levels typically seen in the developing fetus, and they thus served as gestational age-specific standards. Leptin levels were measured using customized magnetic bead array. Results: Cord blood leptin levels were several fold higher than the postnatal levels that were
obtained when premature infants reached the same gestational age: 1002 vs 126 pg/ml at 26-29 weeks postmenstrual age, 2670 vs 320 pg/ml at 30-32 weeks postmenstrual age and 5363 vs 890 pg/ml at 33-36 weeks postmenstrual age (p<0.0001 for all). This leptin deficiency of prematurity developed within 24 hours of delivery, and was significant in all gestational age preterm infants. It was not associated with postnatal growth restriction. Sex difference in leptin levels became apparent at 32-36 weeks gestation, with female infants having higher leptin levels than male infants: 1102 vs 694 pg/ml (p=0.0005). Conclusion: Preterm delivery leads to sustained profound leptin deficiency through 36 weeks postmenstrual age. At later gestation this leptin deficiency is more pronounced in male infants. Targeted nutritional interventions may be needed to improve the postnatal leptin status of premature infants.

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MILD HYPERBILIRUBINEMIA MAY PROTECT AGAINST OXIDATIVE STRESS AND CYTOKINE UPREGULATION CAUSED BY NEONATAL HYPERGLYCEMIA IN THE DEVELOPING HIPPOCAMPUS OF RAT PUPS
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Background: Hyperbilirubinemia is common in preterm infants. High levels of unconjugated bilirubin (UCB) lead to bilirubin encephalopathy by targeting distinct brain regions including the hippocampus. UCB is also an antioxidant and may protect against cellular injury at low levels. The effects of low levels of UCB on the preterm hippocampus are not known. The purpose of this study was to determine the effects of low levels of UCB on markers of oxidative stress and inflammation in a preterm Gunn rat model both before and after exposure to a superimposed oxidative stress. Homozygous Gunn rat pups (jj) develop UCB in the neonatal period due to a UDP glucuronyl-transferase mutation, while their heterozygous (Jj) littermates remain unaffected. Methods: Streptozotocin (STZ)-induced hyperglycemia was used as a model of oxidative stress, as hyperglycemia is a common comorbidity in preterm infants. Four groups were studied (n=6/group); control (Jj), jaundiced (jj), control+STZ, and jaundiced+STZ. STZ was injected at 100 mg/kg on postnatal day 2 (P2, similar to 25 wk preterm human brain) in the hyperglycemic groups, and pups in the control groups were injected with citrate buffer. Body weights, blood glucose levels, and UCB levels were monitored. On P6 (similar to 32 wk preterm human brain), rats were killed and the mRNA expression of markers of oxidative stress (PARP-1), inflammatory cytokines (CXCL-10), and antioxidants (GPX4, SOD2) in the hippocampus were determined using qPCR. Results: Mean (+/- SD) UCB levels were higher in the jj groups on P6 (3.5 +/- 0.9 mg/dL) relative to controls (0.0 mg/dL, p<0.01). Mean (+/- SD) blood glucose levels were higher in the STZ groups on P6 (290.2 +/- 100.3 mg/dL) relative to controls (154.7 +/- 6.3 mg/dL, p<0.01). PARP-1 transcript expression was upregulated (+20%, p<0.01) in the Jj-STZ group compared with Jj-controls, however there was no difference in expression between jj-STZ and jj-control groups (p=0.60). Likewise, CXCL10 expression was upregulated (+55%, p<0.01) in the Jj-STZ group compared with Jj controls, with no difference between jj-STZ and jj-control groups (p=0.65). There was no difference in the transcript expression of antioxidants in either of the group comparisons. Conclusions: STZ-induced hyperglycemia results in oxidative stress and inflammation in the preterm hippocampus of non-jaundiced pups but not in pups with mild unconjugated hyperbilirubinemia. There was no compensatory change in antioxidant expression, suggesting that UCB itself may play a protective role in limiting injury and inflammation caused by hyperglycemia. Therefore, efforts to aggressively treat mild neonatal jaundice in preterm infants with phototherapy, itself a prooxidant, may negate this potential protective factor.
ARE EPIDEMIC STRAINS OF \textit{PSEUDOMONAS AERUGINOSA} PRESENT IN NEWLY INFECTED CYSTIC FIBROSIS PATIENTS IN THE UNITED STATES?

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\textbf{Background}: Epidemic strains of \textit{Pseudomonas aeruginosa} (PA) have been identified in many countries, but to date none have been identified within the United States (US). The Early Pseudomonas Infection Control Clinical Trial (EPIC CT), which collected bacterial isolates from patients with newly acquired PA infection from 55 cystic fibrosis (CF) centers across the US, provides an ideal opportunity to assess for epidemic strains of PA infecting CF children. **Methods**: Whole genome sequencing was performed on each of the 585 isolates collected from 192 patients during the 18-month EPIC CT. Multi-locus sequencing typing (MLST) and phylogenetic was performed on the EPIC CT isolates and known epidemic strains. **Results**: There were a total of 240 isolates from 192 patients, when excluding repeated isolates, that were grouped into 135 different sequence types (STs). None of the isolates had STs that were consistent with previously typed or sequenced epidemic strains such as the AES-1, AES-2, AES-3, DK2, LES and PES. Seven STs, comprised of 64 isolates from 58 patients, were found in CF centers located in all four regions of the US (Northeast, Southeast, Midwest and West). A further 4 STs, comprised of 17 isolates from 17 patients, were found in 3 of those regions. An MLST phylogenetic tree demonstrated that the CF isolates were not monophyletic but widely dispersed amongst a collection of non-CF PA strains. Type III secretion system effector gene analysis indicated that 28 (12%) of the 240 isolates were \textit{exoU}+. **Conclusions**: We found no evidence of known epidemic strains of PA in this cohort of patients throughout the US. However, 7 STs were found in all regions of the US, suggesting spread or broad environmental distribution. **Acknowledgements**: Supported by CFF awards HAUSER1510 and SINGH15UO and NIH awards R21 HL129930 and RO1 AI118257. Thank you to the TDN participating sites and patients participating in the EPIC trial.

EARLY INFANCY BODY COMPOSITION OF VLBW PRETERM INFANTS IS NOT ASSOCIATED WITH HIGHER BLOOD PRESSURE AT FOUR MONTHS CGA.

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\textbf{Background}: With the knowledge that poor weight gain in preterm infants is associated with worse neurodevelopmental outcomes, there has been a movement towards aggressive early nutrition during hospitalization. With improved catch-up growth, however, there is concern for increased adiposity and its potential consequences of later metabolic syndrome and hypertension. Little is known regarding how adiposity and body composition and their changes during early infancy affect blood pressure at follow-up. **Objective**: To determine if body composition at term and 4 months corrected gestational age (CGA), or change in these measurements over time, was associated with higher blood pressure at 4 month CGA. **Design/Methods**: Prospective data was collected on 68 appropriate for gestational age (AGA) infants born <32 weeks gestational age. Body composition (fat mass (FM), fat free mass (FFM), and % FM) was measured with air displacement plethysmography at term and again at 4 months CGA, and change in these measurements calculated. Systolic (SBP) and diastolic blood pressures (DBP) were measured at 4 months CGA using an infant blood pressure cuff. Linear regression analysis was performed, adjusting for sex and gestational age, and the body composition changes were adjusted for the time between the two measurements. **Results**: Median gestational age at birth was 28 1/7 weeks and mean birth weight...
was 1075g (z-score -0.03). 35 of 68 (51%) were male. At term, mean %FM was 18%. At 4 months CGA, mean % FM was 22.3%. Infants gained an average of 3.7% FM from term to 4 months CGA. Adjusted regression models showed that neither DBP nor SBP at 4 months CGA was significantly associated with FM, FFM, or FM% at discharge or at 4 months CGA, or with the change in body composition between the two timepoints. Conclusions: Early changes in body composition are not associated with increased BP measured at 4 months CGA in this group of preterm infants. Long term data is needed to determine critical periods for gains in various compartments and their associations with long-term metabolic risk. Possibly a strategy of aggressive early nutrition aimed at rapid early growth in all compartments of weight gain could improve neurodevelopment and avoid the need for later childhood rapid catch-up growth, which has been associated with worsened metabolic risk.

28 NEC-LIKE INJURY FOLLOWING PANETH CELL DISRUPTION OCCURS THROUGH AUTOPHAGY PATHWAYS.

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Background: Necrotizing Enterocolitis (NEC) remains the most devastating gastrointestinal disease in premature infants. Previous work from our lab has shown that Paneth cells (PCs) may play a key role in the disease pathogenesis of NEC. To further understand this relationship, we have developed a murine model that recapitulates many characteristics of NEC through dithizone-induced PC disruption. However, the mechanism by which dithizone induces PC disruption is unclear. We hypothesize that dithizone disrupts PCs by inducing degranulation of the cellular contents. Methods: Mice were either C57Bl/6 or PC-DTR (C57Bl/6 background) which contain an HA-tagged human diphtheria toxin receptor coupled to the PC specific cryptdin-2 promoter. Mice were treated with intraperitoneal dithizone (75 mg/kg body weight), diphtheria toxin (40 ng/g body weight), or pilocarpine (50 mg/kg body weight) and compared to sham controls (n>3 for all groups). Mice were euthanized 6 hours after injection and the small intestine was harvested. PCs were labeled immunohistochemically through Alcian Blue-Periodic Acid Schiff stain, anti-lysozyme, anti-HA, or a novel antibody that targets the PC surface. PC quantification was determined at 20X by a blinded investigator and via flow cytometry by anti-lysozyme. Apoptosis was quantified by anti-cleaved caspase 3 staining and PCR. Autophagy was determined using electron microscopy. Statistics were determined by ANOVA or t-test as appropriate. Results: Dithizone treatment significantly reduced PC numbers by 35% (n=10, p=0.02 by immunohistochemistry and 0.04 by flow cytometry) and gene expression of cryptdin and lysozyme by 50% (n=3), but our novel PC surface marker (D1C2), showed no decrease, indicating that the PC membrane was still present but the cellular granules were missing. Dithizone treatment did not significantly increase apoptosis. Under electron microscopy, dithizone induced PC autophagy and not necrosis (diphtheria toxin induced) or degranulation (pilocarpine induced). Conclusions: Dithizone induces autophagy in PCs. As PC disruption-induced NEC requires PC disruption, we believe that autophagy is required as a mechanism to induce pathology. It is our hope that these findings will provide a reasonable mechanism for how PC disruption-induced NEC may model human disease.

29 FEMALE BIASED NEUROTROPHIN MEDIATED NEUROPROTECTION IS ESTROGEN RECEPTOR ALPHA DEPENDENT AFTER NEONATAL HYPOXIA ISCHEMIA.

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USA, Hacettepe University School of Medicine, Ankara, Turkey, Acibadem University, Istanbul, Turkey. **Objective:** Hypoxia and ischemia (HI) related brain injury after perinatal asphyxia is a major cause of life-long disability. Female neonates are two times more resistant to the effects of perinatal asphyxia, a phenomenon that is poorly understood. We recently reported that increased hippocampal ERα post-HI confers neuroprotection only in the female neonate hippocampi through crosstalk with the neurotrophin receptor, tyrosine kinase B (TrkB). Activation of the TrkB via its selective agonist, 7,8-dihydroxyflavone (7,8-DHF) results in neuroprotection by decreasing apoptosis at 1 day following HI only in female mice in an ERα dependent way. Thus, we hypothesize that absence of ERα will ablate the sex differences seen in improved long-term functional outcome in response to TrkB agonist therapy in neonatal mice following perinatal HI. **Methods:** HI was induced in P9 mice by unilateral carotid artery ligation and exposure to 10% O2 for 50 minutes using Vannucci’s HI model. Long-term functional outcome were assessed using novel object recognition (NOR) and location (NOL) tests by habituating the mouse to the empty maze for 10 minutes for three days, followed by 10 minutes of familiarization by placing two identical objects, the next day. After 24 hours, mice were subjected to testing replacing one of the familiar objects with a novel one (NOR) or placing the familiar object to a new location (NOL). For all trials, the time spent exploring each object is recorded and the percent time spent with novel object or location were recorded as discrimination ratio. ANOVA was used to compare the discrimination ratios between the groups. **Results:** ERα wild type (WT) sham male and female mice were able to discriminate novel object from familiar object as opposed to WT HI male and female mice (p = 0.02). ERα WT HI male and female mice spent significantly more time with familiar object (t = 22.63 sec) instead of novel object (t = 7.54 sec) in testing phase of NOR (p < 0.001). 7,8-DHF recovered the discrimination ratio of WT HI female to sham female levels (p < 0.001). 7,8-DHF treatment failed to improve the cognitive function in ERα knockout female and male mice (p = 0.02). **Conclusion:** 7,8-DHF therapy improves the cognitive function only in female WT mice in an ERα dependent way. Understanding the cellular basis of the sex differences seen in neurotrophin mediated neuroprotection following neonatal HI that is ERα dependent is important to target sex-specific mechanisms.

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THE TEST OF INFANT MOTOR PERFORMANCE IS RELATED TO COGNITIVE AND LANGUAGE OUTCOMES AT 2 YEARS OF AGE IN HIGH-RISK, PRETERM INFANTS.

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**Purpose/Hypothesis** : The motor repertoire of early infancy is directly observable behavior that is an indicator of neurologic functioning and may presage neurodevelopmental outcome. Using MRI at term age, we previously identified a relationship between impaired white matter and performance on the Test of Infant Motor Performance (TIMP) at 10-15 weeks post-term age in high-risk, preterm infants. The purpose of this study was to determine the relationship between performance on the TIMP and cognitive, language, and motor outcomes on the Bayley Scales of Infant and Toddler Development - 3rd edition (BSID-III) at two years of age in high-risk, preterm infants. **Number of Subjects:** 106 infants born at ≤31 weeks gestational age, with a birth weight of ≤1500gms, who required oxygen at birth, were prospectively recruited. **Materials/Methods:** Infants were tested with the TIMP at 10-15 weeks post-term age and were assessed again with the BSID-III at two years corrected age. Associations between TIMP and BSID-III scores were analyzed with linear regression. Logistic regression was used to predict adverse BSID-III scores using TIMP z-scores. Sensitivity, specificity, positive and negative values were calculated for various cut points of the TIMP z-score and BSID-III composite scores of ≤85. **Results** : The TIMP z-scores at 10-15 months of age were significantly associated with all three subscales on the BSID-III at 2 years of age (P<.001).
The effect of the TIMP z score did not vary significantly. A strong correlation was seen with language (Pearson 0.53) and motor (0.54) subscales, and a moderate correlation (0.43) with the cognitive subscale. For each 1 point decrease in TIMP z-score, the odds of having a poor outcome on the BSID-III (≤85) were the increased by: 5x motor (95% CI 2.44-10), 3.23x language (1.79-5.56), and 3.57x cognitive (1.92-6.67, P<.001). Using a TIMP z-score cutoff of -0.5, specificity was relatively high for cognitive (87%), language (88%), and motor (89%) outcomes, but low for sensitivity to outcomes (cognitive 41%, language 49%, motor 57%). A TIMP z-score cutoff of -1 yielded higher specificities (cognitive 97%, language 95%, motor 96%) and lower sensitivities (cognitive 33%, language 33%, motor 43%) for later outcome. Conclusions: This study demonstrates that the TIMP is related to cognitive, language, and motor outcomes on the BSID-III at 2 years of age in high-risk, preterm infants. At 2 years of age, the BSID-III has been shown to underestimate later motor impairments, which may be why the sensitivity of motor outcome was lower than in previous publications. Infants born preterm are at a higher risk of later impairments in language, cognition and motor abilities, but it is often difficult to predict at an early age. Therapists who use the TIMP for motor assessment in a preterm population may also consider the relationship between TIMP and future cognitive and language performance when assessing high-risk infants.

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HUMAN MILK (HM) BIOMARKERS IN PUMP-DEPENDENT MOTHERS OF PRETERM INFANTS

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Background: Little is known about closure of tight junctions (TJ) in mammary epithelium in pump-dependent mothers of preterm infants, who commonly experience lactation delay or have insufficient human milk (HM) volume. Previous studies have described HM biomarkers of TJ closure (sodium [Na], protein, citrate, lactose) in term mothers; preterm data is limited. Objective: To compare changes in HM biomarkers with HM volume in the first 5 days post-partum in exclusively pump-dependent mothers of preterm infants. Design/Methods: HM from every pumping session for mothers of singleton preterm (<33 week) infants at an urban NICU was weighed and time stamped for the first 14 days postpartum to determine daily HM volume. HM samples were collected twice daily for biomarker analysis. Normal concentration ranges indicating TJ closure for each HM biomarker were based on prior studies of term mothers (Na<16mM, protein<24.3mM, citrate>3.7mM, lactose>46.1g/L). Statistical analyses consisted of descriptive statistics and linear mixed models performed using R. Results: The sample consisted of 16 mothers (63% black, 25% Hispanic, 12% white; 75% obese/overweight; 50% primiparous; 44% previously breastfed) who delivered infants at 29.8+/−2.1 weeks gestation weighing 1484g+/−474g. HM samples for biomarker analysis were available for a subset of mothers (day 1: 4, day 2: 8, day 3: 10, day 4: 13, and day 5: 15). The number of biomarkers within normal term range increased over the first 5 days, with all samples demonstrating at least one biomarker within normal range by day 3. Having all four biomarkers in the normal range was significantly associated with a higher HM volume on day 3 (p<0.017) and day 5 (p<0.041). However, only 6 (40%) mothers had all four biomarkers within normal range by day 5. Conclusions: The majority of preterm mothers do not achieve TJ closure, defined by all four biomarkers within normal range, by day 5 postpartum which is well past the 3 day average for term mothers. HM biomarkers may provide objective measures to be used in future research and intervention assessment.
AGE-DEPENDENT DIFFERENCES IN MICROGlia IN RESPONSE TO HYPOxia ISCHEMia IN THE DEVELOPING BRAIN

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1Waisman Center, University of Wisconsin, Madison, WI, USA; 2Department of Pediatrics, University of Wisconsin, Madison, WI, USA. **Background:** The microglial response plays an important role in injury and recovery after hypoxia-ischemia (HI) in the developing brain. We have previously described regional and age-dependent differences in the microglial response to HI: infant mice (P9) demonstrated a more vigorous microglial activation and proliferation compared to juvenile mice (P30). The aim of the current study was to assess for age-related differences in microglia morphology and gene expression during normal brain development and in response to hypoxic-ischemic injury. **Methods:** Immunostaining was performed in naïve P2, P9, P30, and P60 mice. Microglia were isolated from P2, P9, P30 and P60 mice and quantitative rt-PCR was performed. HI was induced in P9 and P30 mice by unilateral carotid artery ligation and exposure to 10% O2 for 50 minutes and immunostaining and rt-PCR was performed 2 days post-injury. **Results:** During normal brain development, microglia are seen to progress from an ameboid morphology to a highly ramified morphology. Expression of the TGFbeta receptor and the Mer Tyrosine Kinase receptor significantly increased during normal brain development. HI induced an increase in TGFbeta receptor expression in P9 mice which remained significantly less than the expression seen in P30 mice. **Conclusions:** Microglia morphology and gene expression evolves during normal brain development. Hypoxia ischemia results in different microglial responses depending on the age at which the injury occurs. TGFbeta receptor signaling and MerTK signaling may play a role in age-dependent differences in microglial responses to HI.

