Department of Pediatrics Research Day

Abstract Book

June 1, 2018



School of Medicine and Public Health UNIVERSITY OF WISCONSIN-MADISON

RESEARCH DAY FRIDAY, JUNE 1, 2018 HSLC 1335

FRIDAY, JUNE 01, 2018

12:30 – 1:00 PM	Lunch			
HSLC 1335	Lunch			
1:00 – 3:00 PM	Oral Presentations			
HSLC 1335	(see below)			
3:00 – 5:00 PM	Poster Reception (with light hors d'oeuvres)			
HSLC Atrium	Residents, Fellows, and Faculty			

ORAL PRESENTATIONS				
1:00 – 1:30 PM	Introduction and Welcome from Keynote			
	Megan A Moreno, MD, MSEd, MPH			
1:30 – 1:45 PM	Maternal Stress and Depression Are Associated with Development of a High- Wheeze, Low-Atopy Phenotype in Their Young Offspring			
	Sima Ramratnam, MD			
1:45 – 2:00 PM	Treatment of Positive Urine Cultures in the NICU – A Potential Source of Unnecessary Antibiotic Exposure			
	Daniel Gorski, MD			
2:00 – 2:15 PM	Reduced ED Visits and Hospitalizations from Medical Device Complications After Enrollment in Complex Care			
	Christina Barreda, MD			
2:15 – 2:30 PM	Treatment of Infant Formula with Patiromer Dose Dependently Decreases Potassium Concentration			
	Neil Paloian, MD			
2:30 – 2:45 PM	The AFCH PEWS Scoring Tool: How Are We Doing After Ten Years?			
	Nicole Kamps, MD			
2:45 – 3:00 PM	Symptom Scores and Frequency of Upper Respiratory Infections in Children Diagnosed with Acute Bacterial Sinusitis			
	Gregory DeMuri, MD			
3:00 – 5:00 PM	Poster Reception (with light hors d'oeuvres)			

RESIDENT ABSTRACTS

AN EXPLORATION OF INCIDENCE, EXACERBATING FACTORS, AND TREATMENT OF SICKLE CELL DISEASE IN MBALE, UGANDA Christina E. Amend; Nicole St. Clair; Peter Olupot-Olupot

Background: Sickle cell disease (SCD) can cause significant lifelong morbidity and mortality, with the greatest burden of affected patients (>75%) in Sub-Saharan Africa (SSA). In Uganda, 20,000 babies per year are born with sickle cell disease. There are well-established guidelines for the management of SCD in high-income countries (HIC), but minimal guidance is available for children with SCD living in low- and middle-income countries (LMIC). It is not feasible to apply HIC guidelines to the majority of patients in LMIC settings due to limitations in diagnostic and therapeutic resources as well as variable patient demographics. Development of LMIC-specific guidelines for SCD patients has been hindered by insufficient knowledge of the SCD population in LMIC settings (including true disease prevalence, co-morbidities, and demographic factors).

Purpose: To define the SCD population that required hospitalization at Mbale Regional Referral Hospital in Eastern Uganda in order to better target interventions.

Methods: Retrospective chart review of children hospitalized for SCD to better characterize their presenting crises and potential associations/exacerbating factors.

Results: Charts were reviewed from 86 children hospitalized for sickle cell crises. Most children were under 9 years old (78%), the most frequent crisis leading to hospitalization was pain (62.8%), and sepsis and malaria were the most common associations. Children were rarely documented to be on prophylactic medications with only 5 on malaria prophylaxis, 4 on folic acid, and 2 on hydroxyurea. Complicating these results is that the data is likely incomplete due to inconsistent and difficult to obtain charting.

Conclusions: To create LMIC-specific guidelines, it is imperative to first characterize SCD and its presenting complications in LMIC settings to better target feasible interventions to improve the health and well-being of SCD-affected children. A future intervention will be to create and implement a chart-based template for SCD patients seeking advanced healthcare at Mbale Regional Referral Hospital in Eastern Uganda that will offer more clarity on SCD patient demographics, co-morbidities, and management options with an ultimate goal of creating scalable guidelines for the chronic and acute management of children with SCD in LMIC settings.

SORENESS POTENTIATES THE EFFECT OF TRAINING LOAD ON INJURY RISK IN FEMALE YOUTH ATHLETES

Thomas Devries; Andrew Watson

Purpose: To determine whether soreness influences the relationship between training load (tl) and injury risk in female youth athletes.

Methods: 75 female soccer players (age 13-18) were monitored for 1 year, including 10 months of competition. TI was recorded as session-rating of perceived exertion and every morning participants rated their soreness from -3 to +3 (lower meaning worse). Injuries resulting in lost time were recorded. TI and soreness were aggregated daily as group averages. Days were initially grouped by soreness (high, low) by median split and injury incidence was compared between the groups. Days were then grouped by tl (low, moderate, high) using z-scores and injury incidence was compared between soreness groups within each tl group. Finally, a multivariable poisson regression was used to predict the number of daily injuries throughout the study period, using soreness and daily tl as covariates.

Results: 48 injuries were recorded on 41 days. Injury incidence did not differ between days with high (better) or low soreness ($0.42 \pm 0.7 \vee 0.23 \pm 0.5$ injuries/day, p=0.18). Days with low soreness had significantly increased injury incidence when tl was high ($0.51 \pm 0.7 \vee 0.29 \pm 0.6$ injuries/day, p=0.038), but not when tl was moderate ($0.13 \pm 0.3 \vee 0.10 \pm 0.3$ injuries/day, p=0.72) or low ($0.073 \pm 0.3 \vee 0.038 \pm 0.2$ injuries/day, p=0.72). After inclusion in the multivariable model, injury incidence was significantly and independently predicted by both tl (or=2.14, 95% ci: 1.7-2.8, p<0.001) and soreness (or=0.47, 95% ci: 0.25-0.97, p=0.03).

Conclusion: Among female youth soccer players, soreness potentiates the risk of injury when tl is high, but does not appear to influence injury risk when training loads are low or moderate.

Significance: Monitoring of soreness and tl may allow for more appropriate exercise prescription to reduce the risk of injury.

THE NATURAL HISTORY AND DIAGNOSIS OF COARCTATION REQUIRING SURGICAL INTERVENTION

Alexandra Erdmann; Andrea Rock; Shardha Srinivasan; John Hokanson

Background: Coarctation of the aorta is a common congenital heart condition, affecting 4 per 10,000 live births. Despite continuing advances in early diagnosis of congenital heart disease, including prenatal ultrasound and postnatal universal pulse oximetry screening, the timely diagnosis of coarctation remains challenging. Even when suspected, a definitive diagnosis of coarctation may be difficult to confirm in the immediate newborn period. Our aim was to describe the current natural history of coarctation requiring surgical intervention.

Methods: Children from 0 to 18 years of age who underwent surgical repair for coarctation between 1/1/2012 and 12/31/2017 were included in this study. We performed a retrospective chart review of their course to diagnosis and eventual surgical repair, including prenatal imaging, pulse oximetry screening, and postnatal echocardiograms. Children were classified based on the time of initial concern; fetal, neonatal, or late diagnosis. Late diagnosis was defined as clinical suspicion raised after discharge from the hospital following birth. We also reviewed these patients' associated cardiac and noncardiac diagnoses.

Results: A total of 62 children (69% male) were included. In this cohort, 15 (24%) were identified prenatally, 20 (32%) diagnosed while still hospitalized following birth, and 27 (44%) were late diagnoses of coarctation. Of the 33 children with documented pulse oximetry screening, 24 passed (73%). 45% required more than one postnatal echocardiogram before a definitive diagnosis of coarctation was confirmed (Table 1). 15 (24%) had surgical repair at less than one week of age, 22 (35%) between 7 and 30 days, 13 (21%) between 1 month and 1 year, and 12 (19%) between 1 and 11 years. 42 children were repaired with an end-to-end anastomosis, 18 underwent arch reconstruction, 1 required an interposition graft, and 1 attempted repair by interventional catheterization followed by end-to-end anastomosis. Of these patients, 27 (44%) had bicuspid aortic valves, 11 (18%) had ventricular septal defects, 7 (11%) had persisting left-sided superior vena cavae, 3 (5%) had atrioventricular canal defects, and 2 (3%) had transposition of the great arteries. Significant non-cardiac disease was present in 16% of patients (10/62), including 4 children with trisomy 21, 3 with multiple congenital anomalies, and 1 each with VACTERL, Kabuki Syndrome, and Turner syndromes. There were 2 postsurgical deaths, 1 attributed to SIDS and the other secondary to non-cardiac complications of the child's underlying genetic syndrome.

Conclusions: Early diagnosis of coarctation remains a significant challenge despite improved fetal imaging and universal congenital heart disease screening.

Table 1. Echocardiographic Confirmation of Suspected Coarctation

Time of First Concern for Coarctation	Patients (n = 62)	Diagnosis Confirmed on First Postnatal Echo	Diagnosis <u>Not</u> Confirmed on First Postnatal Echo	Inconclusive Echocardiograms Mean±SD (Range)	
Prenatal Concern	15	7 Patients	8 Patients	1.87±2.45 (0-7)	
Neonatal Concern	20	7 Patients	13 Patients	1.7±1.89 (0-6)	
Late Diagnosis	27	20 Patients	7 Patients	0.78±2.39 (0-12)	

INTERACTIONS BETWEEN RISK FACTORS FOR IRON DEFICIENCY IN NEWBORNS

Jennie Godwin; Sharon Blohawiak, Pamela Kling

Background: Iron deficiency (ID) continues to be the most common nutritional deficiency worldwide with potentially irreversible effects on long-term neurodevelopment. Half of the iron needed in infancy is acquired before birth. Most iron is normally accreted during the third trimester. Eight historical and medical risk factors (RF) for ID in early infancy are established: prematurity, small or large for gestational age (SGA, LGA), multiple gestation, maternal anemia, maternal diabetes, maternal obesity, maternal minority status, and maternal Medicaid. Although these RF are established, less is known about the interactions between RF. Understanding these interactions could identify infants most at risk for ID and establish recommendations for early intervention with iron supplementation.

Objective: To compare cord blood measures of iron status to number of RF in a large dataset and determine interactions between RF.

Methods: This observational study of a 780 member cohort was compiled from several smaller, IRB approved, prospectively collected datasets from a diverse population of mothers and their newborns delivered at UnityPoint Meriter Hospital. Each dataset included historical RF, as well as cord blood measures of zinc protoporphyrin/heme ratio (ZnPP/H) and plasma ferritin.