THYROID CANCER DETECTION BY THYROID ULTRASOUND IN PEDIATRIC PATIENTS

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**Introduction:** Thyroid ultrasound is a widely accepted tool for evaluating thyroid nodules in children but the accuracy of specific ultrasound features in the pediatric population has not been well studied. Previous meta-analysis has suggested the presence of internal calcifications to be most predictive for cancer. **Methods:** We identified children aged <21 years who had evidence of thyroid nodules on thyroid ultrasound. Two radiologists, blinded to follow up, reviewed the ultrasounds imaging and quantified multiple ultrasound features, in addition they gave their overall impression of benign or malignant. The gold standard used for assessing accuracy of the thyroid ultrasounds was either histopathology after surgery, or FNA cytology results plus follow-up (FNA and/or ultrasound) for at least one year, or stable follow-up for at least one year. **Results and discussion:** 135 children (5:1 F:M) with nodules met inclusion criteria, 53% of patients had a single nodule, and additional 36% had 2 or 3 nodules. A total of 236 nodules were reviewed. 90 patients (117 nodules) had FNA performed with suspicious or malignant cytology noted in 42 (36%). 88 patients underwent thyroid surgery (118 nodules), malignant histopathology was noted in 56% of the nodules (53% of patients). No single ultrasound feature predicted malignancy. Internal calcifications were highly specific (94%) but not very sensitive (62%) for malignancy and offered a 92% PPV and 70% NPV. The overall impression of the radiologist of malignancy had a sensitivity of 81% and a specificity of 83% with a PPV of 83% and NPV of 81% in this select population. **Conclusion:** This report confirms the much higher rate of malignancy in pediatric thyroid nodules in children compared to adults (36% of nodules). No single ultrasound characteristic could predict either benign or malignant disease but the presence of internal calcifications and the overall
impression of the radiologist of malignancy were both strongly predictive of malignancy. Since this was a retrospective study where follow-up and further testing was determined based on clinical suspicion, whether these results are applicable to all children undergoing ultrasound for nodules will need to be determined.

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THE NEGATIVES OF BEING POSITIVE: INCIDENCE OF CONVERSION TO CMV POSITIVITY AMONGST PREMATURE INFANTS GIVEN OROPHARYNGEAL ADMINISTRATION OF THEIR MOTHER’S MILK.

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Background: Nearly 98% of pregnant women are CMV seropositive, up to 96% of which may reactivate their CMV during lactation. Premature infants born <32 weeks gestation or <1500g are at highest risk for postnatal transmission through breast milk resulting in anything from asymptomatic seroconversion to a sepsis-like-syndrome with potential neurodevelopmental compromise; however, there is no gold standard for handling human milk to minimize this risk.

Objective: To evaluate data from part a larger study to determine the safety of oropharyngeal administration of own mother’s colostrum and milk in premature infants. Design/methods: In this prospective, multi-site, placebo-controlled, double-blind randomized control trial executed at 3 level III American neonatal intensive care units (NICU), infants whose birthweight was <1250g, had no severe congenital anomalies, and who were admitted to the NICU within 24 hours of life, were enrolled and randomized to receive oral administration of either mother’s milk or placebo, sterile saline, every 2 hours during the first 48 hours of life and every 3 hours until 32 weeks corrected gestational age (CGA). Urine was collected at 3 time points (T1 at baseline, T2 after 24 treatments, T3 at 32 weeks CGA). T3 samples were analyzed for all subjects with follow-up analysis of T1 and T2 only if T3 was positive. Each unit simultaneously gave enteral feeds according to unit protocol.

Results: At the time of review, of the 135 infants enrolled, 77 infants had adequate urine samples from all 3 time points. Only 3.8% (n=3) of the infants were found to be CMV positive at 32 weeks. One of which was known congenital CMV and 2 of which were only positive at T3, in a nursery where all milk was given fresh. Conclusions: The nursery that began freezing milk after 7 days had no conversion out of 42 samples; however, one nursery that routinely gave fresh milk had a 10% conversion rate to CMV positivity. Therefore, administration of mother’s own fresh milk (either enterally or oropharyngeally) in the first week of life appears to be safe; however, using fresh milk thereafter, may increase risk of CMV transmission and warrants further investigation.

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DURATION OF HOME OXYGEN USE IN PRETERM INFANTS AND THE PHYSIOLOGIC DEFINITION OF BRONCHOPULMONARY DYSPLASIA (BPD).

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Background: The physiologic definition of BPD (room air challenge, RAC) is a standardized assessment based on oxygen saturation during a stepwise reduction of administered O2 to room air. RAC has been used to determine the need for oxygen in preterm infants at 36 weeks CGA. In spite of passing the RAC some infants are discharged home on O2 whereas some come off O2 before discharge even after failing the RAC. The relationship between physiologic definition and duration of oxygen requirement has not been previously investigated. Objective: Compare the duration of oxygen use after 36 weeks CGA in preterm infants classified according to the physiologic definition of BPD. Study design: In this prospective cohort study, infant’s ≤ 32 weeks Gestational Age (GA) were classified using the physiologic definition of BPD. Infants were then followed to determine the duration of O2 requirement after 36 week CGA. Results: Out of 107 infants with BPD, by 36 weeks
CGA: 18(16.8%) were in room air, 37 (34.5%) had severe BPD, 40 (37.3%) had moderate BPD and failed the RAC, 12 (11.2%) were in nasal cannula but passed RAC. Infants who passed the RAC were less likely to receive home O2 (6/12, 50%) than those with moderate BPD who failed the RAC (29/40, 72.5%). For those on home O2, the median duration of oxygen use from 36 week CGA until discontinuation of home O2 was 95.5 days for those who passed the RAC Vs 169 days for those with moderate BPD failing RAC Vs 211.5 days for severe BPD.

**Conclusion:** In a NICU with high rates of home O2 use, the physiological definition of BPD may classify mild disease in infants who still receive home O2. This definition can be used to counsel parents regarding the duration of home oxygen requirement in preterm infants with BPD.

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**ADDITIVE MANUFACTURING FOR THE HEALTH PROFESSIONAL: A STEP-BY-STEP MANUAL UTILIZING FREE, OPEN SOURCE SOFTWARE TO 3D PRINT PEDIATRIC HEART MODELS WITH CONGENITAL HEART DISEASE FROM CT IMAGING.**

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This step-by-step manual details the process of converting Digital Imaging and Communications in Medicine files (DICOM) used by CT imaging to 3D printable files (STL) using free, open-source software (Mango, 3D Slicer, MeshMixer). Currently, the only FDA approved software is expensive and not accessible to many institutions, physicians, or students. By following this manual, the healthcare provider or student can quickly and accurately produce a 3D printed model of any organ from CT imaging to increase understanding of complex medical conditions, providing the healthcare provider with an additional tool with which to educate patients and student

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**ENHANCING MORNING REPORT AT A PEDIATRIC ACADEMIC INSTITUTION.**

**JN Buehler**, E Bergamini, M Schildz, P Buchanan, D Halloran, A Tanios, *Saint Louis University Department of Pediatrics, St. Louis, MO.

**Background:** Morning Report is an integral aspect of resident education at many academic medical institutions. It can be presented in various ways, however, the traditional format—a clinical case followed by discussion regarding work-up, diagnosis, management of patients and teaching pearls—has been less than desired by local residents. Concerns include: time restraints of preparing a formal slideshow, presenting a teaching point to attendings well-versed in the material, and anxiety from speaking in front of a large group of people, many of them senior to the presenting resident.

**Objective:** To assess satisfaction with a revised Morning Report format based on baseline strengths and weaknesses identified by residents and attendings.

**Design/Methods:** Residents and attendings at a single, midwest, pediatric, academic institution were surveyed before and after the revised morning report format. Surveys included information on satisfaction with the structure, organization, and presentation style of Morning Report. Following the initial survey, the format transitioned from a traditional presentation-style (formal slideshow) to a more interactive approach, including: audience eliciting the patient’s history of present illness, resident and faculty discussion regarding differential diagnosis and prioritizing diagnostic testing, and dynamic discussion of teaching pearls by specialists. Post-intervention evaluation was performed at 3 months. Descriptive statistics are provided.

**Results:** The initial survey had 30 resident and 37 attending responses; post-intervention survey had 19 resident and 15 attending responses. Analysis was remarkable for increased overall resident satisfaction with Morning Report (26.7% to 68.4%, p=0.004). There was also increased resident satisfaction with the differential diagnosis discussion (40% to 68.4%, p=0.52). Post-intervention, both residents and attendings were satisfied.
with time spent discussing HPI (73.7% and 64.3%, respectively, p=0.71) and medical history/review of systems/physical exam (89.5% and 64.3%, respectively, p=0.11).

Discussion/Conclusions: Our results show overall increased satisfaction amongst residents and faculty regarding Morning Report’s revised format. This data shows that a dynamic and interactive format is preferred above a formal presentation. Despite the national trend of switching to an academic half day, we believe the revised format is beneficial for case presentations during organized learning activities.

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URGENT CARE EMPLOYEES ASSESS SUICIDE SCREENING.
C Watts, AE Burris, K Couch, R Donegan, M Moran, AT Patel, Children’s Mercy Hospitals and Clinics, Kansas City, MO.

Background: Suicide is a leading cause of death in adolescents in the United States. Urgent Care is one possible setting in which to detect those at risk. Staff-perceived barriers to this process include patient flow interruption, lack of resources, and challenging access to interventions. We hypothesized that employees look more favorably on suicide screening at urgent care sites where screening has become the norm, than at sites not currently screening. Methods: This study surveyed employees, based on work done by O’Mara et al, regarding role in the medical team, belief about suicide screening, mental health issues, and interventions for these patients. Results: 142 surveys were completed. These were divided into surveys from North (where screening is underway) versus East/ Blue Valley. This study used a logistic regression model with location as the outcome. 44.4% of North employees strongly agreed that suicide screening is important in urgent care whereas only 19.8% of Blue Valley/East employees strongly agreed (p=0.029). Alternatively, 29.7% of Blue Valley/East employees completely disagreed/disagreed with staff asking about suicide. Only 8.4% of North employees strongly disagreed/disagreed. 48.8% of Blue Valley/ East employees vs. 25% of North respondents agreed/strongly agreed with worries of resource use to address these issues (p=0.016.) Blue Valley/ East employees expressed concerns about patient flow-- 55.5% either agreed/strongly agreed this is a concern. Only 32.4% of North respondents agreed (p=0.112). Several other answers echoed these trends, but without statistical significance. Employees at North were more likely to consider mental health screening a routine part of urgent care visits, including screening for various psychosocial concerns such as alcohol or drug abuse, eating disorders, behavioral concerns and dating violence. Conclusions: Based on these results, employees where suicide screening is underway tend to look more favorably on screening when compared to employees where screening is not done. Our study suffers with limitation of a low power and demographic differences between our three sites. However, even those results found not to be statistically significant still supported this hypothesis. Clinical Correlation: Urgent Care facilities are suggested locations to identify the at-risk patient. Urgent Care employee attitudes about screening become more favorable after implementation. This may encourage screening, increase employee awareness of these at-risk patients, and improve access to mental health care.

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SLEEP LOSS IN AN URBAN GENERAL PEDIATRIC WARD: CAUSES OF SLEEP DISRUPTION AND DIFFERENCES BY RACE.
Chamberlain M, Orlov N, Anderson S, Fishbach S, Gozal D, Arora V.
University of Chicago, Chicago, IL

Background: Sleep is critical to maximizing recovery after illness or injury. Hospitals are difficult places to sleep. This study aims to identify the disruptors of sleep in the hospital as well as compare differences in sleep disruption by race. This is an ongoing observational study that began in February 2017. Methods: General pediatric patients’ caregivers were given the survey after the
patient spent a night in the hospital. Surveys include a modified Karolinska Sleep Log and a validated Likert-scale questionnaire on sleep disruptors in the hospital. **Results:** To date we have enrolled 101 patients. Sleep at night was significantly lower in the hospital compared to at home (mean difference=-126.3 min, CI=[-92.9, -159.7]). Overall, the top 3 reported disruptors were nurse and doctor interruptions (34.0%), vitals (32.0%), and pulse oximetry (27.4%). The sleep difference between hospital and home was lower for African-Americans than non-African-Americans (-104.3 min vs. -176.2 min, P=0.04). These differences can be attributed to reduced total sleep time at home for African-American patients compared to non-African-American patients (538.4 min vs. 597.7 min, P<0.01). There was no significant difference in total sleep time in the hospital. African-American patients were less likely to be disrupted by noise (4.3% vs. 13.3%, P=0.03). **Conclusions:** Children sleep about 2 hours less in the hospital when compared to their home sleep pattern. Pulse oximetry, vital signs, and interruptions by clinical care teams were important disruptors. African-American children were less impacted by hospitalization. The difference in total sleep at home, the difference in reported noise disruption, and much of the literature on race and sleep environment, suggest that African American children may have more chaotic at-home sleep environments. This could explain why the chaotic hospital environment was less impactful. Pediatric inpatient wards should consider strategies aimed at limiting the disruptions caused by medical interventions. Future work should focus on understanding and improving sleep for African-American children at home.

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**VARIANT CLASSIFICATION CONFLICT AMONGST GENES SUBJECT TO REPORTING OF SECONDARY FINDINGS.**

**BP Chaudhari, L Rasmussen, F Wehbe, J Starren, Northwestern University, Chicago, IL.**

When different clinical genomics labs classify the same variant differently, a variant classification conflict (VCC) arises. As the application of genomics in clinical settings increases, VCC is an increasingly recognized problem. The problem is exacerbated when secondary findings (SFs) are reported. The ACMG has published a list of 56 genes recommended for reporting of SFs (ACMG56, 2015 version). While cardiomyopathy genes in the ACMG56 have previously been reported to be subject to significant risk of VCC, it is not known if this risk is generalizable. We therefore sought to calculate the frequency of VCC in the ACMG56 within the ClinVar dataset and identify predictors of VCC. We a priori hypothesize excess VCC in genes associated with cardiac phenotypes. All submissions (N=136,210) of ACMG56 variants (N=39,876) in the ClinVar database were extracted. The percentage of eligible variants with VCC was calculated for each gene. The overall rate of VCC was 13%. The rate of VCC in specific genes ranged from 0% (NF2) to 47% (KCNQ1). The rate of VCC for Cardiology, Oncology, Connective Tissue and Other was 21%, 11%, 11%, 17% respectively (p<10^-5 for test of equality). Relationship with minor allele frequency, lab and epoch were also explored and have idiosyncratic associations with VCC. The previously reported high rate of VCC in cardiomyopathy genes appears to also affect genes implicated in arrhythmia but is not universal across all genes recommended for reporting of SFs. Labs and healthcare systems reporting SFs should individualize their approach to surveillance for VCC based on particular genes and phenotypes.

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**ANALGESIC EFFECT OF BREAST MILK COMPARED TO ORAL SUCROSE SOLUTION ON PRETERM NEONATES UNDERGOING MINOR PAINFUL PROCEDURES: A RANDOMIZED, SINGLE-BLIND TRIAL.**

**P Dina, M Weiss, C Sajous, P Hummel, M Naber, Ronald McDonald’s Children’s hospital, Loyola University Medical Center, Chicago, IL.**
**Objective:** The purpose of this trial was to compare the analgesic effect of breast milk (either maternal or donor) to oral sucrose solution (24%) in preterm neonates, less than 33 weeks gestational age (GA), undergoing heel lance in the Neonatal ICU. **Methods:** In this randomized single blind controlled cross-over study, preterm neonates were randomized to receive breast milk or sucrose for the first heel lance, crossing over to the other for the second, and continuing to alternate for a total of 4 separate heel lances. The amount of analgesic was GA specific. The primary outcome was the Neonatal Pain, Agitation and Sedation Scale (N-PASS) score. The secondary outcomes were Premature Infant Pain Profile (PIPP) score, heart rate, respiratory rate and oxygen saturation at baseline, 0, 1, 2, and 3 minutes. Data were analyzed with Wilcoxon Sign Rank test. The study had an 80% power to detect a 1 point difference in N-PASS score. **Results:** We enrolled 32 neonates 25 to 32 weeks GA on non-invasive respiratory support or room air; 20 participants completed all four observations. Neonates were divided into two groups: “breast milk first” and “sucrose first”. Groups were similar regarding weight, GA, and age at data collection days. NPASS scores were similar between the groups except at 3 minutes \((p = 0.048)\) (Table 1). There was no significant difference in the PIPP score, heart rate, respiratory rate and oxygen saturation between the two groups at all time periods. Adverse events, seen in equal frequency with breast milk and oral sucrose solution (24%), were benign and self-limited. **Conclusion:** Results based on NPASS score and other outcomes indicate similar analgesic effects of breast milk compared to oral sucrose solution (24%) during heel lance in preterm neonates.

<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>Breast/donor milk</th>
<th>Sucrose</th>
<th>(p) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre - procedure</td>
<td>1 (0-1)</td>
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<tr>
<td>0</td>
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<td>1 (1-3)</td>
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<tr>
<td>3</td>
<td>1 (1-2)</td>
<td>1 (0-2)</td>
<td>0.048</td>
</tr>
</tbody>
</table>

**Table 1:** Median NPASS score with (interquartile range) of breast/donor milk and oral sucrose solution (24%) at baseline, time 0 (right after heel lance and squeeze) and time 1, 2 and 3 at 1, 2 and 3 minutes after heel lance, respectively.