Results: As the number of RF rose, the ZnPP/H increased (p<0.0001) and ferritin fell (p<0.0001). Beyond 0-1 RF the ZnPP/H rose by 28 µmol/mol and remained constant through 5+ RF. Ferritin fell on average 27.3 µg/L for each additive RF. In univariate analyses either prematurity or a hypothesized RF, maternal preeclampsia, had the strongest individual impacts on ZnPP/H (p<0.0001) and ferritin (p<0.0001). In multivariate analysis preeclampsia was highly interrelated with prematurity. Both being premature (p<0.0001) and SGA (p<0.02) negatively impacted iron measures, with an additive interaction between these RF (p<0.02). In term infants diabetes impacted iron (p<0.0001), with an additional interaction with LGA status (p<0.025).

Conclusions: In this combined dataset, iron status was poorer with 2+ RF, with prematurity being the most dominant single RF. Premature infants, with a shortened third trimester, have an insufficient iron endowment, especially those SGA. At term, iron status is worse in the setting of maternal diabetes and LGA status. It is important to understand how these historical RF interact to determine those at greatest risk for developing ID and potentially implement early intervention.

RISK FACTORS AND SOCIOECONOMIC INDICATORS OF IRON DEFICIENCY ANEMIA IN CHILDREN UNDER 5 YEARS OF AGE IN RURAL IMO STATE, NIGERIA

Jennie Godwin; A. Nwaba; A. A. Nwaba; Victoria Rajamanickam; K. Mezu-Nnbue; E. Esenwah; N. Ikoro; Olachi Mezu-Ndubuisi

Background: Iron deficiency is the most common childhood nutritional deficiency and hematologic disease worldwide. Rural Southeastern Nigeria has a high prevalence of childhood anemia associated with severe malnutrition and chronic illness. We hypothesized that children in this population have low dietary iron intake associated with anemia and that there is poor general knowledge of anemia in the community.

Objective: To determine prevalence and knowledge of anemia and assess dietary iron intake in children < 5 years of age in rural Nigeria to identify modifiable health risk factors associated with iron deficiency.

Methods: Out of over a hundred children in attendance, 35 children, under 5 years old, were randomly selected in a cross-sectional study at the Mezu International Foundation annual community medical outreach following Institutional Review Board approval from a collaborating local institution, Federal University of Technology, Owerri, Imo State, Nigeria. A questionnaire was administered to caregivers addressing socio-economic status (SES), dietary iron intake, and knowledge of anemia. All participants received medical exams by licensed physicians. Hemoglobin (Hgb) was measured with a hemoglobinometer and anemia was defined as a Hgb < 11.0 g/dl, with severity of anemia stratified as mild (10.0-10.9 g/dl), moderate (7.0-9.9 g/dl), and severe (<7.0 g/dl) per WHO standards.

Results: There were 12 males (34%) and 23 females (65%). In the cohort, 54% were anemic (17% mild (n=6), 29% moderate (n=10), and 8.5% severe (n=3)). Hgb (mean±SD) was 8.1 ± 2.1 g/dl in children < 1 year old (n=7) and 10.6 ± 1.8 g/dl in children 1-4 years old (n=28). There was a significant association between age and diagnosis of anemia (P=0.02). In the study cohort, 34% were currently breastfeeding (71% < 1 year old). There was a positive correlation between hemoglobin levels and amount of dietary iron intake (r=0.36, P=0.03). All patients (100%) had a middle SES score. When surveyed, 82% of caregivers did not know the meaning of anemia and 94% did not know causes of anemia.

Conclusions: Despite middle-income status, families surveyed had poor knowledge of anemia. Children with lower dietary iron intake and breastfed infants <1 year old were more anemic than older children. An educational program incorporating recommendations for sustainable local iron-rich dietary options for both children and breastfeeding mothers could aid in alleviating the burden of iron deficiency anemia in this community.

TREATMENT OF POSITIVE URINE CULTURES IN THE NICU - A POTENTIAL SOURCE OF UNNECESSARY ANTIBIOTIC EXPOSURE Daniel P. Gorski; Adam S. Bauer; Matthew W. Harer

Background: Urinary tract infection (UTI) incidence in the neonatal intensive care unit (NICU) ranges from 0.1 to 1%. The generally accepted pediatric definition of UTI is >50,000 colony forming units (CFU) of a single organism on catheterized culture or 10,000-50,000 CFU with pyuria on urinalysis (UA). Obtaining a neonatal catheterized urine culture can be technically difficult and the potential for contaminated urine culture is high. We hypothesize that the diagnosis of UTI in our NICU is clinician-dependent and not based on the accepted pediatric definition of UTI.

Objective: To describe variation in the clinical diagnosis of UTI in a level III NICU.

Methods: A retrospective cohort review from a single-center 26-bed NICU was performed between 11/2015 and 02/2017. Demographic data was collected from the electronic medical record for all neonates with urine cultures. A positive urine culture was defined by any bacterial growth and UTI was diagnosed at the discretion of the treating clinician. Pyuria was defined as >5 WBC per high-powered field. Hydronephrosis grading defined by the Society of Fetal Urology criteria.

Results: 909 neonates were admitted to the NICU during the study period and 116 urine cultures were obtained from 79 neonates. Of 38 positive urine cultures, 26 were treated for UTI (in 20 unique neonates) resulting in an incidence of 2.9% (26/909) (Table 1). Straight catheterization was the most common technique used to obtain cultures (91%, 106/116). Of the positive urine cultures treated for UTI, only 23% (6/26) met the accepted pediatric definition. UA was obtained in 54% (14/26) of UTIs while only 29% (4/14) had pyuria. For UTIs not meeting the definition, 132 total days of antibiotics were administered (8.25 days/patient). E.coli was the most common pathogen (42%, 11/26, Figure 1). Renal ultrasound was obtained in 90% (18/20) of neonates treated for UTI and all had hydronephrosis (14/18 SFU Grade II; 4/18 SFU Grade I or trace). Of neonates with hydronephrosis, voiding cystourethrogram was obtained in 72% (13/18) and only 3 displayed evidence of vescicoureteral reflux.

Conclusions: Our UTI incidence is greater than previously reported NICU studies. Most UTIs failed to meet the current pediatric UTI definition and potentially contributed to 8.25 days per patient of unnecessary antibiotic exposure. A uniform UTI definition is needed in the NICU population and prospective studies comparing culture methodology and standardized definitions are needed.

PERINATAL AND EARLY-LIFE MICROBIOTA CHANGING RISK FACTORS MAY IMPACT CELIAC DISEASE

Alexis Gumm; Daniel O'Connell

Background: Celiac disease (CD) is an immune mediated enteropathy affecting approximately 3 million Americans caused by a permanent sensitivity to gluten in genetically susceptible individuals. It is unknown what, if any, specific earlylife events predispose one to develop the disease. There is limited data looking at multiple perinatal and early-life influences in a single cohort and the later development of CD, which was the aim of this study.

Methods: A retrospective chart review was conducted on two hundred 0-18 year old children diagnosed serologically and by endoscopy with CD from a large academic health system. Data was obtained from those children, as well as two hundred controls. The following perinatal and early-life events were obtained from the chart review: mode of delivery, maternal antibiotic exposure, feeding history, antibiotic exposure and environmental factors.

Results: Of the 200 children diagnosed with CD, 91 met the inclusion criteria and were compared to 84 sex and agematched children without CD. Median age at diagnosis was 10 years old, and 56% were female. Family history of CD and animal exposure were statistically significant in patients with CD. See full table for all results.

Conclusions: This retrospective chart review was able to identify family history of CD and animal exposure as specific early-life influencers that could predispose one to developing CD. This study was limited by information available in the electronic health record so certain conclusions, such as exposure to maternal antibiotics and formula exposure, could not be drawn. Future larger, prospective studies could collect and compare more data, potentially identifying an influencer this study was unable to find.

TABLE:

Perinatal and Early-Life Microbiota Changing Risk Factors

	Celiac Disease N (%)	Control N (%)	Odd Ratio (95% CI) for Celiac Disease vs Control	p-value
Family History of Celiac Disease	25 (38)	2 (3)	14.62 (3.33-64.10)	<0.00001
Cesarean Birth	38 (79)	45 (66)	1.94 (0.88-4.55)	0.1267
Maternal Antibiotic Exposure	11 (26)	14 (25)	1.04 (0.41-2.63)	0.9346
Rural	24 (27)	27 (33)	0.75 (0.39-1.45)	0.3947
Farm Exposure	3 (3.3)	3 (3.7)	0.89 (0.18-4.54)	0.8954
Animal Exposure	46 (51)	28 (35)	1.93 (1.04-3.57)	0.0346
Smoke Exposure	11 (12)	13 (16)	0.73 (0.31-1.72)	0.4719

THE AFCH PEWS SCORING TOOL: HOW ARE WE DOING AFTER TEN YEARS?

Nicole Kamps; Megan Peters

Background: Early identification of critically ill patients improves both morbidity and mortality by allowing for early intervention or escalation of care. The Brighton Pediatric Early Warning Score (Brighton PEWS) is a validated and widely used illness-severity assessment tool in pediatric hospitals, though since its development and publication in 2005, several hospitals have adapted the original tool to fit their institution's needs. The American Family Children's Hospital (AFCH) at the University of Wisconsin also employed a modified PEWS (AFCH PEWS) score that adds a point for certain patient characteristics such as oncology diagnosis, congenital heart disease, NG/G-tube present, transferred from PICU, or need for oxygen at home. The objectives of this study are to compare the performance of the AFCH PEWS score to published reports of the Brighton PEWS (AUROC 0.798, 73.6%/88.5% and 38.9%/93.9% sensitivity/specificity for score greater than 3 and 5 respectively). The findings of this needs assessment will inform future directions for an ongoing quality improvement project pertaining to the use of the AFCH early warning scoring tool.

Methods: We performed a retrospective chart review of 107 pediatric patients hospitalized on the general care wards of AFCH that had a Rapid Response Team request for evaluation by the pediatric critical care team between January 2017 and June 2017. We collected the AFCH PEWS and abstracted Brighton PEWS scores based on patients' recorded vital signs and appearance at the time of the RRT. Specificity, sensitivity, and area under the receiver-operating curves were calculated for both AFCH and Brighton PEWS scores.

Results: The AUROC for AFCH and Brighton PEWS scores for pediatric patients housed in the general care wards was 0.56. Optimal threshold for predicting transfer to the PICU was 5 for the AFCH score (sensitivity 46%, specificity 69%) and 4 for the Brighton score (sensitivity 49% and specificity 67%).