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**EFFECTIVE TREATMENT OF FOCAL SEGMENTAL GLOMERULOSCLEROSIS RELAPSE IN RENAL TRANSPLANT PATIENTS**


**Background:** Focal segmental glomerulosclerosis (FSGS) relapse is a common complication in children receiving renal transplant. The implication of FSGS relapse is critical as it can significantly impact patient morbidity and graft survival. The use of plasmapheresis has previously been used in the field of pediatrics however limited data is available to demonstrate its efficacy. **Purpose:** This study investigates the effect of using an aggressive plasmapheresis protocol in conjunction with rituximab in FSGS relapse in pediatric patients with kidney transplant. **Methods:** The study includes six patients with primary FSGS that underwent kidney transplant in our center in the last 3 years. Out of the six patients, four patients (66%) had a relapse within two weeks of transplantation. The main parameter used to determine response to treatment was Urine Protein/Creatinine ratio (U P/C). The plasmapheresis protocol utilized included an aggressive regimen (daily for 5-7 days, then 3 times per week, frequency adjusted every 2 weeks according to U P/CR ratio target of <0.5 mg/mg). Rituximab was used as an adjunct in three of the four patients. Complete response was defined as U Pr/Cr ratio < 0.5 mg/mg. All six patients were on steroid based protocol. **Results:** Out of the four patients that were in relapse, 100% of the patients achieved remission and graft survival using the plasmapheresis protocol in conjunction with 2 doses of
Rituximab (in 3/4 patients). Three patients were in complete remission within 1 month of treatment while the fourth patient was in complete remission within 2 months of treatment. None of the patients developed significant complications over a follow up period of 11 (2-21) months. All patients demonstrated graft function in the last visit with mean estimated Glomerular filtration rate 84 cc/min/1.73m^2 (78-92). Conclusions: Early and aggressive plasmapheresis and Rituximab are viable options to achieve remission in the management of FSGS relapse post-transplant. Implications for practice: The use of aggressive plasmapheresis regimen with or without Rituximab can be effectively used to treat FSGS relapse post-transplant. A long-term, large multicenter study is needed to be carried out in order to confirm efficacy and to monitor possible adverse effects.

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USE OF FLOWCHARTS AND TEMPLATED CLINIC NOTES TO IMPROVE TYPE 2 DIABETES COMORBIDITY SCREENING.
Samuel Engle1, David Wyatt 1, and Peter Wolfgram1. 1Pediatric Endocrinology, Children’s Hospital of Wisconsin, Milwaukee, WI, United States.
Background: To assess our Diabetes clinic’s baseline adherence to ADA and ISPAD guidelines for obtaining urine creatinine/albumin ratio (UACR) and lipids at diagnosis with type 2 diabetes (T2D), and improve screening adherence with flowcharts and a revised note template. Design/Methods: We extracted data from the EMR (Epic) for all patients seen at the Children’s Hospital of Wisconsin Diabetes clinic from 7/2014-2/2017 with a new diagnosis of T2D. Order entry date and specimen collection date for UACR and lipids were obtained. A provider was considered adherent to the ADA/ISPAD guidelines if labs were resulted in the previous 6 months from the visit or ordered within 3 months of diagnosis. Vizio flowcharts and a new clinic note template based upon ADA/ISPAD guidelines were created and presented to the 15 providers on 7/8/2016 (date of intervention). Pre- and post-screening rates were compared using the chi-square test. Results: There were 61 patients included in the analysis, 45 pre-intervention and 16 post. Only 4 of the 16 post-intervention visits used the new note template. From pre-to post-intervention the UACR order entry rates increased from 44% to 81% (p = 0.01), while UACR specimen collection rates were unchanged from 88% to 67% (p = 0.10). Lipid order entry rates (62% to 75%, p=0.36) and lipid panel collection rates (97 to 100%, p=0.58) were unchanged. In the 4 post-intervention visits in which the new note template was used, 100% met UACR and 75% met lipid guidelines. The one chart with a new templated note missing a lipid order indicated that the lipid panel had been obtained within the past year. Post-intervention visits without use of the templated note had 66% adherence for both UACR and lipid guidelines. Conclusion: The ordering rate of UACR significantly increased following introduction of the flowcharts and new templated clinic note. The new templated note may be more effective in aiding adherence to guidelines compared to the flowcharts, although small sample size limit interpretation. Further monitoring and encouragement of RNs and providers to use the new clinical notes will continue for the next 2 years.

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PEDIATRIC RESIDENTS’ PERCEPTIONS AND PRACTICES ON ABUSIVE HEAD TRAUMA PREVENTION IN INFANTS.
M Farhat1; J. Brar1; S. Guertin1; 1Department of Pediatrics and Human Development, Michigan State University, E. Lansing, MI.
Background: Data from the CDC indicates that 3 to 4 children die daily in the Unites States from abusive head trauma (AHT), and with a case fatality rate of 25%, the remaining 75% suffer severe neurological sequelae. AHT also presents a significant economic burden and public health repercussions. Across the literature, there is evidence of the effectiveness of brief parent educational programs to prevent AHT. Methods: The project involved pediatric residents at
Michigan State University’s Pediatric Residency program in Lansing, Michigan. It aimed at assessing awareness surrounding AHT, along with trends and capabilities in providing effective anticipatory guidance and necessary resources to parents of infants, during well visits. It took the form of a survey addressing these aspects. **Results:** 18% of residents (n=4) correctly identified inconsolable crying as the most important risk factor for AHT. 50% (n=11) provided anticipatory guidance on the normal infant crying pattern in only 0-25% cases, and 18% (n=4) provided this in only 25-50% of cases, despite the fact that almost half indicated their awareness of the normal infant crying pattern and comfort describing it to parents. 45% (n=10) provided anticipatory guidance on dangers of shaking a baby in only 0-25% of visits, and another 27% in only 25-50% of visits. 68% (n=15) provided instructions on what to do in case of caregiver frustration in less than 50% of visits. 73% (n=16) were unaware of the presence of hotlines that can help parents with fussy babies. **Discussion:** Across the literature, effective materials used for AHT prevention disclosed facts on (1) the risks of shaking a baby, (2) the normal infant crying pattern, and (3) the strategies that parents can use when angry/frustrated with crying. As an intervention measure for improving resident practices revealed by our survey, we are introducing a prevention strategy similar to the period of PURPLE crying tool, the “CRY PEAKS” tool, helping residents cover all aspects of anticipatory guidance for AHT prevention and given to parents/caregivers for future reference. **Conclusion:** Pediatric residents potentially play a significant role in the prevention of AHT, being healthcare providers to at risk populations. We are advocating for empowering physicians with knowledge around the topic and equipping physicians with intervention tools that would help cover different aspects of its anticipatory guidance.

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**ENTEROVIRUS INFECTION IN YOUNG INFANTS: PREVALENCE, CLINICAL, AND LABORATORY CHARACTERISTICS IN COLUMBUS, OHIO.**

J Feister, A Medoro, C Tomatis Souverbielle, J Campbell, G Akkoc, O Ramilo, D Salamon, A Leber, G Erdem, Nationwide Children’s Hospital, Columbus, OH.

**Background:** All infants under two months of age undergo routine work up at Nationwide Children’s Hospital that includes blood, CSF, and mucosal site PCRs for enteroviruses (EV). We sought to determine the local EV prevalence, clinical characteristics and viral correlates of disease severity in this large population. **Methods:** Retrospective EMR review from January 2015 to September 2016) of all infants 4-60 days of age evaluated for fever or sepsis between January 2015 and September 2016. An in-house developed real-time PCR was used for EV detection. **Results:** Of the 713 patients tested, 151 (21%) patients were positive for EV in at least one site. Majority of the patients (76%) presented between the months of June and October. Median age was 24 days (IQR 16-37). Median length of stay (LOS) was 40.82 hours (IQR 33.4-47.5). 122 (81%) had fever and 27 (18%) had a rash on admission. Median duration of antibiotic treatment was 2 days (IQR 1.5-2) and median hospital charges were 13,169 USD. CBC values and transaminases were normal. 75 (49%) patients had EV PCR positive in CSF, 120 (79%) in superficial sites, and 109 (72%) in blood and 51 (34%) patients had positive EV PCR in all three sites. 5 patients were admitted to PICU (3.3%), of which 2 had EV detected in CSF. Two patients required pressor support and 3 had seizures. All patients recovered and had no complications at discharge. Among CSF positive patients, median CSF WBC count was 50 (IQR 5-360 cells/μl). Median PCR cycle threshold (Ct) values were: 35.88 (IQR 34.1-37.5) for CSF, 32.54 (IQR 30-36.42) for blood, and 34.58 (31.96-37.36) for superficial sites. CSF and blood Ct values in PICU patients were not significantly different (Ct values in CSF or blood had no significant correlation with length of stay. 55 patients (36%) had coinfections – 53 viral (parechovirus, parainfluenza and rhinovirus/EV [these cannot be distinguished by testing method]), and 2 bacterial (group B Streptococcus and coagulase negative staphylococcus bacteremia). **Conclusions:** EV was commonly identified in infants undergoing sepsis evaluation.
Almost half of the patients had EV meningitis. Although, there were no serious complications, 3% of patients required PICU admission. Bacterial coinfection rates were low.

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IMPROVING SAFE SLEEP FOR HOSPITALIZED INFANTS.
E Frey, N Hamp, N Orlov, University of Chicago, Chicago, IL.
Background: In October 2016, the AAP released updated recommendations for the safe sleep of infants. Despite significant reductions in the rate of SIDS over the last 20 years, sleep related deaths still account for approximately 3,500 deaths annually in the United States with an incidence in African American infants that more than doubles that seen in non-Hispanic white infants. The AAP recommends that healthcare providers endorse and model safe sleep practices in all interactions with parents and caregivers of infants, including in the inpatient setting. Previous studies indicate that (1) there is often non-adherence to safe sleep practices (SSP) in the hospital setting and (2) parents who observe healthcare providers placing infants to sleep in ways inconsistent with the guidelines are less likely to adhere at home. Objective: It is important that healthcare providers caring for infants model and endorse the AAP 2016 safe sleep recommendations while in the hospital setting. However, anecdotal evidence suggests that these guidelines are not carefully followed in the inpatient setting at Comer Children’s Hospital. In this project, we aim to assess baseline adherence to the 2016 guidelines for hospitalized infants and will subsequently educate providers to better model SSP for our patients’ families. Methods: We used the Model for Improvement, endorsed by the Institute for Healthcare Improvement, to develop our QI project. We began by assessing pre-education SSP in the hospital by conducting random audits of patient rooms for hospitalized infants <12 months of age. Audits targeted adherence to the five AAP-enforced SSP recommendations deemed most applicable to the hospital setting. We also examined nurses’, residents’, and hospitalists’ knowledge of, attitudes toward, and perceived barriers to SSP via self-assessment surveys and focus groups. An educational intervention for clinical staff was developed and implemented and post-intervention audits of patient rooms were completed to evaluate improvement in adherence to SSP. Results: Data from pre-intervention crib audits was collected on 100 infants admitted to Comer Children’s Hospital during the months of April and May. We found that 0/100 patients were compliant on all 5 recommendations. Focus group and self-assessment survey data is being analyzed currently in order to inform the structure and content of the educational intervention which will be presented to the healthcare team in early-July 2017. The post-intervention audit will be completed by August 2017.

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RARE PRESENTATION OF HOLOPROSENCEPHALY AND CEBOCEPHALY IN INFANT OF DIABETIC MOTHER
J Garisa, S Sharma, S Mahajan, T Balaji*, Sinai Children’s Hospital, Chicago, Illinois.
Introduction: Infants born to Diabetic mother are associated with increased risk of complications at birth. Severity and type of complications depends on the onset and control of the mother’s diabetes. Poor glycemic control in the first trimester and at the time of conception can cause major birth defects and spontaneous abortions. Diabetic fetopathy happens in the second and third trimesters, causing subsequent fetal hyperglycemia, hyperinsulinemia, and macrosomia. Case presentation: This report describes term baby born to 21 year old mother with parental history significant for poor controlled diabetes (White classification –C). Mother HbA1C was 9% in the first trimester and she had a history of a spontaneous abortion in first trimester due to poorly controlled diabetes mellitus. Baby was born by induced vaginal delivery complicated by shoulder dystocia. Initially baby was unresponsive requiring oxygen administration with APGAR’s of 7 and 9 at 1 & 5 minutes. Physical examination showed appropriate for gestational age baby with microcephaly, ceboccephaly (single nostril, hypotelorism and proboscis like nose) and micropenis with
hypospadias. Head ultrasound on the day of admission was suggestive of Holoprosencephaly. Echocardiography on day of life 2 was done and showed small closing patent ductus arteriosus and small patent foramen ovale. Chromosome analysis was normal. **Discussion:** Infants born to diabetic mother has higher rate of congenital malformations as compare to the normal population. Infants born to mother with well controlled diabetes (White classes A) are associated with less chances of congenital abnormalities. However, infants born to poorly controlled diabetic mother (White classes B, C, D, F) are associated with higher incidence of malformations. Most common reported anomalies include caudal regression, situs inversus, ureter duplex, renal agenesis, cardiac anomalies and anencephaly. Finding of holoprosencephaly along with cebcephaly has been rarely reported in the literature.

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**INTEGRIN β2 IMMUNOMODULATORY GENE VARIANTS IN PREMATURE INFANTS WITH NECROTIZING ENTEROCOLITIS.**

*V George,* A Holmes, H Menden, S Xia, V Sampath, Children’s Mercy Kansas City, MO.

**Background:** Genetic factors that program dysregulated intestinal immune responses in NEC are poorly understood. Toll like receptor (TLR) proteins regulate innate immune responses critical for maintenance of neonatal gut bacterial tolerance. β2 integrins are involved in fine tuning of TLR-mediated immune responses. Deficiency of Integrin β2 (ITGB2) has been shown to cause hyper-responsiveness to TLR stimulation and ITGB2 mutations have been implicated in several human disease phenotypes including Leukocyte adhesion deficiency, chronic colitis, and Hirschsprung’s associated Enterocolitis. These data support investigation of the ITGB2 gene as a locus for NEC susceptibility. **Hypothesis:** ITGB2 genetic variants will be associated with increased susceptibility to Necrotizing Enterocolitis in premature infants. **Objective:** Determine whether loss of function ITGB2 genetic variants are more prevalent in premature infants with Necrotizing Enterocolitis when compared to gestational-age matched controls. **Methods:** Case – control study involving 55 premature infants less than 36 weeks with NEC and 150 gestational age matched controls. Blood or buccal samples will be collected for DNA extraction and targeted sequencing of the entire exonic ITGB2 gene locus will be performed using bar-coded, multiplexed, high-throughput sequencing (MiSeq, Illumina Inc.). Genetic variants will be annotated using appropriate software and the prevalence of deleterious variants compared using Fisher’s exact tests. Based on the prevalence of ITGB2 variants in the general population (5%) we will have 80% power to detect a 4-fold increase in prevalence of ITGB2 variants in NEC. **Results:** In a preliminary study where we sequenced the exonic locus of 300 immune genes in premature infants less than 34 week gestation, we found 3/14 infants had deleterious mutations in ITGB2 compared to only one among 25 infants with GA<34 weeks without NEC. Studies are ongoing to complete ITGB2 sequencing in the proposed number of cases and controls. A catalogue of known missense and deleterious ITGB2 variants has been collated using the ExAC browser ([http://exac.broadinstitute.org/](http://exac.broadinstitute.org/)). **Conclusion:** Our preliminary data suggests increased prevalence of deleterious ITGB2 variants in premature infants with NEC. With this study we seek to validate ITGB2 as a potential locus for NEC susceptibility in premature infants.

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**ANOGENITAL DISTANCE (AGD) IS DETERMINED DURING MALE PROGRAMMING WINDOW (MPW) IN HUMAN NEWBORN, SERVING AS A BIO-MARKER OF PRENATAL ANDROGEN ACTION.**

*V Goyal,* V Chawdhary, V Jain, A Davis, P Shekhawat MetroHealth Medical Center, Cleveland, OH,Cincinnati Childrens Hospital, Cincinnati,Cleveland Clinic Foundation, Cleveland, Ohio.

Ano-genital distance (AGD) is an anthropometric measure and is a sensitive measure of *in utero* androgen action. Male Programming Window’ (MPW) is defines as duration during which genital
development is programmed, likely to be 8–14 weeks of gestation in humans. Disruption of androgen action ONLY during this MPW results in reproductive health disorders.

**Purpose:** Assess in utero androgen action during early gestation by:
1. Measuring AGD to determine if male preterm infants have longer AGD compared to females, and
2. Whether AGD and/or other genital anthropometric measures correlate with androgen levels.

**Methods:** Recruited 202 normal neonates. Genital anthropometry (table 1), measured using Vernier calipers within 3 days of birth. Collected 1 ml of cord blood from all neonates to measure five sex steroid hormones using LC-MS. **Results:** Significant difference seen in male and female AGD1 & AGD2. Significant difference in testosterone levels in male & females seen. On multiple regression analysis, after adjusting for confounders, both AGD 1 and AGD 2 were not associated with any of the postnatal androgen levels in males and females. We also found no association of any of the androgen levels with penile length, penile girth or glans girth.

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<th>Table 1: Study Demographics (n=205)</th>
<th>Male (n=117)</th>
<th>Female (n=88)</th>
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<tr>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
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<tr>
<td>Gestational age (weeks)</td>
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<td>Birth Weight (gms)</td>
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<td>AGD1 (mm)</td>
<td>21.7 (6)</td>
<td>12.9 (3.8)</td>
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<td>AGD2 (mm)</td>
<td>41.9 (8.9)</td>
<td>34.1 (7.3)</td>
<td>&lt;0.001</td>
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<td>Testosterone (ng/dl)</td>
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<td>108 (25)</td>
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<tr>
<td>Androstenedione (ng/dl)</td>
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<td>Penile Girth (mm)</td>
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<td>Penile Length (mm)</td>
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<tr>
<td>Glans girth (mm)</td>
<td>8.6 (3.8)</td>
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**Conclusion:**
- AGD is significantly longer in preterm males compared to female infants.
- AGD is NOT correlated with any postnatal androgens.
- This strongly supports the existence of MPW in humans during which AGD is fixed by in utero androgen action, and unaffected by postnatal androgens.
- Results suggest the causes of newborn and adult reproductive health disorders, such as endocrine disruptors, should be explored during the human MPW, i.e. between 8-14 weeks of gestation.

**50 IMPROVING CONSTIPATION CARE: A UNIQUE PEDIATRIC GASTROENTEROLOGY-PRIMARY CARE CHILDHOOD CONSTIPATION COLLABORATIVE FOR DEVELOPMENT OF A CONSTIPATION TOOL KIT TO ENHANCE DETECTION AND STANDARDIZE MANAGEMENT OF CONSTIPATION IN CHILDREN IN THE AMBULATORY PEDIATRIC DEPARTMENT OF AN INNER-CITY HOSPITAL.**

Gulati R, Hospattankar KP, Super D, Needlman RD, MetroHealth Medical Center-Case Western Reserve University, Cleveland, Ohio.

Constipation is common in children with estimated prevalence ranging from 0.7-29.6%, may become chronic and with associated complications. The most common type is functional i.e., absence of an underlying organic cause, disproportionately affect some ethnic minorities in the US; many of who utilize Medicaid- supported health insurance. Moreover, there’s evidence showing constipation is underreported and, hence, potentially under diagnosed in some groups like African
American children. Failure to recognize constipation by parents or pediatricians in a timely manner may lead to chronic symptoms and decrease the likelihood of successful treatment. Thus, under the auspices of CaseCAN-a workforce development program funded by the Ohio Department of Medicaid, Medicaid Technical Assistance and Policy Program (MedTAPP) Healthcare Access (HCA) Initiative SFY 16 and SFY 17, we piloted a model of collaboration between the disciplines of Pediatric Gastroenterology and Primary Pediatrics with the following goals: 1. Increase awareness about importance of early detection of constipation in children using systematic screening in Primary Care. 2. Develop a comprehensive constipation tool-kit to facilitate high quality, evidence-based care. We designed a brief, easy-to-understand Bowel Habit Survey Questionnaire (BHSQ) as a screening test to parents of children presenting for well childcare and we have developed a comprehensive constipation tool kit. We received 843 patient surveys out of the 1362 surveys administered (62% survey return rate.). The sensitivity and specificity of the BHSQ as a screening tool for constipation in well childcare was ~100% and ~80% respectively. Rate of diagnosis of constipation with BHSQ was higher as compared to routine diagnosis of constipation (11.9% observed rate vs. 5.4%, P < 0.001; Chi Square). Active screening for constipation in primary care pediatrics yields a higher rate of constipation diagnosis as compared to routine well childcare. This strategy has the potential for early diagnosis and improved outcomes in childhood constipation. Our comprehensive constipation tool kit is ready. This includes (a) an electronic health record (EHR) order smartest for pediatric providers; and (b) an interactive, easy-to-understand constipation instructional handout for families with low literacy skills.

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FUNCTIONAL CHARACTERIZATION OF 4 ABCA3 MUTATIONS IDENTIFIED AMONG INFANTS WITH RESPIRATORY DISTRESS SYNDROME.

JY Hu, P Yang, H Heins, D Wegner, B Hackett, J Wambach, and F Cole, Washington University in St. Louis, St. Louis, MO.

Background: Recessive mutations in the ATP-binding cassette transporter A3 gene (ABCA3) are associated with severe neonatal respiratory distress syndrome (RDS) and childhood interstitial lung disease. Infants with biallelic nonsense or frameshift mutations present with severe progressive neonatal RDS and die by 1 year of age without lung transplant. However, infants and children with missense mutations have more variable disease presentations and courses not easily predictable by in silico algorithms. To date, few ABCA3 mutations have been functionally characterized in surrogate cell systems. ABCA3 mutations are grouped into those that disrupt intracellular trafficking and protein processing (type I) and those that reduce ATPase activity (type II). Characterization of mutation-encoded disruption of protein expression and function is necessary to develop pharmacologic strategies to reconstitute ABCA3 function. Objective: To characterize functionally 4 previously uncharacterized ABCA3 mutations identified among newborn infants with severe, progressive RDS using protein immunoblotting, immunofluorescent localization, and electron microscopy. Methods: Using transient transfection of HEK293T cells, adenoviral transduction of A549 cells, immunoblotting, immunohistochemical ABCA3 localization, and electron microscopy, we functionally characterized 4 ABCA3 mutations (p.N140H, p.T181I, V1399M, and p.S1516N). We included 2 previously characterized mutations (p.L101P, p.N568D) as controls. Results: Mutant proteins encoded by p.N140H and p.S1516N demonstrate protein processing (180kDa, 220kDa bands) and intracellular localization patterns similar to wild-type ABCA3. The mutant proteins encoded by p.V1399M and p.T181I are abnormally processed (single 180kDa band). However, unlike type I mutations, T181I did not co-localize to the endoplasmic reticulum or lamellar body-like intracellular organelles. Electron microscopy demonstrates abnormal lamellar body-like organelles in the cells transduced with p.T181I and p.V1399M. Conclusions: Characterization of mutations p.N140H and p.S1516N suggests that mutation-encoded disruption does not result from aberrant protein processing or trafficking but may be due
to reduced ATPase activity. The p.T181I and p.V1399M mutations encode abnormally processed ABCA3 proteins; however, the T181I mutant protein’s failure to co-localize to the endoplasmic reticulum, like known type I mutations, suggests a new mechanism for ABCA3 deficiency. These results emphasize that mutation characterization is critical for development of personalized strategies for treatment of infants and children with ABCA3 deficiency.

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A COMPARATIVE STUDY OF CLINICAL PARAMETERS IN NEWBORNS WITH HYPOXIC ISCHEMIC ENCEPHALOPATHY IN PRESENCE AND ABSENCE OF SEVER MRI ABNORMALITIES.

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Division of Neonatal-Perinatal Medicine, Department of Pediatrics, Wayne State University, Detroit, MI

Hypoxic Ischemic Encephalopathy (HIE) is a leading cause of developmental impairment among infants. Clinicians have limited tools to accurately predict developmental outcomes of infants with HIE. MRI scans are not immediately available to predict severity of brain injury. To provide counseling to parents whose babies suffer from HIE, it is important to develop parameters which can correlate with severity of MRI injury. SNAPPE and CRIB scores are known to correlate with future developmental outcomes in sick newborns. There are no studies that look into the correlation between these scores and MRI findings. The objective of this study is to address the hypothesis that SNAPPE and CRIB scores are significantly higher for newborns that have increased severity of injury as shown by MRI findings. Upon IRB approval, a patient list was compiled using a retrospective chart review. Newborns with HIE born between 2009 and 2015 who underwent therapeutic hypothermia were included in this study. The MRI findings were classified using previously published NICHD neonatal network classification. Perinatal and postnatal data was collected and CRIB and SNAPPE scores were calculated. SPSS statistical analysis was used. Chi-squared tests were used for categorical variables and Mann-Whitney U or unpaired t-tests were used for continuous variables. No correction was performed for missing data or multiple comparisons. Clinical parameters like gestational age, birth weight, sex, race, and ethnicity, level of C-reactive protein and other tests for severity of disease (SNAPPE score and CRIB score) were not significant when compared with severity of MRI. PaO₂ and Glucose levels were not statistically significant except for values described in table below.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Mild or No Injury</th>
<th>Moderate to severe Injury</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum arterial partial pressure of oxygen on 5th day of life (mm Hg)</td>
<td>72 ± 11 (N=5)</td>
<td>217 ± 139</td>
<td>0.043</td>
</tr>
<tr>
<td>Minimum arterial partial pressure of oxygen on 1st day of life (mm Hg)</td>
<td>41 (31 - 66) N=9</td>
<td>54 (24 - 419) n=20</td>
<td>0.034</td>
</tr>
<tr>
<td>Maximum blood glucose level on 4th day of life (mg/dL)</td>
<td>102 (69 - 180) N=48</td>
<td>89 (64 - 121) N=56</td>
<td>0.036</td>
</tr>
<tr>
<td>Minimum blood glucose level on day 4th day of life (mg/dL)</td>
<td>85 ±13 (N=14)</td>
<td>69.05 ± 15 (N=22)</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Variation in glucose metabolism and oxidative metabolism are equally important towards final outcome and should be monitored and optimized on an ongoing basis. Severity of sickness as indicated by SNAPPE, CRIB, and Apgar scores, does not necessarily lead to significant MRI findings and should not serve as the sole indicator of discontinuation of support in newborns with moderate to severe HIE.
TIMING OF DIAGNOSIS OF COARCTATION OF AORTA/ INTERRUPTED AORTIC ARCH IN NEWBORNS IN A HOSPITAL IN MIDWEST REGION.

I. Jagadesan, N. Parashar, L. Gopinieti, H. Srinivasan, Mount Sinai Hospital, Advocate Christ Medical Center, Illinois.

Objective: Congenital Heart Defects (CHDs) affect nearly 40,000 births per year in the United States. Delayed diagnosis of congenital heart disease worsens the preoperative condition and outcome of surgery in neonates. The objective of this study was to determine the timing of diagnosis of Coarctation of Aorta (CoA)/ Interrupted Aortic Arch (IAA) in a hospital in Midwest region. Methods: Retrospective review of charts of infants admitted to a tertiary hospital in Midwest region between 2013 and 2015 with Coarctation of Aorta or Interrupted Aortic Arch was done. The age at the time of diagnosis, associated cardiac conditions, blood pH at the time of admission, length of ICU and hospital stay and mortality were analyzed. Results: A total of 52 cases of CoA/ IAA were diagnosed. Thirty nine cases were prenatally diagnosed. Of the remaining 13 cases, seven were diagnosed during their initial hospital admission and six were discharged undiagnosed and then readmitted. Mean age at diagnosis was 0.98 days in first group and 21.2 days in second group. There were four cases of CoA and three cases of IAA in first group. Three cases of CoA had associated left heart obstructive lesions. All three cases of IAA were associated with subaortic stenosis. There were five cases of CoA and one case of IAA (associated with subaortic stenosis) in second group. All five cases of CoA had associated left heart obstructive lesions. Four of the seven cases (57.1%) and three of the six cases (50%) had pH less than 7.30. Mean lengths of ICU and hospital stay were 16.5 days and 22.8 days respectively in first group and were 10.4 days and 14.2 days respectively in second group. There was positive correlation between the age at diagnosis and ICU/hospital stay in first group and negative correlation in second group. There was no mortality in both groups. One patient in second group had passed CCHD screening and was discharged and then readmitted. CCHD screening results for rest of the patients were unobtainable. Conclusion: Despite prenatal ultrasounds and postnatal screening, CoA and IAA are frequently missed. We recommend a new protocol of repeating CCHD screening at 1 week of age at the initial newborn visit for the early diagnosis of these life threatening cardiac defects.

CONGENITAL HYPOTHYROIDISM IN PREMATURE INFANTS.

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Background. Incidence of congenital hypothyroidism (CH) has almost doubled in the recent years. This is partly due to increased detection of CH in preterm infants. Data on epidemiology of CH among preterm infants in large cohorts are limited. Objectives. To determine the incidence of CH in preterm infants and to identify associated risk factors. Methods. This is a retrospective cohort study of preterm infants born before 32 weeks from 2012-2016 in the state of Wisconsin. Newborn screening results on CH and demographic data were obtained from Wisconsin state newborn screening program. Congenital hypothyroidism was sub divided to initial congenital hypothyroidism (TSH >30 in initial newborn screening) and congenital hypothyroidism with delayed TSH elevation (normal initial screening, TSH >15 on subsequent screening). Initial CH was sub divided to severe (TSH >100) and mild (TSH >30). Univariable logistic regression analysis was performed to identify demographic factors associated with initial CH and CH with delayed TSH elevation. Results. Total of 3180 preterm infants were included in the study. Mean gestational age and birthweight were 1191g (+/-399) and 28.4 weeks (+/-2.4) respectively. Overall incidence of CH was 2.4%. Initial CH incidence was 1.4% (severe 0.06%, mild 1.3%). Incidence of CH with delayed
TSH elevation was 1%. African American infants had lower odds of initial CH compared to Caucasian infants (p 0.009). Lower gestational age (22-24 and 25-27 weeks), birth weight (<500 and 500-1000g) and TSH 15-20 on initial newborn screen were associated with CH with delayed TSH elevation. **Conclusion.** Overall incidence of CH was 2.4%. This increase incidence was mainly due mild initial CH and CH with delayed TSH elevation. Lower gestational age, lower birth weight were associated with CH with delayed TSH elevation, a similar association was not detected for initial CH.

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**ELUCIDATING THE ROLE OF MIR-1253, A CANDIDATE TUMOR-RELATED GENE IN MEDULLOBLASTOMA.**

**R K Kanchan**, S K Batra*, and S Mahapatra*, *Department of Biochemistry and Molecular biology, University of Nebraska Medical Center, Omaha, NE

Medulloblastoma (MB) is the most common malignant pediatric tumor of the central nervous system (CNS) and a leading cause of childhood related morbidity and mortality. Large-scale transcriptional profiling and mutational analyses have facilitated the stratification of medulloblastoma into four primary subgroups, i.e. WNT, SHH and non-SHH/WNT groups 3 and 4. Prior studies have revealed mutations in 17p13.3 in over 50% of patients with non-SHH/WNT medulloblastoma. Aside from HIC1, none of the other 13 tumor suppressor genes (TSG) within this locus has received any attention in the context of medulloblastoma. We first studied the expression on known TSGs in 5 established MB cell lines, i.e. DA0Y, D283, D341, D425, and HDMB03, and discovered that 3 microRNAs (miRs) (miR-22, miR-212, miR-1253) and 2 proteins (SMYD4 and HIC1) are significantly downregulated in all cell lines. MicroRNAs deregulation (miRs) has emerged as a hallmark of multiple cancers. We chose to focus on miR-1253, a 104-bp micro RNA localized to the most distal part of 17p13.3 with expression exclusive to the CNS. We learned that miR-1253 expression is abrogated *in vitro* via hypermethylation, a common epigenetic silencing mechanism in cancer. Expectedly, both de-methylation and transient transfection of miR-1253 mimic in these cell lines resulted in recovery of micro RNA expression. Expression recovery was concomitant with activation of apoptotic pathways, differential regulation of c-Myc, and a resultant decline in medulloblastoma cell viability. Taken together, our studies suggest that miR-1253 may serve a tumor suppressor function specific to medulloblastoma.

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**PERINATAL-NEONATAL IODINE STATUS: LONGITUDINAL ASSESSMENT OF IODINE AND THYROID STATUS IN PRETERM INFANTS.**

**N Kanike**, M Thomas, S Groh-Wargo, D Kumar, E Chien, P Shekhawat, MetroHealth Medical Center, Cleveland, OH.

Iodine is an essential component of thyroid hormones and plays a critical role in neurodevelopment. Iodine deficiency during pregnancy and early postnatal life especially in extremely preterm (EP) infants can adversely affect brain growth. Preterm infants on parenteral nutrition (PN) do not receive iodine supplementation and are at risk of iodine deficiency. There are no established standards of iodine supplementation in this vulnerable population. Our primary aim was to assess iodine status of mother-infant dyads at the time of delivery. Further, we aimed to assess neonatal iodine and thyroid function (TFT) status postnatally. We prospectively measured urine iodine (UI) and TFT’s in 50 mother-infant dyads at birth, at 1 week, 1 month, 2 month, 3 month and at discharge postnatally. Sixty four percentage of mothers were iodine deficient at the time of delivery with median iodine level of 96 mcg/L (normal >150 mcg/L). Their free T4 levels were low at 0.48 ng/dL (normal 0.86-1.90 ng/dL) with normal TSH values, indicative of subclinical hypothyroxinemia. In the newborn, UI excretion and UI/creatinine were much higher at lower GA than term. The UI levels were thirtyfold higher in EP infants after application of iodine containing
antiseptic for procedures (p<0.01) but this rise lasted less than one week. EP infants on PN developed iodine deficiency with a median of 73 mcg/L (p=0.017) and had high thyroglobulin levels at 187 ng/mL (normal <13 ng/mL) by 1 month of age. These levels improved with enteral nutrition. Iodine deficiency is prevalent in pregnant women and is often associated with subclinical hypothyroxinemia. EP infants during first two months of life especially when on PN develop iodine deficiency and are at risk for subclinical hypothyroidism. Iodine supplementation during pregnancy and to PN solutions for infants should be strongly considered to avoid subclinical hypothyroidism.

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VITAMIN D STATUS IN A LARGE COHORT OF PRETERM AND TERM INFANTS.

N Kanike, K Hospattankar, S Groh-Wargo, MetroHealth Medical Center, Cleveland, OH.

Vitamin D deficiency causes poor global mineralization of the skeleton. Deficiency during pregnancy has been linked to higher risk of food sensitivities, eczema, asthma, type I Diabetes, autism and respiratory infections. Intake of 400 International Units daily in prenatal vitamins is generally considered sufficient. However, distribution of vitamin D levels among preterm, late preterm and term infants is unknown. We aimed to determine distribution of vitamin D [25(OH) D] levels in a large cohort of newborns. We did retrospective chart review of neonates admitted to level III NICU in Cleveland, Ohio, from 2009 to 2014 with recorded Vitamin D levels. Of total 1210 neonates, 37% were term and 63% preterm, 42% Caucasian and 44% African American. At birth, median 25(OH)D level was 18 ng/ml (3 to 482 ng/ml) with 35% of infants vitamin D deficient(<15ng/ml) and 52% insufficient (15 to 30 ng/ml), even though 72% of mothers took prenatal vitamins. In Vitamin D deficient group, 22% were Caucasian and 52% African American infants. Vitamin D levels (ng/ml) were significantly higher in preterm than in term infants (19 vs 15.9, p< 0.001), and higher in late preterm than in term infants (17.8 vs 15.9, p=0.014). Vitamin D levels were negatively associated with birthweight (Spearman correlation coefficient: -0.25, 95% CI: -0.30 to -0.19) and gestational age (-0.25, 95% CI: -0.30 to -0.19). Vitamin D levels were positively associated with maternal vitamin D levels (0.79, 95% CI: 0.55 to 1; n=28), and negatively associated with maternal BMI (-0.35, 95% CI: -0.54 to -0.15; n=94). Our study results suggest that neonates born in the northern US are at high risk of vitamin D deficiency, even when mothers are compliant with prenatal vitamins. Prenatal vitamins may not contain enough vitamin D to ensure replete status at the time of birth. It is time to rethink our approach to ensure Vitamin D sufficiency in pregnant women and their newborns. Higher-dose supplementation may be needed to improve maternal and neonatal vitamin D status. Our study also suggests that vitamin D levels are higher in preterm and late preterm infants than in term infants, despite preterm infants having less intrauterine time for transplacental transfer of Vitamin D. Further multicenter large studies are required to delineate vitamin D levels in preterm infants.