Conclusions: The AFCH PEWS score was not more sensitive or specific than the Brighton PEWS score. Overall, the use of either score did not perform as well as previous reports in predicting clinical deterioration of pediatric patients requiring escalation of care. We did not evaluate for inter-rater reliability, which could be a contributing factor to the scores' low performance and a potential area for quality improvement. Our current score also does not consider a patient's requirement for high-flow nasal cannula (HFNC), the use of which was only recently adapted in the general care units, which may also explain the lower than expected predictability for PICU transfer. Future directions may include assessing inter-rater reliability and reinforcing consistent use of the tool, updating the tool's modifications to include additional points for increased level of support, or evaluating the feasibility of adopting a more predictive score, such as CHEWS from Boston Children's Hospital, which was found to have an AUROC of 0.902 as compared to the Brighton PEWS AUROC of 0.798. We will initiate work with our multidisciplinary team to propose interventions aimed at the improvement of early identification of clinically declining patients at AFCH.

CONTINUITY IN RESIDENT CLINICS

Perry Krumenacher; Megan Neuman; Jens Eikhoff; John Frohna; Tina Childs

Background: Continuity clinic provides residents a unique opportunity for long term patient relationships. The recent literature offers limited information on resident continuity with patients, including resident perceptions, continuity rates, and factors associated with continuity. At our midsized academic pediatric training program, resident clinic sites vary in their appointment templates and scheduling processes.

Purpose: To assess resident perceptions of continuity and identify whether clinic volumes, post-graduate (PG) year, or clinic site were associated with improved continuity

Methods: A mixed model of qualitative resident surveys and quantitative billing data was used. 3 classes of recent graduates plus the current senior residents completed a survey, including value of continuity and how much they experienced it. Billing data from clinic visits over two academic years was examined, with 49 residents at 7 clinic sites providing 11,944 visits. Continuity was defined as percent of patients who had seen the resident previously in the study time period. Logistic regression analyses were conducted to evaluate the effects of clinic visit volumes, PG year, and clinic type on continuity rates.

Results: 32 of 44 residents (73%) completed the survey, with 23 (72%) listing continuity as "somewhat" or "very important," but only 6 (19%) felt they had patient continuity every week. The average annual continuity rate was 16% (7-27%); for residents with 2 years of data, the continuity rate was 22% over 2 years (10-35%). Overall, there was no significant correlation between visit volume and continuity rates (rho=0.18, p= 0.45); but when analyzed by PG year, PG3 continuity had a weak positive correlation (rho=0.33, p=0.095) with volume. Continuity rate did not vary among PG1s, PG2s and PG3s (annual rates of 17%, 15%, and 17% respectively). The continuity rate was higher for residents with their own clinic schedules when compared to those working off their preceptors' schedule (23% vs 20%, p=0.012).

Conclusions: Residents value continuity in clinic, but achieving patient continuity is challenging. The literature describes that higher clinic volumes contribute to continuity, although in our study that was true only for senior residents, who may have more well-established relationships. Schedule type did statistically significantly affect continuity. Next step for our program will be to look at consistency of clinic weekday as a factor affecting continuity. These findings will inform ongoing program and clinic-level improvements to this essential aspect of resident training.

IS TYPE 1 DIABETES MELLITUS MORE PREVALENT IN ADOLESCENTS DIAGNOSED WITH GENDER DYSPHORIA?

Santhi Logel; M. Tracy Bekx; Jennifer Rehm

Background: Type 1 diabetes mellitus (T1DM) often presents during childhood, with an estimated prevalence of 1.9-2.4 per 1000. The prevalence of transgender identity is difficult to quantify but has been estimated to be 0.06 per 1000 adults and 0.07 per 1000 youth in the United States. A local estimate found 0.15 per 1000 of high school students identify as transgender. Currently, there is no known association between T1DM and gender identity. However, a recent adult study found a 2.3-fold higher prevalence of T1DM in a transgender population seen at an outpatient endocrinology clinic within a university hospital. Objective: To determine the prevalence of adolescent patients seen at our university hospital with the diagnosis of T1DM and gender dysphoria (GD).

Methods: A retrospective chart review was conducted at the University of Wisconsin Hospitals and Clinics from 11/1/2007 to 11/1/2017. Inclusion criteria included age 10-21 years, problem list diagnosis of T1DM (E10.*), and problem list diagnosis of GD (F64.*). Prevalence rates were calculated for each diagnosis.

Results: Records were available for 749,284 individual patients age 10-21 years during the review period. Prevalence rates of T1DM and GD are in Table 1. A diagnosis of both TIDM and GD was found in 5 patients, resulting in a prevalence of T1DM diagnosis in 15.87 per 1000 of patients with a diagnosis of GD, 5.9-fold higher than the prevalence of T1DM in the same pediatric population.

	Gender Dysphoria (F64.*)	Type 1 Diabetes Mellitus (E10.*)
Number	315	2017
Prevalence per 1000	0.42	2.69

Table 1. Prevalence of patients age 10-21 years with diagnosticcodes for GD and T1DM

Conclusion: Compared to the previous studies mentioned above, there was an increased prevalence of adolescents who had a diagnosis of gender dysphoria and a significantly increased prevalence of those patients also with a diagnosis of T1DM. While results of an EMR review should be interpreted with caution, these findings coincide with the adult study that found a higher prevalence of T1DM in patients seen in a transgender clinic. A possible explanation for these findings is that patients with T1DM have more frequent exposure to health care and have established a trusting relationship with their pediatric endocrinologist. As such, these patients may feel comfortable discussing gender identity with their health care team and are therefore more likely to have sought medical care related to gender identity.

A MULTIDISCIPLINARY APPROACH TO PEDIATRIC OBESITY SHOWS LASTING IMPROVEMENT IN BMI Z-SCORE POST-INTERVENTION

Kristen Marten; Jennifer Rehm; Aaron Carrel; David Allen; Cassandra Vanderwall

Background: Obesity affects 17% of American children and requires lifelong intervention. Multidisciplinary clinic-based treatment programs have shown promising effects in the short-term, but the ability to maintain this change after the intervention is not well studied.

Objective: The purpose of this study was to determine the posttreatment outcomes of children seen in a multidisciplinary (physician, dietician, and exercise physiologist) pediatric obesity clinic (MPOC).

Methods: We performed a retrospective chart review using the MPOC database, which included all clinic patients seen from January 2008 to August 2016 (n=634). Patients with a minimum of two clinic visits were included and one and two year post-treatment data (n=470) using electronic health records were obtained. Our primary outcome was the absolute change in BMI Z-score (BMIZ) from the final MPOC clinic visit compared to one and two years post-intervention. Multivariate regression analysis was performed to characterize probability of response and predictors of change in BMIZ.

Results: MPOC patients were diverse and ranged in age from 3 to 18 years [Table 1]. Among participants, mean BMIZ decreased significantly during intervention (-0.13 +/- 1.47, p <0.001), and was maintained at 1 and 2 years post-intervention [Table 2] [Figure 1]. Mean BMIZ significantly decreased in participants between ages three to five years following intervention and a further reduction was seen again at 1 year post-intervention (-0.27 +/- 0.26, >0.001). Patients with a significant decrease were younger or had a higher BMI at time of referral with no difference between race, ethnicity, gender, type of insurance, or number of visits.

Conclusions: Outpatient intervention for pediatric obesity at a multidisciplinary clinic was effective in reducing or stabilizing BMIZ even beyond MPOC visits, particularly when patients were referred at an early age. Future studies will compare patients with similar age and BMI who received intervention in the MPOC with those who did not. Although primary prevention continues to be the ideal management, dedicated obesity specific intervention is successful in long-term treatment of pediatric obesity.

CONGENITAL HEART DISEASE MANAGEMENT IN TRISOMY 13 AND 18: A SURVEY OF PEDIATRIC CARDIOLOGY PROVIDERS Kevin A Pettit; John Hokanson

Background: During the past decade, the care of patients with Trisomy 13 (T13) and Trisomy 18 (T18) has continued to evolve, with trends in the literature indicating that intervention for these patients remains controversial but is increasingly considered. Studies, limited by small sample size, selection bias, and intent to treat, have found conflicting evidence as to whether procedural management of cardiac defects in patients with T13 and T18 improves survival time. Best practices for these patients are not well defined, and the aim of this work is to identify current perspectives and practices of pediatric cardiology practitioners.

Methods: A survey was sent to all members of the AAP Section on Cardiology and Cardiac Surgery. Respondents were asked whether, presuming that a patient with T13/T18 could breathe spontaneously and family requested treatment, they would consider specific catheter interventions or Risk Adjustment for Congenital Heart Surgery (RACHS) category interventions to be appropriate. Other questions focused on provider perceptions regarding T13/T18 quality of life, decision making, goals of care, and measures of care such as extracorporeal membrane oxygenation (ECMO).

Results: A total of 60 respondents participated, for a response rate of 15%. Most were non-interventional pediatric cardiologists (73%). Respondents skewed male (75%), were likely to work in a university hospital system (72%), and had a mean of 18.6 years in practice (median 20 years). Although there was some variation, over half of respondents indicated that, with the exception of PDA stenting, each catheterization procedure addressed by the survey was appropriate for T13/T18 patients. Respondents were less likely to indicate that a catheterization was appropriate as procedural risk and complexity increased (figure 1). Most providers felt that RACHS 1 and 2 surgical interventions were appropriate in T13/T18 patients. Perception of appropriateness for surgical intervention fell for RACHS 3 and thereafter (figure 2). Only 1 respondent (2%) indicated that ECMO is sometimes reasonable in T13/T18 patients prior to cardiovascular intervention, while 8% felt that ECMO is sometimes appropriate after interventional catheterization and after cardiovascular surgery. Almost half (49%) of respondents reported that T13/T18 patients have a poor quality of life, while 41% felt that T13/T18 patients can have a fair quality of life. Most respondents felt very comfortable (55%) or somewhat comfortable (34%) in helping to make decisions with T13/T18 patients. Participants indicated that the respiratory status of patients affects (37%) or may affect (32%) their recommendation for intervention.

Conclusions: Overall findings demonstrate variability amongst provider perspectives pertaining to the care of patients with T13/T18. However, trends exist regarding the appropriateness of specific interventions based on intervention complexity and risks.

FORMULA SUPPLEMENTATION AND BARRIERS TO EXCLUSIVE BREASTFEEDING IN INFANTS BORN VIA CAESAREAN SECTION

Ashley Przybilla; Megan Neuman; Nicole Baumann-Blackmore; Elizabeth Goetz

Background: Breastfeeding rates have been gradually increasing over the years in the United States. In 2016, 81.1% of women had ever breastfed, but only 44.4% were exclusively breastfeeding at 3 months of age. Infants born via caesarean section are more likely to receive formula supplementation than infants born by vaginal delivery. Formula supplementation is done for a variety of reasons, however, there can be some undesired effects of formula supplementation, including alterations in the infant's gut microbiome, decreased maternal milk supply and decreased duration of breastfeeding. The purpose of this study is to investigate the reasons for formula supplementation in newborn infants and identify any possible barriers to exclusive breastfeeding in infants born via C-section. Methods: We conducted a single-center retrospective chart review of all infants >37 weeks gestation, born via C-section from July 1st, 2017-September 30th, 2017 at Meriter Hospital in Madison, WI. Rates of formula supplementation versus exclusive breastfeeding were evaluated. Characteristics and trends among births were compared, including formula supplementation rates, size for gestational age, reason for formula supplementation and maternal and infant risk factors. Results: A total of 225 neonates were reviewed during the study period. Of those studied, 45% of infants received formula supplementation and 55% were exclusively breast fed during admission. Infants who were noted to be small for gestational age (SGA) were supplemented 78% of the time, whereas infants who were appropriate or large for gestation age (AGA and LGA) were only supplemented 44% and 45% of the time, respectively. Infants born between 37-38 weeks gestation were supplemented 60% of the time, while infants born at 39-42 weeks were only supplemented 39% of the time. Maternal time of admission prior to delivery was also assessed, showing supplementation rates of 38% for mothers admitted for less than 12 hours prior to admission and 58% for mothers admitted more than 13 hours. The amount of maternal IV fluids received prior to delivery showed supplementation rates of 42% for mothers who received less than 2 Liters of IV fluids and 54% for mothers who received more than 2 Liters. The most common reason for formula supplementation was parental choice (51%), followed by weight loss (23%) and hypoglycemia (16%). The average weight loss prompting formula supplementation was 10.7%. No associations were seen between primigravida status and formula supplementation.

Conclusions: We found that increased rates of formula supplementation were associated with infant risk factors, including SGA and younger gestational age, in addition to maternal risk factors, including increased administration of maternal IV fluids and length of maternal admission prior to delivery. The most common reason for formula supplementation was parental choice, suggesting a possible role for increasing education around benefits of exclusive breastfeeding.

ISLAMOPHOBIA AND MENTAL HEALTH DISCLOSURES ON SOCIAL MEDIA AMONG MUSLIM TEENS

Anisha Rimal; Megan Moreno

Background: The mental health implications for Muslims in the U.S. in the current sociopolitical climate are currently understudied. The growing tide of Islamophobia has marked consequences for the mental health of young Muslim Americans. The purpose of this study was to understand the opinions and experiences of Muslim teenagers regarding Islamophobia expressed online and inform efforts to provide mental health resources for this specific population.

Methods: In this two-part study, content analysis was conducted to evaluate both a sample of youth online posts on Tumblr, a popular microblogging and social networking website, and online resources for mental health directed at Muslim Americans. First, our Tumblr search included four hashtags for a sample of 25 posts each: "Islamophobia"; "Islamophobic"; "Islam"; "Muslim." Inclusion criteria for posts: the writer of the post identified as a Muslim American under the age of 20. Selected posts were evaluated using a codebook focused on four constructs including: "sadness"; "stress/stressed"; "bully/bullied"; "harass/harassed".

Second, Mental health resources were identified via Google search for terms "Mental Health Muslim USA". Inclusion criteria included educational, public health and nonprofit organization websites. Our target sample was ten websites to evaluate for mental health resources directed at youth. Reliability assessment on a 10% subset of posts and pages showed interrater agreement at 90%.

Results: In our 100 Tumblr posts, Table 1 describes frequencies across categories. We found that fear/scared was most common across the different hashtags, though up to a quarter of posts on most hashtags were categorized as sad/sadness. Additionally, over half of the posts under both the "Islamophobic" and "Islamophobia" hashtags included at least one of the selected keywords.

Of the ten websites evaluated, four of those websites had resources that were directed towards American Muslim youth. The organizations that provided these resources were: Institute for Muslim Mental Health, Family and Youth Institute, Muslim American Society-Social Services Foundation and The Khalil Center. The websites had links to videos, workshops and toolkits for parents and community leaders to help provide a framework of support for Muslim youth in the community. There were no resources designed to directly engage Muslim youth through these organizations.

Conclusions: Evaluation of Tumblr posts among Muslim teens indicated that a high percentage of teens disclosed information that indicated feelings of sadness and fear that resulted from incidents of Islamophobia that they have experienced. There are limited mental health resources that engage Muslim youth, indicating that further research and efforts are needed in this area.

FEVER IN INFANTS: ASSESSING VARIABILITY IN SEPSIS EVALUATION

Kathryn Schmit; James Conway; Ann Allen

Background: Fever is a common presentation of infants resulting in frequent medical visits. Since fever may be the sole sign of invasive bacterial infection (IBI) in infants less than 3 months of age, invasive testing is often performed. Many physicians are guided by standardized criteria, which were created to aid in determining those at low risk of IBI. Though these criteria exist, there is limited guidance regarding appropriate testing in the first 90 days. An American Academy of Pediatrics national quality improvement collaboration, Reducing Excessive Variability in Infant Sepsis Evaluation, is standardizing management of these infants. We evaluate current institutional practice in assessing febrile infants.

Methods: Retrospective chart review of well-appearing previously healthy term infants with no obvious source of fever on initial examination between the ages of 0-90 days presenting with documented or reported fever to either a tertiary emergency department or inpatient hospital, with specific International Classification of Diseases codes over 1 year period. The infants were then separated into three groups: 0-28, 29-60 and 61-90 days.

Results: Of 83 infants meeting criteria, 10% had serious bacterial infection (SBI) with 75% of these being urinary tract infection. Evaluation with complete blood count (CBC), blood culture, urinalysis (UA) and urine culture varied between groups from 84%, 87% and 29% respectively. Within this latter group, 75% were underimmunized. CBC results were abnormal in 64% of all infants with leukopenia the most common abnormality. Of those with SBI and where CBC was obtained, 50% had leukopenia and 50% had normal white blood cell (WBC) count. UA collection differed between the groups from 88%, 87% and 68% and lumbar puncture attempts performed in 84%, 30% and 4%. CXR was obtained in 27% of infants and all were negative; 40% of these infants that underwent imaging were asymptomatic.

Conclusion: Most criteria rely on leukocytosis to identify high risk for IBI; infants with IBI in this study had leukopenia or normal WBC counts. Sepsis evaluation in febrile infants varies tremendously and an updated guideline for identifying IBI could minimize unnecessary imaging, laboratory testing and unwarranted antibiotic therapy.

PEDIATRIC MUSCULOSKELETAL INFECTION CLINICAL PRACTICE GUIDELINE

David Shafique; Kenneth Noonan; James Conway; Kara Gill; Katherine Le; Sabrina Butteris; Derrick Chen; J. Muse Davis; Mary Jean Erschen-Cooke; Sheryl Henderson; Michael Kim; Kirsten Koffarnus; Jie Nguyen; Jodie Ritchie; Humberto Rosas; Lucas Schulz; Dan Sklansky; Lindsey Spencer; Lianne Stephenson; Josh Vanderloo

Background: Children with musculoskeletal infections can vary substantially in their clinical presentation as well as their treatment. Location of infection, age of the patient, and causative organism may all lead to patients having variable workups to identify the source of their complaint. This workup, however, is not always efficient which may delay diagnosis or result in testing that is not medically necessary. The increasing prevalence of antimicrobial-resistant pathogens that may result in a more complicated clinical course makes prompt diagnosis critical.

Aims: To develop a guide for the diagnostic testing of children with suspected musculoskeletal infections to help reduce time to diagnosis, reduce cost, improve coordination of any required procedures, and increase antibiotic stewardship.

Methods: A workgroup with members representing Pediatric Hospitalist Medicine, Pediatric Emergency Medicine, Pediatric Orthopedics, Pediatric Radiology, Pediatric Anesthesiology, and Pediatric Infectious Disease was convened to develop a standardized evaluation of children with suspected musculoskeletal infections.

Members of the workgroup offered their clinical experience and expert opinion to develop recommendations. Current literature was reviewed by members of the workgroup to aid in arriving at a consensus for guidelines. An algorithm was developed based on the results of discussions of the workgroup.

Summary: 1) A streamlined algorithm for the diagnosis and management of musculoskeletal infections exists as a Clinical Practice Guideline on UConnect. 2) Regular use of the protocol may help decrease morbidity and mortality associated with musculoskeletal infections

Next steps: Evaluating time to diagnosis, time to definitive treatment, and length of hospital stay both 1 year prior to implementation of the Musculoskeletal Infection Protocol and 1 year after implementation may be useful metrics in assessing success of the protocol.

COMPARING RATES OF ED DISPOSITION BETWEEN AFTER-HOURS PHONE TRIAGE PROVIDERS

William Stanford; John Frohna

Background: After-hours phone triage systems field thousands of calls each year and provide a crucial role in providing safe and effective medical advice when offices are closed. Oftentimes, referral to the ED is necessary, which places significant financial and social stress on families and on an already overcrowded emergency department. It remains unknown if the level of training affects the rate of ED disposition. The purpose of this study was to compare the rates of ED disposition between providers taking after-hours phone triage calls in a pediatric primary care setting.

Methods: In this retrospective chart review, telephone notes from nurses, 1st year pediatric (intern), and 3rd year pediatric (senior) residents were reviewed from 10 general pediatric clinics. Chief complaint, caller relation to patient, age, date, provider type, disposition, and hospital admission were recorded. Rates of emergency department referral were compared using chi squared analysis.

Results: A total of 1,463 phone notes (883 intern, 365 senior, 215 nurse) out of 2,785 calls were reviewed. Only nurse calls with an ED disposition were reviewed due to the volume of nurse calls received during the study period. The mean age of patients was 3.9 years (range 0-28 years) and the mother was the caller 81% of the time. ED disposition was recommended 13.7% of the time by interns, 10.1% by seniors, and 9.76% by nurses. There was a significant difference (p=0.015) between resident (intern plus senior) and nurse referral to ED as well as intern and nurse (p=0.003), but not between nurses and senior (p=0.83) or senior and intern (p=0.085). There was no statistical difference between admission rates among provider types.

Conclusion: We found that residents overall recommended patients go to the ED more often than nurses, but when broken down, this was true only when comparing interns to nurses. These findings suggest that more experience contributes to decreased ED disposition recommendations. Further studies could incorporate interventions performed in the ED to see if acuity differed between provider types.