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ASSOCIATION BETWEEN INTRAUTERINE DRUG EXPOSURE AND VITAMIN D STATUS IN NEONATES: A LARGE COHORT STUDY.

N Kanike, K Hospattankar, S Groh-Wargo, MetroHealth Medical Center, Cleveland, OH.

Vitamin D is not only an essential element in bone health but also a nutrient and pro-hormone that plays an increasingly recognized role in many other organ systems. It has also been implicated in the prevention of infections, autoimmune diseases, some forms of cancer, type 1 diabetes mellitus, and asthma. The prevalence of substance abuse among women of childbearing age has reached epidemic proportions in the United States. Research on illicit drug use during pregnancy has documented the negative effects on the pregnant woman, fetus, and neonate. Outcomes in the newborn include low birth weight and small head circumference. There are no data available on vitamin D status in newborns with intrauterine drug exposure. We aimed to compare vitamin D
status at birth in newborns with intrauterine drug exposure to newborns with no exposure. We did retrospective chart review of neonates admitted to level III NICU in Cleveland Ohio, from 2009 to 2014 with recorded vitamin D levels. Of total 1210 neonates, median gestational age was 35 weeks with 37% being term, 30% late preterm and 33% early preterm newborns, and 42% Caucasian and 44% African American. Two hundred thirteen (18%) infants had intrauterine drug exposure, with median vitamin D [25(OH) D] level of 16.7 ng/ml compared to 18 ng/ml in non-exposed infants (p=0.075). Within the late preterm group, illicit drug exposure was associated with lower vitamin D levels (exposed 15.4 ng/ml vs non exposed 18.1 ng/ml, p=0.021). This was not the case in the early preterm or term infants. Most common illicit drugs used were opioids and marijuana. Our study suggests that newborns with intrauterine drug exposure are at higher risk for poor vitamin D status and that late preterm infants may be especially at risk. It is time to rethink our approach to ensure vitamin D sufficiency in pregnant women and their newborns. Higher-dose supplementation may be needed to improve maternal and neonatal vitamin D status. Further large studies are required to show the effect of illicit drug use during pregnancy on neonatal vitamin D status.

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ECHOCARDIOGRAM FOR INNOCENT MURMURS IN INFANTS: AN APPROPRIATE INVESTIGATION?

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Objective/Background: Heart murmur prevalence in neonates varies from 0.9 to 77.4%, depending on the size of the study, examiner’s experience, timing, frequency and conditions of examination. Heart murmur may sometimes herald critical congenital heart disease (CHD), which accounts for six in every 1000 live born babies. However, an ‘innocent’ heart murmur leading to expensive, time consuming and unnecessary diagnostic tests and parental stress and anxiety is detectable in a large number of newborns without any cardiac malformation. Innocent systolic murmurs (IM) are a group of the non-pathological sounds, heard in a great majority of children (up to 70%). Accuracy and predictive value of heart murmur in cases of suspected CHD have been rarely analyzed in previous studies. In our study, we aim to find out the outcome of infants referred to a pediatric cardiologist for an echocardiogram for the innocent murmurs in newborns. Method: The sample included 87 babies under 1 year of age with the diagnosis of cardiac murmur that were born full term and were either referred from newborn nursery or from outside clinic with the diagnosis of heart murmur from January 2014 to June 2016. Exclusion criteria included all the preterm babies less then 37 weeks gestational age, patients with abnormal antenatal echocardiography, patients with congenital syndromes and those admitted in the NICU. Results: Data analyzed out of 87 patients revealed that none of them had critical congenital heart diseases.

<table>
<thead>
<tr>
<th>Table: Comparing iodine levels between Gestational ages.</th>
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<tbody>
<tr>
<td>Factor</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Birth Weight (g) Median [Q1, Q3]</td>
</tr>
<tr>
<td>Sex, No. (%)</td>
</tr>
<tr>
<td>Race, No. (%)</td>
</tr>
<tr>
<td>- Caucasian</td>
</tr>
<tr>
<td>Ethnic</td>
</tr>
<tr>
<td>1st Urine Iodine Concentration (mcg/L)*</td>
</tr>
<tr>
<td>2nd IUIC, Median [Q1, Q3]</td>
</tr>
<tr>
<td>3rd IUIC, Median [Q1, Q3]</td>
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<tr>
<td>4th IUIC, Median [Q1, Q3]</td>
</tr>
<tr>
<td>5th IUIC, Median [Q1, Q3]</td>
</tr>
<tr>
<td>Maternal Urine Iodine Concentration (mcg/L), Median [Q1, Q3]</td>
</tr>
<tr>
<td>Maternal iodine deficiency, No. (%)</td>
</tr>
</tbody>
</table>

*p-value: a = Kruskal Wallis test with Steel-Dwass multiple comparison adjustment for pairwise comparison, significantly different from 22.27 weeks, significantly different from 28.24 weeks, significantly different from 33.36 weeks, significantly different from 37.40 weeks.
73\emph{(84\%)} of them were referred from the outpatient clinic and 14\emph{(16\%)} were referred from the newborn nursery. Out of 87 patients, 83 underwent echocardiography of which 51 \emph{(61.4\%)} had normal echocardiography findings, 16\emph{(19.2\%)} had ASD/PFO, 9\emph{(10.8\%)} had VSD, 5\emph{(6\%)} had either mild pulmonary valve stenosis or peripheral pulmonary artery stenosis and 2\emph{(2.4\%)} had PDA. None of them required any intervention. Those with VSD were scheduled for follow up within next 3 to 6 months. \textbf{Conclusion:} This study highlights that echocardiogram for innocent heart murmurs, in otherwise healthy term infants, are highly unlikely to show any critical congenital heart diseases. A majority of innocent heart murmurs will have normal findings and doing an expensive work up, such as an echocardiogram, is not warranted; as the murmurs resolve or may not need any intervention. Further study is in progress to expand the data from the last 2 years to the past 10 years with incorporation of Appropriate Use Criteria recommended by ACC/AAP/AHA/SOPE.

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\textbf{CLINICAL DIFFERENCES BETWEEN INFANTS WITH SEVERE BRONCHOPULMONARY DYSPLASIA DIAGNOSED BY SUPPLEMENTAL OXYGEN, NON-INVASIVE VENTILATION OR BOTH.}

\textit{A Kays, A Jani, J Noel-MacDonnell PhD, G Akangire MD, JB. Taylor MD, Children’s Mercy Kansas City, Kansas City, MO}

\textbf{Background:} Severe bronchopulmonary dysplasia (BPD) in extremely premature infants is diagnosed by oxygen (O2) requirement>30\%, need for non-invasive ventilator (NIV) support or both at 36 weeks corrected gestational age. This growing patient population has a high readmission rate and complex medical needs in the first 2 years of life. \textbf{Objective:} Identify clinical differences between the different categories of severe BPD patients while in the NICU and through the first 2 years of life and identification of risk factors for re-hospitalization. \textbf{Methods:} A retrospective chart review was performed on 54 infants in The Center for Infant and Pulmonary Disorders at CMH born with extreme prematurity and severe BPD, born between 2010-2013, who were not tracheostomy/ventilator dependent, and did not have severe neurologic compromise or complex congenital heart disease. Patients were stratified into three groups: group A:NIV, group B:O2, group C:both. Clinical factors in the NICU included a diagnosis of pulmonary hypertension, adrenal insufficiency, reflux, dysphagia, g-tube placement, patent ductus arteriosis, sepsis, necrotizing enterocolitis. Risk factors for re-hospitalization included the NICU clinical factors as well as oxygen use, diuretic use, inhaled steroid use at NICU discharge, 6, 12, 18, and 24 months as well as reason for re-admission. \textbf{Results:} Group A (17\%), Group B (39\%) and Group C (44\%) were significantly different based on GA (25, 26 and 27 weeks respectively), sepsis, and NEC (p=0.021, <0.001, and <0.001) and potentially dysphagia (p=0.053). There continued to be differences in oxygen, diuretic, and inhaled steroid use between the three groups over 24 months (see figure 1) but no significant difference in re-hospitalization rate. Pulmonary viral infection was the most common cause of readmission with RSV, then rhinovirus, being the most commonly identified viral pathogens. \textbf{Conclusion:} Our small retrospective analysis found that NEC and sepsis affected a patient’s risk for being in group C. There continue to be differences between the groups’ oxygen, diuretic use, and inhaled steroid use over time but no difference in re-hospitalization rates. The most common cause of re-hospitalization was viral respiratory infections.

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\textbf{NATIONAL SURVEY OF INSTITUTIONAL PEDIATRIC DISASTER PREPAREDNESS}

\textit{Timothy Ketterhagen, MD\textsuperscript{1}; Deanna Dahl-Grove, MD\textsuperscript{2}; Michele McKee, MD\textsuperscript{1}; \textsuperscript{1}University of Chicago, Chicago, Illinois; \textsuperscript{2}Rainbow Babies and Children’s Hospital, Cleveland, Ohio}

\textbf{Background:} Children require unique planning and resources for disaster preparation. Pediatric specific resources and training exercises may not be readily accessible at all health care facilities. \textbf{Objective:} The purpose of this study is to describe disaster preparations at hospitals throughout
the United States, focusing upon the strategies to address pediatric patients in disaster preparedness. **Design/Methods:** The study design is descriptive using survey methodology. Survey responses were solicited from hospital personnel that are familiar with the disaster preparedness plan at their institution. The survey sought to describe how pediatric patients are represented in disaster preparedness and exercises. In addition, types of pediatric specific disaster policies, procedures, with respect to institutional geographic location, hospital type, and disaster management personnel are also described. **Results:** The survey was distributed to 120 hospitals and responses were received from 29 states, including Washington DC. Fifty-three percent of the surveys were fully completed (63/120). The majority of hospitals had an individual responsible for pediatric-specific disaster planning (63 percent) and also specifically address the care of pediatric patients (<16yo) in their hospital disaster plan (78 percent). Pediatric patients were also represented in the majority of disaster preparedness exercises (86 percent). Of those surveyed, urban hospitals (45/63) were more likely to have an individual responsible for pediatric-specific disaster planning (80 vs. 22 percent [p<0.05]). The hospitals with an individual designated to pediatric disaster planning were more likely to have an institutional disaster plan that specifically addresses the care of pediatric patients (90 vs. 56 percent [P<0.05]). Hospitals with an individual responsible for pediatric-specific disaster planning were also more likely to represent children with special healthcare needs as simulated patients in disaster exercises (73 vs. 22 percent [p<0.05]).

**Conclusion:** The majority of hospitals surveyed incorporate pediatric patients into their disaster preparedness plan. Non-urban hospitals were less likely to address pediatric patients in their disaster preparedness plan. Those hospitals with an individual designated to pediatric disaster planning were more likely to specifically address the care of pediatric patients in their institutional disaster plan. Pediatric disaster planning should be a focus of all institutional disaster plans, including those hospitals in non-urban settings in order to optimize the care of all pediatric patients if a disaster were to occur.

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**THE EFFECT OF THE TIMING OF CAFFEINE INITIATION ON FLUID AND ELECTROLYTE BALANCE IN EXTREMELY PRETERM NEWBORNs.**

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1Pediatrics, Children’s Hospital of Michigan, Detroit, MI.

**Objective:** To evaluate the effect of the timing of caffeine initiation on fluid and electrolyte balance in extremely preterm newborns. **Study Design:** Extremely preterm newborns born at less than 28 weeks and at less than 1000g between 2006-2012 at a level III neonatal intensive care unit received either caffeine therapy within the first 48h of life (early group), after 48h (late group) or no caffeine during the first month of life as per the clinical team. A retrospective analysis of this cohort (n=583) was performed. **Results:** Extremely preterm newborns who received antenatal steroids, surfactant and early caffeine initiation were found to have a lower incidence of bronchopulmonary dysplasia, necrotizing enterocolitis, retinopathy of prematurity, less number of surgeries, less number of medications at discharge and a decreased incidence of mortality. There was no statistical significance for sodium or potassium levels, pH, fluid goal, creatinine or urine output among newborns who received early caffeine versus those who did not. Delayed caffeine exposure was associated with 52.2% of newborns needing home medications at discharge. 83% of patients who received caffeine within 24hrs did not require any type of surgical intervention for various surgical indications compared with 42.3% not needing any surgical intervention. **Conclusion:** Early caffeine therapy did not affect the fluid or electrolyte balance of extremely preterm newborns.
OUTCOMES WITH SPECIFIC APPROACH IN CHILDREN AFTER UNDERGOING PERICARDIOCENTESIS.

**Background:** Pericardiocentesis is a safe therapeutic procedure with a major complication rate of 1% [2]. Echocardiographic guidance during pericardiocentesis has allowed for less traditional approaches to drainage of pericardial fluid [1]. Furthermore, pericardiocentesis without subsequent drain placement has been associated with an increased risk of recurrence [2].

**Objectives:** To assess whether the anatomical approach during pericardiocentesis influences rates of complication. We also assessed if the underlying diagnosis and subsequent pericardial drain placement affects rates of complication. **Methods:** All patients undergoing pericardiocentesis from August 2008 to June 2016 at the University of Minnesota Masonic Children's Hospital were included. Procedure-related complications, the approach of procedure, the location of effusion, history of hematopoietic cell transplantation, the presence of echocardiographic or clinical tamponade, and the use of pericardial drain were analyzed. **Results:** A total of 60 patients underwent pericardiocentesis. Post-hematopoietic stem cell transplant was the most common diagnosis (n=31, 51.7%). A pericardial drain was left in place in 40 patients (66.7%). The most commonly used approaches were the left axillary approach (36.7%) and sub-xiphoid approach (28.3%). The fifth intercostal space was the most commonly used intercostal space (n=16, 26.7%). There were 3 minor complications (5%) and 2 major complications (3.3%). The presence of hematopoietic cell transplantation, approach, or intercostal space did not increase the risk of complications; The complication rate was higher in those patients who did not receive a pericardial drain (p<.006). **Conclusions:** The use of non-traditional, non-sub-xiphoid approach did not significantly affect the rate of complications nor did an underlying diagnosis of hematopoietic cell transplantation. The rate of any complication was higher among those who did not receive a pericardial drain.

**References:**

CLINICAL PRESENTATION AND INSULIN MANAGEMENT IN 88 PARTICIPANTS DIAGNOSED WITH DIABETES UNDER 1 YEAR OF AGE.

**Background:** Hyperglycemia diagnosed in children less than one year of age is most often due to neonatal diabetes (NDM) or autoimmune type 1 diabetes (T1D). NDM affects approximately 1 in every 100,000 births worldwide. Because there is limited data on the use of insulin in this heterogeneous group of patients, we sought to characterize diabetes presentation and insulin management in infants diagnosed under 13 months of age. **Methods:** Participants enrolled through the US Monogenic Diabetes Registry were included if they were diagnosed with diabetes ≤13 months of age. Medical records from time of diabetes diagnosis were requested. Data was analyzed using Stata Version 14 (StataCorp, 2015). For group comparisons, Kruskal-Wallis tests and Fisher’s exact tests were performed. The relationship between age at diagnosis and days hospitalized (Spearman rank correlation) and diabetic ketoacidosis (DKA) (logistic regression) was also determined. Study data was collected and managed using REDCap electronic data capture tools. **Results:** 301 participants met eligibility criteria for this study and 88 had substantive records from time of diabetes diagnosis. The majority were male (52.3%), Caucasian (62.5%), alive at time of
analysis (97.7%), and had permanent forms of diabetes (86.4%). The most common genetic cause was KCNJ11-related diabetes (37.5%) followed by unknown genetic cause/likely type 1 diabetes (21.6%). Median age at diagnosis of diabetes was 10.4 weeks (IQR: 5.2-26.5 weeks). Overall DKA frequency was 66.2%. Several parameters were significantly different among subgroups, including DKA (Table 1). The most common signs/symptoms at diagnosis were polyuria and tachypnea. Therapies used were not significantly different by mutation subtype. Earlier diagnosis age was associated with more days spent in the hospital (r=-0.64). Participants diagnosed at a later age had a greater likelihood of DKA at diagnosis (OR: 1.23 [95% CI 1.04, 1.45]). **Conclusions:** Severe presentation of diabetes was common in this young population, including a high frequency of DKA. This may be due to delay in diagnosis, since later age at diagnosis increased likelihood of DKA. Efforts to reduce any possible delay in diagnosis may help to prevent diabetes-related morbidity in this vulnerable population.

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**ATYPICAL KAWASAKI: REVIEW OF CLINICAL SPECTRUM.**

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**Introduction:** The phrase Atypical Kawasaki was initially introduced to define patients with coronary complications who did not fulfill the classical diagnostic criteria of Kawasaki Disease. The incomplete presentation of the disease poses a great challenge to clinicians, as very often a delay in diagnosis can culminate in very serious associated coronary complications. The diagnostic criteria for typical Kawasaki disease includes fever and at least four of the five additional clinical signs. Atypical Kawasaki disease should be taken into consideration in case of all children with unexplained fever for more than 5 days with 2 or 3 of the main clinical findings. The term “Atypical Kawasaki” is the more frequently used term to describe the incomplete presentation of the disease irrespective of the coronary complications, and it is interchangeable with the term “Incomplete Kawasaki Disease”. **Methods:** A PubMed search of publications from database inception until November 2016 was conducted using the terms Atypical and incomplete Kawasaki. References and related articles were also reviewed to yield additional data. A total of 119 published articles were included in this review. The diagnosis of Atypical Kawasaki disease was mostly achieved by clinical improvement after intravenous immunoglobulin treatment. **Results:** A total of 133 cases were studied. The average age at the time of presentation was 39.4 months with a male to female ratio of 1.5. The 3 most common classical diagnostic features present were fever (100%), cardiovascular involvement (78.9%) and oral changes/mucositis (54.8%). The most common atypical clinical features seen were abdominal pain (12.78%), diarrhea (10.53%) and hepatomegaly (6.77%). A number of atypical presentations were seen, of which the most common were neuro-meningeal disease (10.53%), respiratory distress (6.77%), jaundice (4.51%), pneumonia (4.51%), retropharyngeal abscess (4.51%) and BCG scar reactivation (3.76%). The 3 most common cardiovascular complications were aneurysm (52.38%), vascular dilatation (32.38%), and pericardial effusion (18.1%). **Conclusion:** This review draws attention to a crucial set of gastrointestinal symptoms, as well as other potential systemic indicators (i.e. respiratory symptoms and neuro-meningeal symptoms) that may point towards a diagnosis of Atypical Kawasaki much earlier in the course of the disease. In addition, the diagnostic criteria proposed by the AHA for Atypical Kawasaki needs to be revisited and requires further validation.

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**REVISITING THE SCREENING FOR RETINOPATHY OF PREMATUREITY IN 30-34 WEEK NEONATES IN AN INNER CITY URBAN HOSPITAL.**

*S Mahajan, J Garisa, V Geraldo, J Desai, S Khan, Sinai Children’s Hospital, Chicago, IL, USA*

**Introduction:** Retinopathy of Prematurity (ROP) is the commonest cause of blindness in the pediatric population in the United States. The American Academy of Pediatrics, Section on
Ophthalmology recommends screening for infants with a birth weight (BW) <1500g or <30 weeks gestation (GA), or with a BW 1500g - 2000g or >30 weeks GA. Screening parameters vary across neonatal intensive care units (NICUs) in the US and at Sinai Children's Hospital (SCH) we screen all infants born at GA <32 weeks and BW <1800g. Objectives: 1) to determine the average age of retinal maturation per GA grouping. 2) To examine the initial retinal exam (RE1) for infants >30 weeks till discharge. Methods: A retrospective review of the electronic medical records (EMR) of neonates admitted to SCH-NICU with birth weight of <1800g or GA <32 weeks from March 2013 to February 2016 was undertaken. Results: A total of 116 subjects were studied. 4 groups were identified based upon their GA and age of retinal maturation (RM). Group 1: <28 weeks, RM 39 weeks, Group 2: 28-30 weeks, RM 39.7 weeks, Group 3: >30-32 weeks, RM 36 weeks and Group 4: >32-34 weeks, RM 37 weeks. Groups 3 and 4 were examined for the purposes of our study. Stage 1 ROP was seen in 12.5% of Group 3 RE1 with spontaneous RM at 36.4 weeks and Immature retina (IR) was seen in 16.7% of Group 4 RE1 achieving RM at 36 weeks. 13% of infants >34 weeks had IR with RM at 39.3 weeks. 100% of Group 3, Stage 1 ROP and 57.1% of Group 4, IR were on oxygen supplementation at the time of screening. All groups achieved RM upon discharge. Conclusion: Retinal maturation averages 39 weeks for infants <30 weeks GA and 36-37 weeks for infants 30-34 weeks GA at birth. Although majority of infants 30-34 weeks did not have significant ROP, this study supports the importance of ophthalmologic screening in high risk >30 weeks GA infants, needing oxygen supplementation for the detection of retinal changes that can be closely monitored during their stay in the NICU.

INTERPRETER USE IN URGENT CARE.

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Purpose of Study: Previous Emergency Medicine (EM) studies demonstrated that language barriers between healthcare providers and patients/parents could lead to longer a length of stay (LOS), higher resource utilization, and reduced analgesia. Urgent care centers (UCCs) are experiencing growth as alternatives to EM for acute care. While there is EM literature examining LOS for patients with limited English proficiency (LEP), no such data has been reported in UCCs. This study quantifies the number of patients/caregivers with LEP seen at UCCs operated by a pediatric academic center and compares their LOS to English-speaking patients/caregivers. Additionally, this study compares the triaged acuity, number of medications administered, prescriptions provided, laboratory tests, and radiology studies obtained based on patient/caregiver language.

Methods Used: This is a retrospective study examining LOS among patients aged 2 months to 17 years seen at three UCCs from January - December 2016. Patients were included if they had a primary diagnosis of streptococcal pharyngitis, viral pharyngitis, acute otitis media, bronchiolitis, or asthma. Patients admitted, transferred, or who 'left before seen' were excluded. The preferred language of patients and caregivers was recorded at UCC triage. If either the patient or caregiver indicated a language other than English was preferred, we categorized it as an LEP encounter. We randomly selected 3 English-speaking encounters within each UCC and diagnosis class for each LEP encounter. We report differences in the mean LOS between the two groups.

Summary of Results: Of our sample, 224 (1.3%) had LEP. Of these, 145 (64%) preferred Spanish. We compared the LEP group to 672 visits by English-speaking controls randomly selected for frequency matching. The average LOS for LEP versus English encounters was 84.0 and 76.6, minutes respectively (p = .009). There was no statistically significant difference based on language in triaged acuity, medications administered, prescriptions provided, laboratory or radiological studies obtained.

Conclusions Reached: Our study demonstrates increased UCC LOS for families with LEP. These findings are similar to results in the Emergency Medicine literature. There were no statistically significant differences in number of medications prescribed or administered, nor laboratory or radiology studies based on a patient/caregiver's language. Clinical Correlation:
Efficiency, safety, and quality are important in UCCs. This study serves as a starting point to better understand and care for patients/families with LEP in the UCC setting.

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CURRENT PRACTICES IN TRACKING NEWBORN METABOLIC SCREENING RESULTS IN ILLINOIS.
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Objective: A successful newborn metabolic screening program should involve universal screen, immediate follow-up testing of the newborns with abnormal results, diagnosis confirmation, and timely documentation of both normal and abnormal results in the patient's medical record. However, there are many challenges for primary care providers to track results: a) lack of continuity by the same provider from birth hospital to primary care setting; b) lack of awareness on the process to obtain results which makes it time consuming; c) false sense of security when the newborn appears “healthy”. The objective of this study was to determine current practices to retrieve newborn metabolic screening results in the state of Illinois with the ultimate goal of finding possible solutions to address identifiable barriers by simplifying the retrieval process. Methods: A validated online survey was sent to primary care providers in the state of Illinois with the assistance of the Illinois Chapter of the American Academy of Pediatrics (ICAAP). Results: Total responses were 192 out of 2100 (9%), 113 completed the entire survey (5%). Respondents included: Board-certified pediatricians 90%, Board-eligible in pediatrics 7% and Nurse practitioners and residents 3%. Seventy percent of providers see 1-10 newborns per week, 27% see more than 10 newborns weekly and 3% see variable number. Eighty-two percent were satisfied with their internal process to retrieve positive results and the remaining 18% perceived their tracking system as suboptimal. Ninety percent of providers were notified about positive results, out of which 70% received results within 7 days and the remaining 30% after 1 week. Sixty-four percent of providers were notified when initial newborn metabolic screening was negative. At the 2 week newborn visit, 29% of providers indicated that they do not try to retrieve results if the newborn is well-appearing and without a concerning history. Most providers (99%) agreed that an information system that allows quick and easy access to results should be developed. Conclusions: Although pediatric providers acknowledged the importance of the state newborn screening program, failure to retrieve negative results seems to be a common practice. Providers should be educated in the importance of tracking newborn screening results on all newborns in their practice. Barriers for failure to retrieve results can be addressed by developing a more integrated and user friendly system.

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GASTRIC TRICHOBEZOAR AND ITS ASSOCIATION WITH FAILURE TO THRIVE.
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Introduction: Bezoars are rare solid conglomerates of undigested material found in the gastrointestinal tract. They are classified according to their composition into Trichobezoar (hair), vegetable fibers (phytobezoar), diospyrobezoar (persimmons), lactobezoar (curdled milk) and pharmacobezoar (medications). In children it commonly presents with associated psychiatric disorders such as trichotillomania with trichophagia and pica. Delayed diagnosis can result in complications such as ulceration, perforation, intestinal obstruction, malabsorption, obstructive jaundice, etc. This report describes a 22 month old boy with failure to thrive and iron deficiency anemia resulting in trichophagia with associated trichobezoar and phytobezoar. Case: A 22 month old African American boy with history of failure to thrive was admitted to the inpatient pediatric floor with a four month history of decreased appetite and two days of decreased activity, vomiting and lethargy. Weight on admission was 9.12 kg corresponding to the 0% in the World Health Organization growth chart, length: 89 cm (85% for length), Z-score was -2.91, demonstrating severe
malnutrition. Physical examination revealed a thin built, lethargic, fussy but consolable baby without associated skin or hair abnormalities. Laboratory tests were significant for iron deficiency anemia, hyponatremia (132 meq/L), low bicarbonate (13 mmol/L), elevated alkaline phosphatase (216 U/L), low pre-albumin (8 mg/dL) and low 25-OH Vitamin D (10 ng/mL). Lead level was 2.2 ug/dL. On the third day of hospitalization, the patient had one episode of black-colored emesis containing hair like material. Upper gastrointestinal series showed gastric bezoar with probable extension into the small bowel. Multiple fabric trichobezoars were removed endoscopically. Hospital course was complicated by proximal jejunum perforation managed with surgical repair. Oral diet was reinitiated on post-operative day six and progressively advanced to full diet. Patient was discharged on iron and vitamin D supplementation. Discussion: Phytobezoars, trichobezoars and lactobezoars are the most common bezoars associated to gastric outlet obstruction. Risk factors for trichobezoars include female gender, African American and aboriginal race, mental retardation and underlying behavioral disorders leading to pica. Diagnosis of bezoars can be confirmed by endoscopy or upper gastrointestinal series with contrast. The treatment for bezoars includes different modalities such as chemical dissolution, endoscopic removal, prokinetics, laparoscopy and laparotomy. Bezoars should be considered as differential diagnosis in children presenting with failure to thrive and symptoms of gastrointestinal obstruction.

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ACHIEVEMENT OF SUCCESSFUL ORAL NUTRITION AS A NEW PARAMETER FOR EARLY CESSATION OF CAFFEINE IN NEONATES LESS THAN 35 WEEKS’ GESTATIONAL AGE?

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Caffeine as prophylaxis or therapy for apnea of prematurity is widely used in neonates < 35 weeks' GA. Parameters for starting and discontinuing Caffeine vary with every NICU. Objective: To determine the correlation between achievement of predominantly oral feedings (>50% by mouth of total 24-hour period feeds (P50)) and successful Caffeine discontinuation (CaffSD). We hypothesized that establishment of good suck and swallow coordination stabilizes respiratory control leading to the safe discontinuation of Caffeine. Methods: Retrospective chart review of 112 neonates < 35 weeks’ GA in our NICU from January 2013 to January 2016, who had received any Caffeine. Parameters such as start and stop dates of Caffeine therapy, day of life (DOL) of achieving predominant oral feeding (D50), DOL of last apnea, bradycardia, desaturation episode (L-ABD), percentage of PO with CaffSD, length of stay (LOS) were analyzed. Results: P50 was achieved later in lesser GA and Birth Weight [GA < 32weeks vs >32weeks; BW < 1.5kg vs >1.5kg (both p < 0.001)]. Infants who achieved P50 earlier experienced L-ABD sooner (p=0.035). Increased LOS was observed with longer cessation of L-ABD and later CaffSD. P50 was achieved later in infants with RDS, use of mechanical ventilation and PDA. There was no statistical significance of D50 on NEC, RDS, early and late onset sepsis, use of antenatal or postnatal steroids. [Table1]. Conclusion: Attainment of 50% PO was associated with early disappearance of apnea, bradycardia and desaturation episodes. Infants with lesser GA, lower BW, RDS, mechanical ventilation and PDA experienced delayed achievement of P50 and lower percentage PO at CaffSD. Caffeine duration, CaffSD and ABD assessment in the NICU directly contributed to the increase in LOS. Studies to investigate and potentiate early indicators of feeding competency and its impact on safe and timely Caffeine discontinuation are needed.

<table>
<thead>
<tr>
<th>DOL 50% Oral Feeds achieved (D50)</th>
<th>Groups</th>
<th>Mean (SD)</th>
<th>P value</th>
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<td>Gestational Age (weeks)</td>
<td>&lt; 32 (n=88)</td>
<td>45.38 (27.90)</td>
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<tr>
<td></td>
<td>&gt; 32 (n=24)</td>
<td>24.0 (16.808)</td>
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<tr>
<td>Birth Weight (kg)</td>
<td>&lt;1.5 (n=79)</td>
<td>45.5 (27)</td>
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<tr>
<td></td>
<td>&gt;1.5 (n=33)</td>
<td>27.1 (20)</td>
<td>0.001</td>
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<tr>
<td></td>
<td>Male(n=59)</td>
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<td>0.318</td>
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<tr>
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<td></td>
<td>Hispanic/Others(n=54)</td>
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<td>Mode of Delivery</td>
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<td>46.14 (26.89)</td>
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<td>L-ABD</td>
<td>n=112</td>
<td>3.856 (19.172)</td>
<td>0.036</td>
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70 Routine Cranial Ultrasound in 30-34 week neonates: Are we doing too much?  
R Katebian, R Pottimutyapu, S Ravichandran, L Amertil, V Geraldo  
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The American Academy of Pediatrics and American Academy of Neurology recommend screening for Intraventricular hemorrhage (IVH) using cranial ultrasounds (CUS) for neonates born <30 weeks' gestational age (GA). Since IVH is apparent by 72 hours of life in high risk neonates, CUS is normally performed in week 1 of life. Neonatal Intensive care unit (NICU) screening protocols vary in timing, target GA and the frequency of CUS for infants >30 weeks’ GA. Our NICU screens all infants <34 weeks’ GA. Objectives: 1) To examine the timing and frequency of CUS in neonates 30-34 weeks' GA for the first 4 weeks of life 2) To evaluate the efficacy of an expanded screening criteria in detecting CUS abnormalities, its resolution and progression. Methods: Retrospective chart analysis of 30-34 weeks’ GA neonates admitted to the of Sinai Children’s Hospital NICU during 01/2009-01/2016. CUS frequency and time of time of study was examined for the first 2 consecutive CUSs. Results: Data from 485 infants were analyzed. There were 60% 30-<32 weeks GA and 40% 32-34 weeks GA. 68.6% of CUS1 (1st CUS) was performed on days 5-6 (SD 6.08,5.83) week 1(W1) and 21.2%, 6.6% and 3.6% on W2,W3, and W4 respectively. 9.2% of CUS2 (2nd CUS) was performed on W1 and 36.4%, 28.7% and 25.6% on W2, W3 and W4 respectively. CUS1 was done more often on W1 (p<0.0001) than the subsequent weeks while the frequency of CUS2 for W2-W4 were similar (p=NS). Incidence of Grade1,2 and 4 IVH were 3.2%, 0.2% and 0.2% respectively on CUS1. The CUS2 showed 80% persistence of Grade1, 1% new Grade1, 1% progression of Grade1-Grade2, 1% progression Grade2-Grade3 and 1% resolution of Grade4-Grade3. CUS overutilization was 96.5% and 91.8% for CUS1 and CUS2 respectively. Conclusion: Most CUS1 were performed in W1 which indicated an approach to CUS1 timing for 30-34 week neonates that is no different than recommendations for infants at higher risk for hemorrhagic bleed. CUS2 performed after W1 fell within the wide time frame for detecting white matter disease and other abnormalities. The low incidence of overall IVH 3.5% in CUS1 and significant Grade4 IVH 0.2% and the high CUS overutilization should prompt the physician to re-examine current practice with implementation of evidence-based parameters for ordering Cranial ultrasounds in this group.

71 Comparison of Laryngeal Mask Airway and Endotracheal Tube Placement in Neonates  
AA Wanous,* KD Rudser,* KD Roberts*, *University of Minnesota, Minneapolis, MN, USA  
Background: With increased use of non-invasive ventilation, there has been an increased focus of research on less invasive methods of delivering surfactant to neonates with respiratory distress syndrome. We investigated use of a laryngeal mask airway (LMA) for surfactant administration for infants requiring continuous positive airway pressure. Infants who met treatment failure criteria in the LMA and Control groups were intubated and given surfactant via an endotracheal tube (ETT). Objective: This study compares placement of an LMA to placement of an ETT in neonates. Methods: This is one component of a multicenter, randomized controlled trial. Infants were 28 0/7-35 6/7 weeks gestation, ≥1250 grams and ≤36 hours old. Videotape of LMA (n=36) and ETT (n=31) placement were reviewed to determine the time and number of attempts required for successful placement. Heart rate (HR) and oxygen saturation (SaO₂) change from baseline were
analyzed as measures of physiologic stability during placement. **Results:** Duration of attempts was shorter for LMA as compared to ETT placement (32 sec vs 66 sec, p<0.001). Mean total procedure time for successful LMA placement was 88 sec as compared to 153 sec for ETT (p=0.065). Mean number of attempts for successful placement was fewer for LMA placement (1.5 vs 1.9, p=0.106). Physiologic parameters remained near baseline in both LMA and ETT groups with HR change +1 bpm and -1 bpm (p=0.333) and SaO₂ change -7% and -4% (p=0.361), respectively. **Conclusions:** Placement of an LMA was well tolerated and required less time and fewer number of attempts as compared to the traditional method of endotracheal intubation.

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**EXOME SEQUENCING IDENTIFIES A NOVEL MISSENSE VARIANT IN RET IN A FAMILY WITH HIRSCHSPRUNG DISEASE.**

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**Purpose:** To use exome sequencing to identify candidate genes associated with birth defects among infants. **Methods:** We obtained genomic DNA from a male neonate (blood) with Hirschsprung disease and a positive family history and from saliva of family members (unaffected parents and sibling, affected maternal male cousin and uncle). We performed exome sequencing using the IDT xGen Exome Research panel and an Illumina HiSeq 4000 instrument. Sequence reads were aligned to hg19 and annotated with Annovar. We identified rare variants (minor allele frequency <0.01 in the Exome Aggregation Consortium database) and used *in silico* algorithms (CADD, SIFT, Polyphen2, LRT, MutationTaster, GERP++, PhyloP,) to predict variant pathogenicity. Given the positive family history, we assumed dominant inheritance to identify candidate genes for possible association with the phenotype. **Results:** We identified and validated a maternally inherited, novel variant (c.1055A>G, p.H352R) in *RET* in the proband and affected family members (male cousin, uncle) predicted to be pathogenic by CADD (score 24.2) and 6/6 of the *in silico* prediction algorithms. *RET* encodes the RET proto-oncogene, a receptor tyrosine kinase that transduces signals for cell growth and differentiation. Mutations in *RET* are the most common genetic cause of Hirschsprung disease, and most mutations are private. The mother and female sibling carry this mutation but are asymptomatic, suggesting reduced penetrance and possibly sex-limited expressivity. Functional studies of the p.H352R mutation using transfection of HEK293 cells, immunohistochemical localization, and protein immunoblotting to determine RET phosphorylation and activation of the downstream target ERK are in progress. We will perform exome sequencing in asymptomatic carriers to identify potential genetic modifiers of disease penetrance including variants in genes encoding key components of enteric nervous system development (*EDNRB, EDN3, SOX10*) and the RET signaling pathway, as well as variants in X-chromosome genes given the sex-limited expressivity. **Conclusions:** We discovered a novel, heterozygous missense mutation in *RET* which causes Hirschsprung disease with reduced penetrance. Further genomic characterization of this family may identify additional genetic and sex-specific modifiers of disease expression. Exome sequencing of infant-parent trios is a useful tool for genomic diagnosis in infants with birth defects.