DOCUMENTATION OF ADRENAL INSUFFICIENCY AND THE NEED FOR STRESS STEROIDS IN CHILDREN WITH OPTIC NERVE HYPOPLASIA

Jennifer Szmanda; Ellen Connor

Background: Optic nerve hypoplasia (ONH) is a rare disorder in the pediatric population, but has many associated

endocrine abnormalities, some of which may be life threatening if left unrecognized. One of the most important of these is adrenal insufficiency (AI). Stress steroids can be life-saving if administered to children with AI in times of illness or injury; however, it is often difficult for providers to know of this requirement. The problem list in the electronic medical record (EMR) is a common way to alert providers of medical diagnoses. **Objective:** The purpose of this study was threefold. First, to ascertain if children diagnosed with ONH had appropriate

testing for AI. Second, to determine if those with AI had current prescriptions for stress steroids. Third, to see if the EMR problem list clearly showed that stress steroids were indicated in times of illness or injury.

Methods: In this retrospective EMR review, patient records with one of seven ICD-9 or ICD-10 diagnosis codes that included "other eye disorders" or "nervous system congenital anomalies" were selected from patients seen in the pediatric endocrine clinic of a medium-sized children's hospital between 2007 and 2016. Inclusion criteria were patients ages 0-18 who were diagnosed with ONH by Ophthalmology. EMR was reviewed for appropriate testing for AI: ACTH stimulation test. A diagnosis of AI was made if stimulated cortisol was <18 mcg/dl. For those with AI, it was noted if there was a documented plan for stress-dosing in the problem list and a current prescription for stress steroids.

Results: 112 individual patient charts were identified as eligible, and 61 met inclusion criteria. Of these 61 patients with ONH, 44 (72%) had AI testing documented, and 36 of 44 (82%) tested positive for AI. Of the 36 patients with AI, 31 of 36 (86%) had a current stress steroid prescription, but only 12 of 36 (33%) documented the AI status and need for stress steroids in the problem list.

Conclusions: We found that clinicians were sufficient in prescribing stress steroids to nearly all patients with ONH

and adrenal insufficiency, but only $\frac{3}{4}$ of the time documented testing for AI. Furthermore, clinicians were unsatisfactory in using the problem list to alert providers of the need for life-saving stress steroids if required. These findings suggest that even though the EMR problem list is a common way to alert providers of medical diagnoses, physicians do not consistently use this tool to document adrenal insufficiency and the need for stress steroids.

Implementation of Nitrous Oxide Program in a Pediatric Emergency Department

Diane Vu; Katherine Bakewell; Danielle Babb; Nicholas Kuehnel; Michael Kim

Background: Nitrous oxide is a medication that has been widely used for anxiolytic and analgesic effects in minor procedures requiring sedation. We examined the introduction, use, and documentation of pediatric nitrous oxide sedation over the first 14 months in the University of Wisconsin American Family Children's Hospital academic pediatric emergency department. The goal was to identify any gaps with data documentation in our first year of nitrous oxide sedation, working towards better understanding nitrous oxide sedation use and efficacy in our pediatric ED.

Methods: Over a 14 month period (from September 2016 to October 2017), all 75 patient cases of nitrous oxide sedation in the pediatric ED were reviewed in the medical record. Prior to this, nitrous oxide sedation training was done through a 1 hour didactic hands on session with 4*** pediatric emergency medicine physicians, 6 nurses, and 3 child life specialists that ended with a 21 question post-session exam. Nitrous oxide was administered solely by physicians and is ordered outside of the standard ED sedation order set. We reviewed documentation from the patient's entire ED stay including medication administration records (MAR), notes from physicians, nursing, and child life specialists, which was gathered into an Excel flowsheet. Excel flowsheet data included gender, age, procedure, maximum flow of nitrous oxide, duration of administration, adjunct medications, procedure success or failure, sedation success or failure, and complications.

Results: There were a total of 75 pediatric nitrous oxide sedation cases documented, 23 female patients, 52 male with ages ranging from 1-19 years old. Mean age was 8.7 years old. Procedures included 34 orthopedic reductions, 9 foreign body removals, 9 lacerations, 8 IV starts/ IM injections, 3 lumbar punctures, 3 G-tube placements, 2 nail procedures, 2 genitourinary exams, 1 dressing change, 1 wound evaluation, 1 knee tap, 1 urine catheterization, and 1 incision and drainage. Maximum nitrous oxide flow was 70%, but only 38/75 cases had max flow documented. 59/75 cases had documentation for duration of sedation. Only 1 case was less than or equal to 2 minutes and it was not a successful sedation due to patient being unable to tolerate face mask. 8 cases lasted from 3-5 minutes, 16 cases lasted from 6-10 minutes, 13 cases lasted from 11-15 minutes, 14 cases lasted from 16-20 minutes, and 7 cases lasted greater than 20 minutes. 61/75 patients received adjunct medications that ranged from topical local anesthesia to opiates. 17 patients received midazolam in addition to nitrous oxide, 12 patients received LET/LMX, 19 received a lidocaine or proparacaine block in addition to nitrous oxide, and 32 received opiates (fentanyl, morphine, and/ or oxycodone) in addition to nitrous oxide. 18 patients received one or more adjunct medications. Procedural success was found in 67/75 cases with 8 noted failures. Sedation success or failure was determined by descriptive documentation from nursing, child life, and physicians. It was determined that there were 59/75

sedation successes and 16 failures, about 78.6% success rate. There were no reported complications (nausea, emesis, SpO2 <94%, apnea or new agitation) from nitrous oxide sedation in any cases.

Only 35/75 charts had complete documentation for our Excel flowsheet data, making complete documentation only 47%. There were significant gaps in documentation of nitrous oxide maximum flow and duration of sedation. There was no clear area for documentation of adjunct medications, procedure success/ failure, or use of specific metrics to determine adequate sedation or level of distress in patient. There is a standardized procedure note imbedded in physician documentation, but it was not consistently used and IV starts or IM injections were not included in this documentation.

Conclusions: Our review shows that there is still considerable lacking in nitrous oxide sedation documentation in the first year of its use. We would benefit from developing a more standardized and complete documentation of nitrous oxide sedation in our pediatric ED, keeping in mind goals of feasibility within a busy ED department. A pediatric nitrous oxide sedation order set would be useful to incorporate nursing flowsheet documentation and physician orders together. The flowsheet should include timeline data about whether patient passed initial nitrous oxide screening, duration of sedation, nitrous oxide flow percentages, O2 stop time (after nitrous oxide completion), sedation scoring, vitals, adjunct medications and complications. Sedation success is an important measure that we have not addressed well and it will be useful to consider a validated sedation score in future documentation to be used in the duration of sedation. When we are able to gather more complete metrics, we can begin to analyze whether nitrous oxide sedation is a significantly beneficial addition to our pediatric ED and which patient populations most benefit.

FACULY/FELLOW ABSTRACTS

SCHOOL SAFETY AND SUPPORT FOR TRANSGENDER YOUTH WITH NON-BINARY VS. BINARY GENDER IDENTITIES

Brittany Allen; Jennifer Rehm; Ben Andert; Jay Botsford; Stephanie Budge

Background: Transgender, non-binary, and gender nonconforming (TNG) youth are at significant risk of school victimization and violence, including increased risk of harassment and feeling unsafe at school. TNG youth are a heterogeneous group, and non-binary youth have lower mental health scores and increased self-harm when compared with transgender youth with binary (male/man or female/woman) identities. Little is known about school safety and belonging for non-binary youth.

Objective: This project compares the school safety and support experiences of binary and non-binary TNG youth in Wisconsin. **Design/Methods:** We conducted an online survey of TNG youth ages 12-22 in Wisconsin that included assessment of school experiences. We compared responses among youth who reported non-binary identities with those with binary identities using nonparametric Wilcoxon rank sum tests to compare Likert scale response patterns.

Results: 319 TNG youth completed more than 75% of the survey. Of those, 287 identified either binary (164; 57%) or nonbinary (123; 43%) gender identities. Respondents with nonbinary identities were more often Caucasian/White (81.4% vs. 65%, p=0.003, chi squared) and less likely to qualify for free lunch (27.9% vs. 55%, p=0.001, chi squared) than transgender youth with binary identities. Both binary and non-binary groups reported similar school attendance and belonging. However, non-binary youth reported significantly higher ratings of school safety and peer support and were more likely to report being able to access adult support if needed (Table).

Conclusion(s): While absolute differences were small, nonbinary youth felt significantly safer and more supported at school than transgender peers with binary identities. This contrasts with work showing increased mental health challenges for non-binary youth. This may due to the relative racial and socioeconomic privilege of non-binary compared to binary youth in our study. However, this could also represent differences in day to day navigation related to gender identity. Non-binary youth may feel agency in their identity being outside of a restrictive binary, while binary transgender students meet resistance accessing binaried peer groups and spaces at school. Overall, our data suggests that transgender youth with different gender identities may have different school support and safety needs, with transgender youth with binary identities at highest risk.

ENGAGING CLINICIANS TO DOCUMENT PATIENT/FAMILY-CENTERED GOALS IN THE ELECTRONIC HEALTH RECORD (EHR) PROBLEM LIST: A TWO-PHASE QUALITY IMPROVEMENT (QI) PROJECT

Gail Allen; Karen Pletta; Sanjeev Jain; Bradley Kerr; Megan Moreno

Background: Addressing obesity (BMI>95%) in primary care is challenging due to time constraints and the perception that clinic management is often ineffective. Brief motivational interviewing (MI) has shown positive results for obesity and is recommended by the American Academy of Pediatrics.

Objective: In this two-phase QI project, the leadership of 8 general pediatric clinics, with 46,000 medically-homed patients, and an overweight/obesity EHR registry, aimed to increase the use of MI to develop patient/family-centered (PFC) goals for children with obesity and to document in the goal section of the EHR problem list.

Design/Methods: Phase 1: General pediatric system leaders arranged training in MI for all pediatricians and nurses and set expectations to document goals during well-child checks for all patients with obesity ages 2-18 years. Phase 2: Based on poor Phase 1 results, clinicians in one clinic were asked to select a new target population. They chose to broaden the BMI parameters to BMI> 85% (overweight and obese) and to narrow the age group to 2-5 years. Phase 2 included refreshers on goal documentation, and utilized the registry to add a reminder on the daily patient schedule. Comparisons were done with McNemar's Chi-square test.

Results: Phase 1: After 18 months, across 8 clinics, 177/3566 (5%) of children with obesity ages 2-18 years had a goal in the EHR problem list. Phase 2: After 3 months, for overweight and obese children ages 2-5 years in the Phase 2 clinic, the percent of children with a goal in the problem list increased from 21/234 (9%) to 30/234 (13%) (p=0.1). Over the same period, for obese children ages 2-18 in the Phase 2 clinic, PFC goals in the problem list increased from 11% (55/523) to 21% (124/583) (p<0.001).