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**A STATE LEVEL ANALYSIS OF FACTORS IMPACTING VERY PRETERM BIRTHS AT NON-LEVEL III HOSPITALS.**

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**Background:** The national Collaborative Improvement and Innovation Network to Reduce Infant Mortality set a national goal that 90% of very preterm (VPT, <32 weeks gestation) infants be delivered at a hospital with a level III neonatal intensive care unit (NICU). Illinois has employed perinatal regionalization since the 1970s but still has not met the national goal for risk-appropriate
care. This study aimed to identify factors associated with birth of VPT babies at inappropriate levels of care. **Methods:** Each Illinois non-Level III perinatal hospital was asked to complete review forms for VPT live births occurring at their facility during 2015. Forms included questions about maternal medical condition, hospital’s assessment of why the mother was not transported to a level III hospital, and infant outcomes. The VPT form data were linked to birth certificates and 2015-2016 death certificates. Gestational age was categorized (22-24, 25-27, and 28-31 weeks). Bivariate associations were assessed using chi-square tests. **Results:** In 2015, 2,372 VPT infants were born in Illinois, with 80.9% in a level III hospital, 18.3% in a level II or IIE hospital, 0.2% in a level I hospital, and 0.6% in a non-birthing hospital or outside a hospital. Of infants born in non-level III hospitals, 18.3% were 22-24 weeks, 20.8% were 25-27 weeks, and 64.3% were 28-31 weeks. There was a 96% return on VPT review forms. Improved risk-appropriate care was associated with increased proximity between mother’s homes and level III NICUs, private insurance, more prenatal care, older maternal age, and higher education. For VPT infants born at non-level III hospitals, 63% of mothers were not transported before delivery due to active or advanced labor. At 22-24 weeks of gestation, 17.6% listed a neonatal diagnosis incompatible with life as reason for no maternal transport compared with <1% of 25-31 week infants. Mothers delivering at 22-27 weeks (60%) were more likely than women delivering at 28-31 weeks (41%) to have cervical dilation >4 cm on the first examination. **Conclusions:** VPT births outside level III hospitals were more common among women with inadequate or no prenatal care, greater distance to a level III hospital, lower educational attainment, and those who were younger suggesting opportunities for public health investment. The reasons for no maternal transport before delivery varied by gestational age but point to need to further evaluate education of front-line providers about the presentation of very early preterm labor and about the management of perivable pregnancies. With proximity to level III hospitals, the role of remote consultation should also be explored.

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**ATYPICAL CASE PRESENTATION OF KAWASAKI DISEASE WITH PULMONARY HYPERTENSION AND TRICUSPID REGURGITATION**

S Sharma, L Gopineti, S Mahajan, Sinai Children’s Hospital, Chicago, Illinois, USA

**Introduction:** Typical Kawasaki disease (KD) is a systemic vasculitis syndrome of unknown etiology with acute febrile illness. It was initially described by Tomisaku Kawasaki in 1967 as an infantile febrile mucocutaneous lymph node syndrome. It typically affects children less than 5 years of age. KD has been accountable for many cases of acquired heart disease in the developed countries however; associated pulmonary hypertension is rarely reported. There are only two cases of Kawasaki disease described in literature with associated pulmonary hypertension. **Case presentation:** This report describes a 6 years old male patient presented to our ER with acute febrile illness for 4 days. Initial echocardiography was reported to be normal. On day 4 of admission he developed mild respiratory distress and subsequent workup revealed right pleural effusion on ultrasound and moderate pulmonary hypertension with tricuspid regurgitation on echocardiogram. The child was managed with immunoglobulin, aspirin, lasix and albumin infusion. Subsequent addition of methylprednisolone showed tremendous and rapid amelioration of the patient’s symptoms. Pulmonary hypertension was subsequently resolved without any sequel. Discuss literature review. The pulmonary hypertension in the reported cases resolved without any additional specific interventions, thereby suggesting underlying benign vasculitic changes. In addition to reporting such a rare complication in the acute phase of the disease, the beneficial effect seen by the addition of methylprednisolone adds on to the current debate on the appropriate treatment of KD with either steroids or IVIG alone, as opposed to combined treatment in order to ameliorate any vasculitic complications seen elsewhere in the body.
OVERVIEW OF GUNSHOT INJURIES IN THE PEDIATRIC INPATIENT UNIT AT MOUNT SINAI HOSPITAL.

S Sharma, G Shrestha, D Bazick, O Edo-Ohonyba, Mount Sinai Hospital, Chicago, IL.

Introduction/Objective: Gunshot related injuries are the leading cause of death and non fatal injury in US amongst children and adolescents. According to IVDRS (Illinois Violent Death Reporting System), there is an increase in homicides related to gunshot injuries from 2005 (5.6 per 100,000) to 2008 (7.8 per 100,000). The majority of deaths involved children aged 16-18, incidence being higher in males and African-Americans. Mount Sinai hospital (MSH), level 1 trauma centre, receives gunshot injuries and trauma cases as it serves the under privilege south west side community of Chicago. This study aims to report the epidemiological aspect of gunshot violence in pediatric population admitted to MSH, which may represent the surrounding community that is of public health concern. Methods: A retrospective chart review was done for 90 patients admitted at MSH from Jan 2016 – Jan 2017. Patients with age above 18 and those discharged from the emergency department were excluded. Result/Discussion: The demographics show a vast gender difference, 85% being male. Over half of the children were African-Americans (59%), 37 % (Hispanic), and 1 % (Caucasian). Majority of the patients (77%) belonged to the age group 16-18 years. These findings conclude that violence increases with age in children and it is important to be vigilant with that age group. There is an association of underlying mental health conditions, substance use, and gang affiliation with the prevalence of gunshot injuries. Majority of the patients (49%) denied their mental health illness and only few reported mental illness. Majority of the patients (39%) used Marijuana, and 15 % used polysubstance. Children exposed to violence are more likely to become victims/perpetrators of further violence than those not experiencing violence. Regarding gang affiliation, the major findings were 62% (unknown), 31% (no gang affiliation), and 7% had gang affiliation. This finding can be one of the limitations of the study where the patients and their family members do not want to open up such matters publicly. Regarding school status, 29% (unknown), 13 % (drop out), and 58% (currently enrolled) were the major findings. Another significant finding was 32% of the patients had life threatening injury. This is valuable information that gives us important insight into child health in the US, and this study provides a base for epidemiological concern to prevent these kinds of injuries.

RELATIONSHIP OF COAGULATION PARAMETERS AND SNAPPE-II SCORE TO SEVERE INTRAVENTRICULAR HEMORRHAGE (IVH) IN ELBW INFANTS

Ashajyothi M Siddappa, MD1, Gabrielle Quiggle, MPH2, Constance Adkisson, MD, 1Raghavendra Rao, MD 3, 1. Neonatology, Department of Pediatrics, Hennepin County Medical Center, Minneapolis 2. Department of Public Health, University of Minnesota, Minneapolis 3. Division of Neonatology, University of Minnesota, Minneapolis, MN

Background: Immature vasculature along with coagulation abnormalities and fluctuation in cerebral blood flow predisposes the extremely low birth weight infant (ELBW) to intraventricular hemorrhage (IVH). Coagulation parameters are routinely screened in ELBW infants on admission. Similarly, illness severity measures such as the Score for Neonatal Acute Physiology Perinatal Extension II (SNAPPE-II) are designed to predict morbidity and mortality risk in newborn infants during hospitalization. The association of coagulation abnormalities and illness severity with the risk of IVH is not well understood. Objective: To determine the association of coagulation parameters and SNAPPE-II scores to severe (grade 3 and 4) IVH in ELBW infants. Design/Methods: A retrospective chart review of all admissions of preterm infants≤ 29 weeks gestation from January 2008 to December 2013 was performed with IRB approval. Data on prenatal and postnatal characteristics, cranial ultrasound records, and coagulation parameters were collected. SNAPPE-II was calculated (mild, 0-29; moderate, 30-59; severe, 60-162). Univariate and
multivariate logistic regression modeling was used to identify factors associated with severe IVH. The association between individual coagulation parameter and SNAPPE II score and severe IVH was determined. **Results:** 101 infants, from 23 to 28 week gestation were included in the study (birth weight: 811 g ± 224 g). Fifteen infants had severe IVH. Lower gestational age (p=0.006), birth weight (p=0.008), higher SNAPPE II score (p=0.001), prolonged prothrombin time (PT) (p=0.004), and prolonged INR (p=0.004) were associated with severe IVH. Prolonged PT and INR, and lower platelet count increased the probability of severe IVH in an infant with severe illness (SNAPPE II score ≥60) by approximately four folds, relative to those with less severe illness (SNAPPE II score ≤29). (6-10% vs. 40-43%). **Conclusion:** Prolonged PT and INR and lower platelet count increases the risk of severe IVH in ELBW infants with severe illness.

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**CHILDREN WITH MEDICAL TECHNOLOGY DEPENDENCY LIVING AT HOME: PERCEPTIONS OF CARE COORDINATION AND FAMILY IMPACT.**

**SA Sobotka,**¹ EJ Lynch,² MT Quinn,³ ME Msall,¹ ME Peek³ ¹Section of Developmental and Behavioral Pediatrics, Department of Pediatrics, University of Chicago, Chicago, IL; ²School of Public Health, University of Illinois at Chicago, Chicago, IL; ³Department of Medicine, University of Chicago, Chicago, IL.

**Background:** Children with medical technology dependency (MTD) who require both a medical device to compensate for the loss of a vital body function and substantial nursing care, are increasingly living in the community. As this population expands and ages, it is essential to have a deeper understanding of what is required to support community living. Within the state of Illinois, the Division of Specialized Care for Children (DSCC) Home Care Program provides care coordination for children with MTD. **Objectives:** The purpose of this study is to understand the experience of families transitioning from hospital-to-home, and their care coordination needs through the lens of state care coordinators. **Methods:** Subjects were eligible for inclusion if they served as a DSCC care coordinator for the Home Care Program for >1 year. Semi-structured individual interviews were conducted in English and transcribed verbatim. Examples of interview topics include: hospital-to-home transition, the parent experience caring for a child with MTD, factors which influence child health and development, challenges and benefits of home nursing, readmissions, and respite care. All interviews were coded independently using a Modified Template Approach in which the interview guide served as an initial code book, which was modified as additional themes emerged. Coders resolved differences to create uniformity. **Results:** Fifteen interviews were completed and transcribed. The analysis is ongoing. Preliminary themes of care coordinator roles include (1) pride and fulfillment from being the main contact person for families and (2) frustration with resource limitations. Preliminary themes for family experiences include (1) chronic stress of unrelenting caregiving, and (2) deleterious impacts of home nursing shortages. Challenges with home nursing were often discussed at length, particularly for the impact on time to a child’s initial hospital discharge, parent employment, and overall family functioning. Themes surrounding readmission revealed that most families try all alternatives to avoid hospital readmission. **Conclusions:** While Katie Beckett Waivers have theoretically enabled Medicaid policy to support home care, in reality major gaps exist in fluid access to critical home-based services to support children and families living in the community. **Implications for Practice:** In order to best support children with MTD and their families and prioritize services following hospital discharge, further research is needed to understand the parent perspective on hospital-to-home transition and ongoing community care. This preliminary qualitative study suggests that the major factor limiting care optimization for children with MTD is relief for the parents through reliable and quality home nursing.
Oxidative Stress Markers in Newborns of Different Gestational Ages


*Pediatrics, Division of Neonatology, Advocate Children’s Hospital, Park Ridge, IL, United States
**Chicago College of Pharmacy, Midwestern University, Downers Grove, IL, United States

Background: Redox homeostasis instability results from excessive reactive oxygen species (ROS) formation, inadequate antioxidant defense, or both. Prolonged imbalance, known as oxidative stress (OS), leads to cell/tissue injury. At birth, redox homeostasis is burdened because the transition to extrauterine life significantly increases ROS production. Preterm and sick neonates are at greatest OS risk due to immature endogenous and insufficient exogenous antioxidant protection. However, OS and ET-1 interaction in the neonatal period is not well understood. Objective: To determine the relationship between OS markers, ET-1 levels and OS-associated parameters in NICU admitted neonates.

Design/Methods: Sixty-three subjects were enrolled into this prospective, observational study that was conducted in a Level IV NICU. The subjects were divided into groups based on gestational age: 1) Preterm 1: 24-30 6/7 weeks (n=24); 2) Preterm 2: 31-36 6/7 weeks (n=26); and 3) Term: 37-42 weeks (n=13). Umbilical cord (birth) and infant [24 (±4) hours of life] blood samples were collected for ET-1 and OS marker [GSH and malondialdehyde (MDA)] analyses.

Results: Mean cord MDA levels were significantly higher (p<0.001) than 24-hr MDA levels. Significant negative correlations were found between 24-hr MDA and GSH levels, 5-minute Apgar score (p<0.0001, p<0.0001; respectively), and bilirubin levels (p<0.0001, p<0.0001; respectively). No significant (p>0.05) correlations were found in the following analyses: cord/24-hr ET-1 and cord/24-hr OS marker levels, cord/24-hr ET-1 or OS marker levels and race/ethnicity, gender or mode of delivery. Although cord/24-hr OS marker levels were higher in infants born to moms with diabetes vs. non-diabetics and higher in those categorized as overweight and obese vs. normal weight, the differences were not significant. Mean cord MDA levels in PT neonates exposed to prenatal corticosteroids were significantly lower (p<0.05) than unexposed. No significant difference was found between 24h MDA, umbilical cord and 24h GSH levels in these groups (p>0.05). Conclusion(s): Oxidative stress markers (MDA and GSH) and plasma ET-1 levels act independently. MDA (reflecting lipid peroxidation) is higher in cord blood than at 24-hr of life regardless of GA. Because 24-hr MDA and GSH levels correlate with FiO2, 5-minute Apgar score and bilirubin levels, they may be indicative of OS injury and intrinsic neonatal antioxidant defense. Prenatal steroids may reduce OS injury: directly via the lipid peroxidation pathway and/or indirectly by decreasing morbidities, such as RDS.

A Hospital-to-Home Transitional Care Model for Children with Technology Dependency: Improving Family Training and Linkage to Community Resources.

W Tian,† ME Msall,‡ SA Sobotka; †Rush Medical College, Chicago, IL; ‡Section of Developmental and Behavioral Pediatrics, Department of Pediatrics, University of Chicago, Chicago, IL. The University of Chicago, Chicago, IL

Background: Children with complex medical needs and medical technology dependence (MTD) have challenging hospital discharges, often prolonged by non-medical issues (parent training, public funding approval and home nursing availability). For most patients there is no alternative location for hospital-to-home transitional care. Objectives: Almost Home Kids (AHK) is a hospital-to-home transitional care center whose philosophy is that supportive and educational transitional care coupled with skilled respite care over time will empower families to care for complex children at home. This study examines a cohort of parents during and after AHK transition to determine the efficacy of its family training and case management. Methods: The parents of children admitted to either of two AHK locations for hospital-to-home transitional care were recruited for this study. Surveys were administered during and after the training program. Survey response items were
compared using a generalized estimating equation logistic regression model that accounts for the correlation between multiple observations per patient. **Results:** Of 33 participating parents, 53% were mothers, 21% fathers, and 26% foster/adoptive parents. 82% of the children of these parents were <3 years old, and 18% were 3-14 years old. 91% had feeding tubes, 48% tracheostomies, and 33% ventilators. After discharge from the AHK program, families continued to access critical community supports (Table 1). The AHK hospital-to-home transitional care program also demonstrated sustained parent medical technology skills and knowledge after participation (Table 1). Before going home, parents described finding qualified home nurses, providing nighttime care, and accessing subspecialists as their greatest anticipated home care challenges. On follow-up parents described a new lived challenge: unrelenting caregiving. **Conclusions:** After hospital-to-home AHK transition, parents maintain skills and training on medical equipment. This study provides pilot evidence that AHK is a feasible alternative to the hospital during hospital-to-home transition for parent training and complex care case management. **Implications for Practice:** Once a child with MTD is medically stable, AHK is a family-centered model to promote parent training and connection to community resources.

<table>
<thead>
<tr>
<th>Table 1: Admission, Discharge, and Follow-up Outcomes after AHK Hospital-to-Home Transition</th>
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<tbody>
<tr>
<td>Item</td>
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<tr>
<td>Community Supports (N=30)</td>
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<tr>
<td>Usual place for medical care</td>
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<tr>
<td>Referred to Early Intervention</td>
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<tr>
<td>Receiving Early Intervention Services (under age 3, N=24)</td>
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<tr>
<td>Ventilator Management (N=10)</td>
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<tr>
<td>Very comfortable with ventilator alarms</td>
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<tr>
<td>Knows ventilator settings</td>
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<tr>
<td>Can do a back-up ventilator check</td>
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<tr>
<td>Tracheostomy Management (N=16)</td>
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<tr>
<td>Completed tracheostomy change with secondary caregiver</td>
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<tr>
<td>Completed tracheostomy change independently</td>
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<tr>
<td>Feeding tube management (N=28)</td>
</tr>
<tr>
<td>Very comfortable with cleaning dressing/changing tube</td>
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GESTATIONAL AGE-DEPENDENT CEREBRAL OXYGEN EXTRACTION IN RESPONSE TO FLUCTUATIONS OF BLOOD PRESSURE.

**ZA Vesoulis,*** SM Liao,*** AM Mathur, *** *Department of Pediatrics, Division of Newborn Medicine, Washington University, St. Louis, MO, USA.

**Background:** Impairment in cerebrovascular autoregulation in the setting of hypotension has been linked to the development of intraventricular hemorrhage (IVH). While the effect of intravascular volume and pressure are more established factors of autoregulatory function, there is increasing recognition that cerebral metabolism plays a role in directing cerebral autoregulation, although the impact of prematurity is unknown. Premature infants may lack mature cerebrovascular autoregulatory function and fail to adapt oxygen extraction to decreasing systemic perfusion.