Conclusion(s): In Phase 1, when system leadership chose the target population, meager progress was made in documenting goals for children of all ages with obesity. In Phase 2, when clinicians chose the target population for their clinic, progress was made on the new target of goals for overweight and obese young children, and the work spilled over to the older age group such that the phase 2 clinicians made more progress toward the Phase 1 goal of documenting goals for children 2-18 years with obesity. Clinician ownership of the initiative was critical. Once engaged, clinicians exceeded their expectations to develop PFC goals in well-child checks and to document those goals in the EHR problem-list.

NON-INVASIVE ASSESSMENT OF EFFECTIVENESS OF RESUSCITATION AFTER CARDIAC ARREST IN A SWINE VENTRICULAR FIBRILLATORY ARREST MODEL

Awni Al-Subu; Timothy Hacker; George Ofori-Amanfo; Marlowe Eldridge

Introduction: Survival and outcomes after cardiac arrest (CA) depend largely on the effectiveness of cardiopulmonary resuscitation (CPR). Invasive blood pressure and cardiac output (CO) monitoring provide an accurate means of assessing effectiveness of chest compressions. However, most patients lack invasive monitoring at the time of CA and resuscitation. Validated non-invasive assessment of CO and effectiveness of CPR could be an essential management tool in CA and resuscitation.

Hypothesis: Cerebral regional saturations (C-rSO2) and renal regional saturations (R-rSO2) using near-infrared spectroscopy (NIRS), and Volume of Carbon Dioxide Elimination (VCO2) using volumetric capnography, will correlate with cardiac output during open cardiac massage after ventricular fibrillatory cardiac arrest in swine model.

Methods: Eight mechanically ventilated juvenile swine underwent 28 ventricular fibrillatory arrests with open cardiac massage. CPR was initiated within 1 minute after losing pulse pressure. Epinephrine and amiodarone were administered as per PALS guidelines and cardiac massage was administered to achieve target pulmonary blood flow (PBF) as a percentage of pre-cardiac arrest baseline. Non-invasive data, including, VCO2, end tidal carbon dioxide (EtCO2), C-rSO2I and R-rSO2 were collected continuously. Invasive hemodynamic data to assess CO included PBF, carotid blood flows and invasive BPs were collected continuously as well. ECG was monitored and CPR was ended upon return of spontaneous circulation (ROSC).

Results: Our data demonstrate the ability to measure both rSO2 and VCO2 during CPR and after ROSC. With onset of cardiac arrest, there was a sudden decrease in EtCO2, VCO2, R-rSO2 and C-rSO2 by 17.1, 25.9, 20.4, and 24.3% respectively. During CPR, EtCO2 and R-rSO2 had moderate correlation with CO, measured as a percentage of baseline PBF, with correlation coefficient of r 0.63 and 0.41 respectively. However, C-rSO2 had weak correlation with CO. A sudden increase by 10% or more in EtCO2, VCO2, R-rSO2, and C-rSO2 indicated ROSC in 92.6%, 85.2%, 70.4% and 55.6% of the experiments respectively. After ROSC both R-rSO2 and VCO2 had strong and statistically significant correlation with CO with r =0.63 (p<0.001) and r=0.60 (p<0.001) respectively.

Conclusions: Measurement of continuous EtCO2 and R-rSO2 may be used during CPR to ensure effective chest compressions. Moreover, both rSO2 and VCO2 may be used to guide management after ROSC in a swine ventricular fibrillary arrest model.

ESTROGEN RECEPTOR ALPHA DEPENDENT NEUROTROPHIN MEDIATED LONG TERM NEUROPROTECTION FOLLOWING NEONATAL HYPOXIA AND ISCHEMIA

Katharine M. Amborn; Dila Zafer; Vishal Chanana; Damla Hanalioglu; Molly Serebin; Kaylyn Freeman; Makaia Frober; Margaret B. Hackett; Peter A. Ferrazzano; Pelin Cengiz

Background: Neonatal hypoxic ischemic encephalopathy (HIE) is one of the major causes of learning disabilities and memory deficits in children. Male neonatal brains are two times more vulnerable to the effects of HIE. We recently reported that HIE increases hippocampal estrogen receptor alpha (ERa expression leading to neuroprotection only in the female mice hippocampi through crosstalk with the neurotrophin receptor, tyrosine kinase B (TrkB). Phosphorylation of the TrkB via its agonist, 7,8-dihydroxyflavone (7,8-DHF) decreases apoptosis and improves long-term neurological outcome when assessed with MWM test only in female mice. We hypothesized that knocking down of ERa will ablate the sex differences seen in 7,8-DHF mediated long-term neuroprotection following neonatal HIE.

Methods: HI was induced in P9 B6/C57 ERa wild type (WT) and ERa knock-out (KO) mice by using Vannucci's HI model. Recognition and object location memories were assessed at P60+ by novel object recognition (NOR) and location (NOL) tests. Following handling and habituation, each animal was trained by freely exploring two identical objects for 10 min in an open maze. After 22 h, mice were subjected to testing for 10 min by replacing one of the familiar objects with a novel object or novel location. The time spent exploring each object was recorded. Then the discrimination ratio (time spent with novel object divided by total time spent with both objects) was calculated and analyzed between the groups using ANOVA (mean ± SEM).

Results: HI decreased the discrimination ratios for both NOR and NOL tests in ERa WT male ($\% 28 \pm 2$ and $\% 23 \pm 3$) and female ($\% 28 \pm 9$ and $\% 28 \pm 4$) mice compared to sham WT male ($\% 72 \pm 5$ and $\% 55 \pm 6$) and female ($\% 68 \pm 4$ and $\% 71 \pm 12$) mice (p < 0.001), respectively. HI induced decline in recognition and location memory were recovered by 7,8-DHF therapy only in ERa WT females for both NOR and NOL tests, respectively [$\% 64 \pm 6$ and $\% 67 \pm 4$, (p < 0.001)]. 7,8-DHF therapy failed to improve the discrimination ratios for both NOR and NOL tests in ERa KO female and male mice (p < 0.001).

Conclusion: TrkB agonist 7,8-DHF improves the long-term recognition and location memories only in female WT mice in an ERa dependent way following neonatal HIE. Sex differences seen in 7,8-DHF therapy-mediated recovery in object recognition and location memories are ablated in ERa KO mice.

GENDER DIFFERENCES IN PEDIATRIC RESIDENCY PERSONAL STATEMENTS

Jessica Babal; Aubrey Gower; John Frohna; Megan Moreno **Background:** Over 4,500 female and 2,400 male medical graduates write personal statements each year as part of an application to pediatric residency programs. Past studies using text analysis report that women tend to be more relationshipfocused and use more personal pronouns in writing. However, it is not clear how gender differences in writing style, tone, and content extend to personal statements for residency or pediatrics specifically.

Objective: To evaluate gender differences in writing style, tone, and content in pediatric residency personal statements

Design/Methods: We randomly selected and de-identified personal statements from 100 medical students (72 females, 28 males) applying to a university-based pediatrics residency in 2014 and 2015. We used validated text analysis software, Linguistic Inquiry and Word Count (LIWC), to evaluate sentence structure, writing style, and pronoun use. LIWC was utilized to examine content, including descriptors of external drives (achievement, social affiliation) and references to family, friends, money, religion, and death. During a pilot phase, confounding words and proper nouns that were inappropriately categorized by LIWC were removed prior to sample evaluation. Results: Average word count was 681.8 (SD=111.4) and words per sentence was 22.6 (SD=3.9). Words ≥6 letters comprised 27% of text (SD=3.5). Quotations were used in 0.28% of text by females and 0.5% of text by males (p= 0.006). There were no gender differences in degree of analytical writing (highly analytic per LIWC criteria, p=0.46); emotional tone (high positive emotion per LIWC criteria, p=0.28); personal pronoun use (p=0.32); or achievement- related terms (p=0.16). Language of affiliation (eg. social, friend, ally) was used in 3% of text by females and 2.3% by males (p=0.002). There were no gender differences in frequency of references to family, friends, money, religion, and death (p=0.37, 0.32, 0.58, 0.98, 0.64, respectively).

Conclusion(s): There were few gender differences in writing structure, style, and content of personal statements for pediatric applicants. Contrary to previous literature, gender differences in the use of personal pronouns were not found, but similar to prior reports, females were more likely to use relationship words. A less explored finding is that males used quotations more. These findings suggest that pediatrics attracts personality types that express themselves similarly in writing regardless of gender. However, emphasis on relationships may be more deeply embedded in cultural expectations for females.

TRACKING DOWN THE DEFINITION OF A GLOBAL HEALTH TRACK PRELIMINARY RESULTS OF A FORMAL CONSENSUS PROCESS

Heather Lukolyo; Adelaide Barnes; Maneesh Batra; Tania Condurache; Michael Pitt; Jeff Robison; Charles Schubert; Nicole St. Clair; Omolara Uwemedimo; Jennifer Watts; Christina Russ **Background:** Global health (GH) offerings by pediatric residency programs have increased significantly, with 1 in 4 programs recently indicating that they offer a GH "track". Despite the growth of these programs, there is currently no widely accepted standard definition for what comprises a GH track in residency. **Objective:** Achieve consensus on a GH track definition among a panel of pediatric GH resident education experts, including essential educational offerings, institutional supports, and outcomes to evaluate.

Design/Methods: A purposeful sample of 12 pediatric GH education experts representing a range of residency program and track sizes was assembled to work towards a consensus definition using the Delphi method. The panel of participants will complete three rounds of surveys requiring detailed responses to proposed definitions and components. Panelists work toward consensus by offering reasoned opinions in response to other participants' comments and objections. Consensus is defined by acceptance of a definition by 75% or more of participants. Additional elements will be evaluated using a 4-point Likert scale; average scores <1.5 will be considered areas of negative certainty and average scores >3.5 will be considered areas of positive certainty. An inductive approach was used to code qualitative responses and identify themes.

Results: One round of surveys has been completed thus far. Consensus on the definition of a GH track was not yet achieved during the first round of surveys; however, panelists indicated that a "longitudinal" and "formal" curriculum, as well as mentorship, are important components of the definition. Additionally, there was consensus that: at a minimum GH tracks should include pre-departure preparation, preceptorship during GH electives, post-return debrief, and scholarly output; institutions should provide resident salaries, malpractice insurance, and health insurance during GH electives; and finally, outcomes for evaluation should include cumulative scholarly work by track residents, input from global partners regarding the partnership impact and the visiting resident performance, and root analysis of adverse health and safety events experienced abroad by track residents.

Conclusion(s): Consensus on the definition of a GH track, along with institutional supports and educational offerings, is instrumental in ensuring consistency in quality GH education among pediatric trainees. Consensus on track outcomes for evaluation will help to create quality resident and program assessment tools.

REDUCED ED VISITS AND HOSPITALIZATIONS FROM MEDICAL DEVICE COMPLICATIONS AFTER ENROLLMENT IN COMPLEX CARE

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Background: Many children with medical complexity (CMC) depend on medical devices to support essential body functions. Complications from devices can lead to emergency department (ED) visits and hospitalizations, some of which may be preventable. Whether complex care programs can lower ED visits and hospitalizations related to device complications is not known.

Objective: Identify changes in ED visits and hospitalizations related to medical device complications among CMC enrolled in a complex care program.

Design/Methods: Retrospective cohort study of CMC enrolled in a pediatric complex care program (CCP) between 4/1/2014-4/1/2016. ED and hospital visits due to device complications were identified using a structured chart review protocol (3reviewer Kappa=0.92). Changes in ED visits and hospitalizations from device complications in the year before and year after enrollment were determined using paired t-tests. Reductions in device complication visits for CCP enrollees compared to a propensity-matched comparison group of non-CCP CMC were assessed with difference-in-difference estimates.

Results: The 99 CMC assisted by medical devices enrolled in CCP had median 2 devices (IQR 1-2). Gastrostomy tubes were most common (79%) followed by home oxygen (24%) and tracheostomy without mechanical ventilation (14%). Thirty-one CMC (32%) had at 1 least device-complication ED visit and 33 CMC (34%) had at least 1 device-complication hospitalization. Device complications accounted for a mean 0.6 hospitalizations/child (SD 0.97) and 0.7 ED visits/child (SD 1.27) in the year before enrollment. In the year after enrollment, hospitalizations for device complications decreased by 0.18 hospitalizations/child (95% CI 0.02-0.34), and ED visits for device complications decreased by 0.39 hospitalizations/child (95% CI 0.13-0.65). In difference-in-difference analyses, devicecomplication ED visits for CMC in CCP were reduced by 0.22 (95% CI -0.05-0.49) more than the propensity-matched comparison group. The largest reductions in ED visits between CCP and propensity-matched group were among those with gastrostomy tubes (0.29 fewer 95% CI 0.01-0.57).

Conclusion(s): Hospital and ED use due to device complications were common among CMC enrolled in a complex care program and decreased with time. Subsequent research should determine which visits reflect preventable utilization. Though reductions were observed across all device types, complex care programs may be particularly effective at lowering gastrostomy complications that lead to ED visits.

THE IMPACT OF A SCHOLARLY CONCENTRATION PROGRAM ON MEDICAL STUDENT RESEARCH

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Introduction: To promote scientific inquiry and development of research skills, medical schools encourage students to participate in faculty-mentored multi-week research programs. While the main goal is to stimulate and nurture students' passion for and ability to do independent research, productivity resulting in a publication is a desired outcome of students, mentors, and funding sources. Specific factors that contribute to manuscript publication in medical student research programs are not well understood.

Objective: To study the overall student manuscript publication rate in the University of Wisconsin (UW)-School of Medicine and Public Health medical student summer research program between 2002-2017.

Design/Methods: This quality improvement project analyzed characteristics of student enrollees and mentors, and the number of student-mentor research publications identified through a PubMed search at student graduation. We examined the impact of the following variables on publication rate: 1. Student/mentor gender, 2. Type of research, 3. Primary departmental affiliation of mentor, 4. Previous mentor experience within the program.

Results: The program enrolled 1085 medical students who selfselected mentors from any UW department, with 9% (n=99) chosing mentors in Pediatrics. The ratio of male/female enrollees was 56%/44% and male/female mentors was 69%/31%. Enrollee research categories included basic science 282 (26%), public/global health 228 (21%) and clinical 575 (53%). Clinical research included 52% surgical (n=525) and 48% medical (n=484). Publication data were compiled for 607 who were post-graduation, with an overall publication rate of 11.8% (0.55 publications/student). In Pediatrics, 36.5% published (0.39 publications/student). Male students (p=0.028), experienced mentors (p=0.001) and clinical research projects (p=0.029) produced more manuscript publications. However, males selected more experienced mentors than females (p=0.013). Multivariate analysis indicated an experienced mentor was a stronger predictor of publication than student gender (p=0.002 vs. 0.026) or than mentor male gender (p=0.009 vs. 0.195).

While the productivity of medical students depends upon several factors, most importantly is selection of an experienced mentor. Future goals will be to better train less experienced mentors, potentially co-mentoring, to enhance both the training of and productivity of medical student researchers.

FACEBOOK ALCOHOL REFERENCES AMONG FIRST YEAR COLLEGE STUDENTS ON GAME DAY

Kole Binger; Bradley Kerr; Marina Jenkins; Aubrey Gower; Megan Moreno

Background: Alcohol, used by 58% of college students, is involved in up to 1800 yearly deaths among this population. During college football games, consumption is heightened. The emergence of alcohol displays on Facebook during the first year of college may assist with detection and screening of risky drinking, yet it remains unclear if college football game days are associated with an increase in Facebook alcohol displays.

Objective: This study compared first year students' displayed Facebook alcohol references on college football game days to non-game days.

Methods: Participants for this secondary analysis were chosen from a longitudinal cohort study in which incoming freshman were randomly selected from registrar lists at two universities. The present study included participants who attended one university and displayed initiation or escalation of Facebook alcohol references in fall semester, defined below. Facebook alcohol displays were categorized as an Intoxication/Problematic Drinking display (I/PD) (e.g., reference to getting "drunk") or General Alcohol Display (e.g., reference to "beer"). Phone interviews were conducted after initiation (first alcohol reference) or escalation (display of first I/PD display) and included a 28-day TimeLine FollowBack. We compared number of Facebook alcohol references and selfreported number of drinks for each football game day and control day (non-game day Saturday's and Friday's before an away game) using Chi Square tests.

Results: A total 75 participants who were mostly male (55%), white (92%) and had an average age of 18 (SD=0.175), displayed an initiation or escalation. On average, 9.8% of participants posted an alcohol reference on a football game day and 5.1% on a control day (p=0.514). I/PD references were more common on game-days at 15.7% (n=33) compared to control days 12.5% (n=9) (p=0.032). Of the participants who reported drinking on a game day (n=158) the mean number of drinks was 5.95 (SD=0.799) and 5.54 (SD=1.310) for a control day (n=100).

Conclusion: We found that participants were more likely to post an Intoxication/Problem Drinking Facebook alcohol reference on a game day. However, participants were not more likely to post a Facebook alcohol reference and the average number of drinks met criteria for binge drinking, regardless of whether it was a control day or game day. These findings suggest potential use of Facebook alcohol references to aid in targeting prevention efforts on college football game days.

AGE-DEPENDENT DIFFERENCES IN MICROGLIA GENE EXPRESSION AND MORPHOLOGY IN RESPONSE TO HYPOXIA ISCHEMIA IN THE DEVELOPING BRAIN.

Jacob Bogost; Dila Zafer; Vishal Chanana; Pelin Cengiz; Peter Ferrazzano

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.

ACTIVITY RECOMMENDATIONS IN CHILDREN WHO HAVE HAD CARDIAC SURGERY

Jesse M. Boyett Anderson; Megan A. Moreno; John S. Hokanson **Purpose:** Clinicians, parents, and patients must decide which sorts of physical activity (recreational activities or sports participation) are most beneficial and safe for children who have had cardiac surgery and when these children should return to normal activities after cardiac surgery. Current recommendations are limited and tailored to the adolescent and young adult population.

Methods: We invited members of the Midwest Pediatric Cardiology Society to participate in an online survey of their current practice regarding physical activity recommendations in both the immediate post-surgical period and over the long term in patients 12 years of age and younger. Respondents were asked which resources they used in developing activity recommendations, when they recommended a return to normal activities after cardiac surgery, and which sorts of physical activity they would recommend for asymptomatic 8year-old children with varied cardiac histories (no known cardiac defect, repaired coarctation with normal blood pressure, Tetralogy of Fallot with good hemodynamic repair, single ventricle after Fontan, repaired VSD with implanted pacemaker, and mechanical valve anticoagulated with warfarin). Multiple choice, Likert, free-response, and vignettestyle questions were used.

Results: Forty six individuals completed the survey for a response rate of 9.6%. Most were male (69%), physicians (88%) practicing non-interventional cardiology (82%) with an average of 13 years in practice. While there were some areas of consensus in terms of long-term physical activity recommendations, recommended timing of return to normal activity following cardiac surgery was quite variable (see figure 1). Recommendations regarding long-term physical activity were also variable. While there was 100% agreement that children on anticoagulation should not participate in motorsports or sports with high risk of collision (such as football, hockey, and wrestling); 42% of respondents indicated they would also discourage participation in sports with a lower risk of collision, such as soccer, basketball, tennis or softball. Variability in provider recommendations persisted across patient populations (see figure 2).

Respondents indicated that they used patient testing (58%), symptoms (95%), and hemodynamics (100%); and weighed published guidelines (76%), institutional policies (67%), and the opinions of colleagues or experts in the field (73%) when formulating these recommendations.

Conclusions: Exercise and activity recommendations in the immediate post-surgical period and over the long term after pediatric cardiac surgery in children under the age of 12 years are quite variable, reflecting the absence of evidence-based guidelines for the management of these patients. Future studies should explore the basis of this variability and work towards a clearer understanding of the risks and benefits of various activity types and the timing of return to full activity in children who have had cardiac surgery.

SIN3A GENE MUTATIONS CAUSE DIAPHRAGMATIC HERNIA AND LUNG HYPOPLASIA 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 study the role of Sin3a transcriptional regulation on the developing diaphragm, lung, and pulmonary vasculature. **Method:** Using a tissue-specific, conditional knockout approach in a mouse model, we inactivated the expression of Sin3a in either the developing diaphragm or 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 due to failure of muscle migration. Furthermore we found that deletion of Sin3a in the developing lung mesenchyme results in lethal pulmonary hypoplasia and failure of alveologensis due to impaired development of the alveolar myofibroblasts.

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 required in the developing lung mesenchyme and that lung-specific deletion of Sin3a results in lethal pulmonary hypoplasia and failure of alveologenesis. These data support the model that genetic defects in patients with CDH can cause abnormal development of the lungs, independent of the associated diaphragm defect.

UTILIZING INSTAGRAM FOR SOCIAL MEDIA PROMOTION; A RESEARCH TEAM'S MODEL

Maggie Bushman

Social media promotion can boost an organization's success, however, techniques for a successful social media promotion for research teams remains unknown. The purpose of this study was to evaluate the use of SMPP by a pediatric research team on Instagram to increase user engagement. Instagram was selected for this study, as it is currently the fastest growing social media platform. Four different promotional campaigns were launched during spring semester 2018, including "Road to URS" and promotions for a summer research program. Engagement was measured after campaign completion by assessing the average number of likes per post. This study found that there was a significant increase in the average number of likes with the use of SMPP. This study will provide techniques utilized on Instagram for promotion and to provide research teams with a model for increasing user engagement.