**Methods:** Infants ≤ 28 wks GA were recruited. Systemic oxygen saturation (SpO₂), mean arterial blood pressure (MABP), and cerebral saturation (near-infrared spectroscopy, SctO₂) were measured continuously over the first 72h. Resulting data underwent error processing. For each remaining 10m window, mean MABP and fractional tissue oxygen extraction (FTOE) were calculated. Infants were divided into two groups (23-25 wks and 26-28 wks). Median FTOE at lower (MABP < 30 mmHg), medium (MABP 30-40 mmHg), and higher (MABP > 40 mmHg) values were compared. **Results:** Sample n=68, mean±SD GA=25.5±1.3 wks, BW=823±195g. Median FTOE in the more preterm group vs. more mature group was statistically different at lower value of MABP (p<0.01) and higher values of MABP (p<0.01), but not at medium values (p=0.08) **Conclusion:** The more mature group (GA 26-28 wks) displayed an appropriate increase in oxygen extraction during hypotension, steadily decreasing as MABP increased, suggesting mature autoregulation. An
opposite, and paradoxical, response was noted in the more preterm group, suggesting an inability to mount a compensatory response when BP is outside of the physiologic range.

81 EFFECTIVENESS OF ABUSIVE HEAD TRAUMA PREVENTION EDUCATION FOR NEW PARENTS IN A GENERAL CARE NURSERY.
D Eblovi, V Wang, E Daily, J Hageman, University of Chicago Medical Center, Chicago, IL
Objective: Despite primary prevention efforts, infant abusive head trauma (AHT) continues to cause high mortality and devastating developmental sequelae. Studies have shown that parental frustration is a significant factor for AHT, thus educating parents is an important prevention strategy. Our study evaluated the impact of an educational intervention for parents of newborns in a general care nursery serving an urban, low-income population. Methods: Parents were instructed with a 12-minute video and flier about the dangers of shaking infants and safe coping strategies when frustrated by incessant crying. The parents completed a 3 question true/false pre- and post-video survey to test comprehension. Semi-structured phone interviews, completed 3-6 months later, evaluated information recall and implementation. Results: Parents of 126 newborns (59% of whom were publicly insured) completed the education and surveys. The average test score improved from 60.9% to 76.4% (95% CI for improvement: 9.6% to 21.3%; p < 0.0001). Only 14.2% of parents initially responded correctly to “It is dangerous to leave an infant crying in crib for 1 hour,” but 56.7% did on the post-test (p < 0.0001). 11 parents responded to follow up phone interviews. When asked about techniques for responding to frustration with a crying infant, 82% discussed placing their infants in a crib or safe place. Conclusion: This study demonstrates that a brief video and written educational intervention could improve parents’ knowledge and implementation of a strategy for preventing abusive head trauma. The sample was small and faced selection bias, with few parents completing phone interviews. However, our results suggest that low cost education for new parents in an urban, low-income population can improve understanding of AHT prevention and be easily implemented in nurseries nationwide.

82 AN INDIVIDUAL HEALTH PLAN FOR CHILDREN WITH MEDICAL COMPLEXITY- A SIMPLIFYING TOOL FOR CAREGIVERS
Sherea Stricklin, Elizabeth Bergamini, Donna R. Halloran, Joseph Lammert, Abraham Zabih, Aline T. Tanios. Saint Louis, Missouri, USA at Saint Louis University/Cardinal Glennon Children’s Hospital
Background: Children with medical complexity (CMC) have the following characteristics: 1) chronic, severe health conditions, 2) substantial health service needs, 3) functional limitations which are often severe, and 4) high health resource utilization. 1% of children account for one-third of total pediatric healthcare costs; the majority of this 1% are CMC. At least 25% of CMC spending can be attributed to hospital readmissions, and CMC account for 49% of hospital days. An Individual Health Plan (IHP) is a document summarizing a patient’s medical history and needs designed to assist with communication between the patient and health care provider. Objective: Assess challenges and communication issues during medical visits for CMC. Evaluate for a change in these issues after implementation of an IHP for CMC. Design/Methods: We enrolled all subjects in the Complex Medical Care Program starting in April 2016 – present at a single, Midwest, academic, children’s hospital. IHHPs were developed at enrollment and updated periodically, as needed. Baseline and six month follow-up surveys included a) the extent of their child’s medical care, b) the challenges during medical visits, and c) communication issues encountered. Responses were open-ended and Likert scale. Descriptive statistics are provided. Results: A total of 89 baseline surveys included children <1 year (24%), 1-3 years (47%), and 4-10 years (29%). At baseline, 77% of these patients were followed by >4 physicians, and 66% were hospitalized >1 time in the year prior to enrollment. 56% of caregivers reported >19 minutes to review medical history with new
providers, and 12% of the caregivers reported most to all of the time having difficulty in recalling history. 52% of caregivers reported concerns about communication. 70% and 67% of caregivers responded that they believed an IHP would decrease medical delays and errors, respectively. A total of 21 follow-up surveys were completed at the time of abstract submission. Preliminary analyses of the 6-month follow-up data indicate that 67% report <20 minutes to review medical history, none had difficulty recalling history, and 62% had NO concerns about communication. Conclusion(s): At baseline, caregivers surveyed report significant stress, time, and difficulty in recalling their child’s complex medical history. The majority reported feeling that an IHP would be useful in decreasing medical care delays and errors. Early analyses of follow-up data indicate the IHP is addressing some of these challenges.

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EARLY INTERVENTION SERVICES FOR LEAD-POISONED CHILDREN.
A Zimmerman, N Hamp, N Leighton, Legal Council for Health Justice and University of Chicago, Chicago, IL.

Background: Lead poisoning remains a prevalent and preventable environmental health hazard affecting children. Low-level lead exposure has been proven to significantly increase the risk of learning disabilities, behavioral problems, and developmental delay. It has substantial social implications as lead disproportionately affects children from low-income, minority households. Early Intervention (EI) is a federal program established to enhance the development of children who are at risk of or who have known developmental delays and allows states to include “disorders secondary to exposure to toxic substances” as a condition for children to automatically qualify for services. Recognizing EI services have the potential to improve outcomes of children exposed to lead, a workgroup was assembled to determine the blood lead level that Illinois should adopt as a threshold for automatic EI eligibility and the services that would assist children not yet exhibiting delays. Methods: We surveyed 50 states to determine which include lead poisoning as an automatic qualifier for EI and, in those states, which services children are eligible to receive. Data was collected on Illinois children with elevated blood lead levels (BLLs) over several years. The number of children with BLLs at 5, 6, and 10 µg/dL and above were broken down by zip and grouped together by the EI Child and Family Connections (CFC) site serving each area. Data was analyzed to determine the impact on the EI system if CFCs were to become responsible for serving lead-poisoned children at levels >/=5 µg/dL. Results: As of late 2016, 21 states have EI standards that grant automatic eligibility for services to children with elevated BLLs and Illinois is not one of them. From 2014 through 2016, the prevalence of Illinois children with BLLs >/=5 µg/dL has decreased by 10-15% each year. Based on 2015 data, we determined that if Illinois EI served 50-75% of children birth to age 3 at BLLs of 5 and above, the program could potentially evaluate and serve an additional 2532-3797 children each year. Only five CFCs will have more than a 20% increase in new clients by the end of 2017, demonstrating the capacity for EI to serve lead-poisoned children without overwhelming the program and providing a template for advocates in other states to follow to establish automatic eligibility for EI services.
The James Sutherland Award

The James Sutherland Award was named after a neonatologist from the University of Cincinnati, who was instrumental in establishing their neonatal unit. Dr. Sutherland was a renowned teacher, clinical investigator, and role model for trainees. He was active in the Midwest Society for Pediatric Research, and encouraged trainees to submit work at the annual meeting. The award, which recognizes the best investigative work presented by a junior faculty member, was first given in 1991. To be eligible for this award, the junior faculty candidate must be no more than five years out of fellowship training.

The award is accompanied by an honorarium and plaque. The recipient is announced and honored each year at the Founder and Sutherland Awards Luncheon held during the MWSPR annual meeting.

<table>
<thead>
<tr>
<th>Year</th>
<th>Recipient</th>
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<td>1994</td>
<td>Thomas Scholz, MD</td>
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<td>1995</td>
<td>Edward N. Guillery, MD</td>
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<td>1996</td>
<td>Michael R. UHING, MD</td>
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<td>1997</td>
<td>Carol Gilmour, MD</td>
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<td>1998</td>
<td>Robert H. Lane, MD</td>
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<td>D. Balkundi, MD</td>
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<td>Janine Y. Khan, MD</td>
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<td>Steven Pipe, MD</td>
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<td>Shruti M. Phadke, MD</td>
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<td>J. Carter Ralphe, MD</td>
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<td>Michael Blake, MD, PhD</td>
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<td>2006</td>
<td>Matthew I. Goldsmith, MD</td>
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<td>2007</td>
<td>Jayme D. Allen, MD</td>
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<td>2008</td>
<td>Alex Huang, MD and Mara Becker, MD, MSCE</td>
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<td>2009</td>
<td>Michael Wilhelm, MD</td>
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<td>2010</td>
<td>Celeste Morely, MD</td>
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<td>Amy VanMorlan, MD</td>
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<td>2012</td>
<td>Juan Boriosi, MD</td>
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<td>2013</td>
<td>Craig A. Byersdorfer, MD</td>
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<td>2014</td>
<td>Naim Alkouri, MD</td>
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<td>2015</td>
<td>Sarah Haskell, MD</td>
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<td>2016</td>
<td>Dave McCulley, MD</td>
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<td>2017</td>
<td>Awarded at the MWSPR Meeting</td>
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The Frederic M. Kenny Memorial Award

Frederic M. Kenny was instrumental in establishing the Pediatric Endocrinology Clinical and Fellowship Program at the Children’s Hospital in Pittsburgh. Dr. Kenny was a scholarship student at Princeton University, then a medical school student at The Johns Hopkins University School of Medicine, where he received his medical degree in 1955. He completed his general pediatric residency at The Johns Hopkins Hospital in 1958 and then spent two years in the U.S. Navy. He then returned to The Johns Hopkins Hospital where he completed a pediatric endocrine fellowship.

In 1962, Dr. Kenny accepted an invitation to move to Pittsburgh and assume the position of director of the Pediatric Endocrine Division. He developed an outstanding clinical program in pediatric endocrinology and laboratory research focused primarily on normal adrenal function ranges for children and adolescents. He was intensely interested in the pathophysiology of all of the endocrinopathies, and his work led to the description of the course of endocrine diseases. He co-authored approximately 100 papers and made more than 40 presentations at scientific meetings around the world.

The Kenny Award is given for outstanding research presentation by a fellow at the MWSPR, and with sponsorship from Abbott Nutrition includes an honorarium and plaque.

1989  Michael S. (Mickey) Caplan, MD
1996  Brenda B. Poindexter, MD
2001  J. Carter Ralphe, MD
2002  Indra D. Chandrasekar, MD
2003  Heather Bartlett, MD
2004  Eyal Shteyer, MD
2005  Peter DeYoung, MD
2006  Rinku Mehra, MD
2007  Wendy Luce, MD
2008  Melissa Agoudemous, MD
2009  Suzanne Kingery, MD
2010  Misty Good, MD
2011  Andrew Harris, MD
2012  Brian Becknell, MD
2013  Brittany L. Knipstein, MD
2014  Jessica White, MD
2015  Kok-Lim Kua, MD
2016  Rakhee Bowker, MD
2017  Awarded at the MWSPR Meeting
The Jack Metcoff Award

The Jack Metcoff Award is given for outstanding research presentation by a resident or fellow at the MWSPR. The recipient receives a plaque and honorarium.

Jack Metcoff made a major impact on the field of pediatric nephrology and body fluid physiology. Throughout his career, Dr. Metcoff was the consummate teacher of clinical pediatrics and pediatric nephrology, of a problem-oriented approach to patient care, of the use of computers in medicine, and of investigative attitudes and techniques.

The Annual Conference on the Kidney, which he edited from 1950 to 1967, reflected the best of basic and clinical research progress in those years and remains a hallmark of journalistic excellence. As a leader and catalyst in the development of the Nephrosis Foundation, which evolved into the National Kidney Foundation and the American Society of Nephrology, he helped to lay the foundation for current professional and patient education.

1994 Bindya S. Singh
1995 Genie E. Roosevelt
1996 Raghavendra Rao
1997 Howard M. Katzenstein
1998 Rajeev Dixit
1999 Jennifer L. Kloesz
2000 Gregory Dalshaug
2001 Lisa K. Kelly
2002 Nancy B. Aspey
2003 Gerhard C. Hildebrandt
2004 Aaron K. Olson
2005 Christopher Linblade
2006 Todd D. Nebesio
2007 Nicholas Von Bergen
2008 Sundan Rajan
2009 Paul Mann
2010 Shaun Ashfield
2011 Dennis Slagel
2012 Brian Stansfield
2013 Lauritz Meyer
2014 Sophia Patel
2015 Jean Dinh
2016 Kyle Sabey
2017 Awarded at the MWSPR Meeting
The William Segar Award

The William Segar Award was initiated in 2012 to be given annually to a student, resident or fellow trainee with a hypothesis driven clinical research or behavioral/social or education project that involves innovative improvement in patient care delivery.

Dr. Segar's father was the first pediatrician to practice in the state of Indiana. Bill would earn both his BS (1944) and MD (1947) from Indiana University. Dr. Segar has long been an advocate for trainees and had served the MWSPR well as its 5th President and 2nd Founder’s Award winner. Dr. William E. Segar was one of the 38 people who attended the first meeting of the Midwest Society for Pediatric Research in Iowa City on October 27, 1959. He was present for the first business meeting and voted on the bylaws of the Society. He became the 5th president of the MWSPR in 1965. He was an active member and organizer of the Salt & Water Club, an active group that met adjacent to the MWSPR.

Together with Dr. Malcolm Holliday, he developed Holliday-Segar equation for calculating fluid therapy. Other than his time in the US Army at Walter Reed Medical Center, he trained and practiced medicine exclusively in Pediatric Departments within the MWSPR territory, University of Indiana, University of Illinois, Mayo Medical School, and finally the University of Wisconsin, where he became Chair of Pediatrics. This award is sponsored by Friends of William E. Segar.

2012       Carl Backes, MD  
2013       Shawna S. Shafer, MD  
2014       Emma Austenfeld  
2015       Brock Medsker, MD  
2016       David Segar, MD  
2017       Awarded at the MWSPR Meeting
Cleveland Clinic Award

The Cleveland Clinic awards Student Award is given for the most outstanding abstract presentation by a trainee at a level prior to postgraduate training or residency. The Cleveland Clinic has long supported the role of medical, graduate, undergraduate students, and even high school students in the MWSPR and provides ongoing support for this award.

2001 Anthony Ratanproeksa
2002 Liza Cadnapaphornchai
2003 Karen Wiseman
2004 Emily Segar
2005 Amy Hurst
2006 Christopher Lux
2007 Keri Drake
2008 Christa Pittner
2009 Katie Meyer
2010 Emily Peterson
2011 Jeremy Sandgren
2012 Brandon Downing
2013 Richard C. Godby
2014 Micaela Zywicki
2015 Raymond Kreienkamp
2016 Matthew Murtha
2017 Awarded at the MWSPR Meeting
The Stanley Phillips Award

Awarded for the best poster or posters at the MWSPR meeting. This award is named after Stanley Phillips III, a first year neonatology fellow at University of Wisconsin, who died during a transport in 2013 from a terrible ambulance accident. Dr. Phillips was a kind and compassionate physician, whom loved caring for ill newborns. He was looking forward to his research career and presenting at the MWSPR meeting. However, his research and clinical career was cut short. In the short time as a fellow, he was admired as an enthusiastic, inquisitive, thoughtful and caring physician. This award is sponsored by Meriter Foundation and University of Wisconsin Department of Pediatrics, Neonatology Division.

2013 Frances A. Boyle
2013 BreAnn Sheehan, MD
2014 Michael Thompson, MD
2015 Michael Thompson, MD
2016 Kristin Kan, MD, MPH
2017 Awarded at the MWSPR Meeting
The Founder’s Award

The Founder’s Award is the highest honor given by the Midwest Society for Pediatric Research to a senior member in recognition of contributions made in the development of the careers of academic pediatricians and in the advancement of pediatric research. Since 1986, this award has recognized some of the leaders in our field of pediatric research and academic medicine.

Mead Johnson Nutritionals has generously provided an honorarium and plaque to the recipients during an awards luncheon held in honor of the recipient.

1986    Samuel J. Fomon, MD
1987    William E. Segar, MD
1988    Orville C. Green, MD
1989    Ira M. Rosenthal, MD
1990    Jean Holowach-Thurston, MD
1991    William Weidman, MD
1992    Reginald D. Tsang, MD
1993    Rosita Pildes, MD
1994    Dharmapuir Vidyasagar, MD
1995    Fred G. Smith, MD
1996    Gunner B. Stickler, MD
1997    Dorothy J. Becker, M.B.B.Ch.
1998    Laurence A. Boxer, MD
1999    Robert T. Hall, MD
2000    Sherin U. Devaskar, MD
2001    Edward S. Ogata, MD
2002    Jean E. Robillard, MD
2003    Frank R. Greer, MD
2004    Robert P. Kelch, MD
2005    John A. Widness, MD
2006    James E. Heubi, MD
2007    Edward F. Bell, MD
2008    William E. Truog, MD
2009    Avory A. Fanaroff, MD
2010    Michael K. Georgieff, MD
2011    Juan F. Sotos, MD
2012    Alan H. Jobe, MD, PhD
2013    Howard Kilbride, MD
2014    Margaret K. Hostetter, MD
2015    Jeffrey Segar, MD
2016    Francis Sessions Cole, III, MD
2017    Valerie Opipari, MD
Officers and Council Members
2017

President
Jeffrey Segar, MD (2016-2017)
University of Iowa Children’s Hospital

Past President
Heather Bartlett, MD (2014-2017)
University of Wisconsin College of Medicine

President-Elect
Laura S. Haneline, MD (2016-2017)
University of Iowa Children’s Hospital

Secretary
Patrick Brophy, MD (2014-2019)
University of Iowa Carver College of Medicine

Treasurer
Noah Hillman, MD (2016-2020)
Cardinal Glennon Children's Hospital

Council Members (three-year term)

Michelle Baack, MD (2017)
University of South Dakota

Carl Backes, MD (2017)
Nationwide Children's Hospital

Neal Blatt, MD (2018)
University of Michigan

Sarah Haskell, DO (2018)
University of Iowa Hospital and Clinic

Steven Olsen, MD (2018)
Children’s Mercy Kansas City

Josh Petrikin, MD (2017)
University of Missouri-Kansas City

Anna Petryk, MD (2017)
University of Minnesota Amplatz Children's Hospital