EXTRACELLULAR VESICLES FROM BONE MARROW DERIVED MESENCHYMAL STROMAL CELLS INDUCES ANGIOGENESIS IN HUVEC THROUGH AKT DEPENDENT ENOS SIGNALING

Chandramu Chetty; Grace Swanson; G. Nelson; Rudolf K Braun; Vivek Balasubramaniam

Rationale: It has become clear that survivors of premature birth suffer from an arrest in lung development that is characterized by abnormalities in lung structure and function that persist into adulthood, known as Bronchopulmonary Dysplasia (BPD). There are currently no therapies for the arrest in lung development in BPD, nor an understanding of the mechanisms leading to a persistence of an arrest in lung development and compromised repair mechanisms that are seen in survivors of premature birth. We have previously shown that the treatment of neonatal rats with mesenchymal stromal cell (MSC) derived extracellular vesicles (EV) protect lung structure in neonatal mice during exposure to hyperoxia. We hypothesize that EV protection of lung structure is through induction of Akt/eNOS mediated angiogenesis.

Methods: We collected conditioned medium from rat bone marrow derived MSCs and isolated EV by standard protocol. To assess Akt activation HUVEC cells were treated with EV along with MK-2206, an Akt inhibitor (iAkt), and quantified phospho-Akt and phospho-eNOS levels. Functional effects of EVs were analyzed by in vitro tube formation and scratch assays (migration). There was an n=4 in each condition.

Results: Treatment with MSC derived EV induced Akt phosphorylation and in bi-phasic manner. At 8 hrs time point phosphorylation of Akt increased by $89\% \pm 68$ (p = 0.087). Yet EV treatment significantly increased in e-NOS phosphorylation by $78\% \pm 19$ (p = 0.002). Treatment with Akt inhibitor blocked EV induced Akt phosphorylation and down stream e-NOS activation. EV treatment increased tube formation by 75% (p<0.01). Akt inhibition blocked EV-induced tube formation. EV treatment increased HUVEC migration by 81% (p<0.01). Conclusion: Treatment with MSC derived-EV enhances HUVEC tube formation and migration. A mechanism for this may be through an increase in eNOS activation that is known to be a critical pathway for endothelial cell growth and function. This suggests that the effect of EV treatment may be through the enhancement or preservation of lung vascular growth that is known to be dysfunctional in hyperoxic injury of premature infants.

HOSPITAL DISCHARGE EXPERIENCES IN THE PLANS FOR ACTION AND CARE TRANSITIONS RANDOMIZED CLINICAL TRIAL

Ryan J. Coller; Maryanne Chumpia; Thomas S. Klitzner; Carlos F. Lerner; Lindsey R. Thompson; Bergen B. Nelson; Siem Ia; Mary L. Ehlenbach; Paul J. Chung

Background: In a pilot randomized clinical trial, the Plans for Action and Care Transitions (PACT) intervention reduced hospitalizations for children with medical complexity (CMC) by targeting key drivers of hospital use. PACT included proactive crisis planning, in-person caregiver coaching at discharge and both in-home and telephone follow-ups. Whether PACT improved caregiver discharge-related experiences and transition outcomes, however, is unknown.

Objective: To evaluate whether PACT participants reported more family-centered experiences, caregiver confidence, and primary care provider (PCP) follow-up post-discharge than usual care participants.

Design/Methods: Secondary analysis of a randomized clinical trial involving CMC enrolled in a complex care program from December 2014-September 2016. Caregiver experience was assessed through questionnaires within 3 days of discharge using a previously adapted Care Transitions Measure-3 (aCTM-3). Additional transition outcomes included confidence to avoid a 7-day emergency department visit or 30-day readmission, setting follow-up appointments prior to discharge, and attending scheduled PCP visits post-discharge. Intervention effects were examined with bivariate analyses.

Results: 147 English- and Spanish-speaking CMC < 18 years old were randomized to PACT (n=77) or usual care (n=70). Most patients were Hispanic, Spanish-speaking, publicly insured, and had mean 3.7 complex chronic conditions (SD 1.8). In intent-totreat analyses, discharges among PACT caregivers had aCTM-3 scores 5.6 points higher (95% CI 0.2-11.0) than those of usual care CMC. PACT caregivers more frequently reported being very confident to avoid either an ED visit in the week post-discharge (60% vs 39% following usual care discharges, P=0.01) or a hospitalization in the month post-discharge (49% vs 35%, P=0.08). Although discharges for PACT CMC were less likely to have appointments set prior to discharge, they were equally likely to have scheduled PCP visits in the month post-discharge. **Conclusions:** A health coaching intervention to support CMC caregivers at times of crisis and around hospital discharge improved measures of family-centeredness and caregiver confidence. These post-discharge caregiver experiences may have contributed to the reductions in hospital use observed in the PACT trial.

TRANSITIONING TO ADULT-ORIENTED INPATIENT CARE: PRIORITIES OF US CHILDREN'S HOSPITALS

Ryan J. Coller; Paul J. Chung; Sarah Ahrens; Mary L. Ehlenbach; Kristin A. Shadman; Mala Mathur; Kristin Caldera; Andrew LaRocque; Ann Sheehy

Background: Hospital use is greater when adults with childonset chronic conditions continue to be admitted to children's hospitals, and inpatient care is increasingly recognized as an important part of youth-adult transitions. Inpatient youth-adult transition research and clinical initiatives are hampered, however, by lack of an established set of inpatient transition processes.

Objective: To identify the most important and feasible inpatient transition activities, and to determine whether feasibility and importance ratings are associated with consistent performance of transition activities at US children's hospitals.

Design/Methods: National survey of inpatient general pediatric leaders at US children's hospitals during January-July 2016. Inpatient transition activities (n=21) were identified through multidisciplinary ideal-state process mapping. Respondents rated importance and feasibility of each transition activity using 5-point Likert scales. Exploratory factor analysis (EFA) combined highly correlated important or feasible activities into scales. Logistic regression examined associations between performing a transition activity and activity feasibility and importance.

Results: Ninety-six of 195 children's hospitals responded (49.2%). EFA produced 5 factors with similar item groupings across both feasibility and importance. Factors included 1) having an inpatient transition policy and identifying patients needing transition, 2) establishing provider agreement on timing, 3) assessing readiness and educating families, 4) planning, transferring and documenting, and 5) closing loops post-transition. One factor (having a policy and identifying patients needing transition) was both the most important (mean 4.4) and most feasible (mean 3.7). Feasibility factor scores were strongly associated with performing transition activities. Importance factor scores, however, were only weakly and inconsistently associated with performing transition activities.

Conclusions: US children's hospital leaders identified important and feasible transition processes. Based on high feasibility and importance, a top youth-adult healthcare transition priority should be developing policies and systems to identify patients needing inpatient transition. Importance alone, however, predicts actual uptake much less than feasibility. Concerted efforts to make the most important activities more feasible are likely needed for implementation to succeed.

SYMPTOM SCORES AND FREQUENCY OF UPPER RESPIRATORY INFECTIONS IN CHILDREN DIAGNOSED WITH ACUTE BACTERIAL SINUSITIS.

Gregory DeMuri; Ellen Wald

Background: Sinusitis is one of the most frequent complication of acute viral upper respiratory infection (URI) in children. The diagnosis of acute bacterial sinusitis depends on the use of clinical features to distinguish it from uncomplicated URI.

Objective: The aim of this study was to compare the severity of symptoms using a standardized symptom score in episodes of URI with episodes of acute sinusitis in children and to determine if children diagnosed with sinusitis experienced more frequent URIs.

Methods: Children 4-7 years of age were followed prospectively for 1 year. Parents were instructed to call study nurses at the first sign of upper respiratory symptoms. Weekly phone calls or text message reminders were made to parents to inquire about respiratory symptoms. Sinusitis was diagnosed based on established clinical criteria. A standardized symptom score was used to quantify symptoms on day 3, 7, 10 and 15 of illness.

Results: Symptom scores were obtained during 480 URI episodes and 37 sinusitis episodes. The mean symptom scores were 7.5, 3.5, 1.5 and 0.5 for URI episodes on day 3, 7, 10 and 15. The mean scores for sinusitis episodes were 8.7, 4.9, 7.3, 1.7 on days 3, 7, 10 and 15. The scores for sinusitis subjects were significantly higher than URI subject on day 3, 7, 10, 15 (p=0.01 for initial scores, ≤0.001 for days 7, 10 and 15). On day 7 of illness, 26% of URIs and 54% of sinusitis episodes had a symptom score over 4 (OR 2.0 CI 1.5-2.9, <0.0001). Day 3 symptom scores for sinusitis episodes where significantly higher for face pain, impaired sleep and reduced activity. Day 7 scores for sinusitis episodes were significantly higher for congestion, cough and nasal discharge but not for face pain or swelling, fever, headache, appetite, impaired sleep or reduced activity. 206 non-sinusitis and 31 sinusitis subjects completed 1 year of follow-up. The mean (mode) number of URIs during the one-year study period in non-sinusitis subjects was 1.7 (1). The mean (mode) number of URIs in the sinusitis subjects was 3.5 (3). The difference between the means was significant (<001). 12% of non-sinusitis subjects and 42% of sinusitis subjects had four or more URIs (RR=3.5 CI 2.0-6.0, <0.0001).

Conclusion: Symptom scores were higher in subjects with sinusitis on days 3, 7, 10 and 15 of illness than in patients with uncomplicated URI. The mean number of URIs in the one-year study period was higher in subjects who had sinusitis than in those with uncomplicated URI. In this study, sinusitis episodes were associated with more severe symptoms even before the diagnosis of sinusitis was made. Subjects who had sinusitis during the study period had a higher incidence of URI.

SOCIAL MEDIA USE AMONG PARENTS OF CHILDREN WITH MEDICAL COMPLEXITY: A QUALITATIVE STUDY

Mary Ehlenbach; Michelle M Kelly; Anne S Thurber; Nicole E Werner; Anna Jolliff; Gemma Warner; Nadejda L Doutcheva; Ryan J.Coller

Background: The use of social media (internet-based communication that enables information sharing, messaging and networking) is pervasive. Adults with chronic diseases increasingly use social media as a tool to manage their health. How parent caregivers use social media to support the care of children with medical complexity (CMC) is unknown.

Objective: To characterize parent caregiver use of social media to support the care of CMC enrolled in a pediatric complex care program.

Design/Methods: We conducted 10 semi-structured interviews with parent caregivers of CMC in their homes to understand how they provide daily care. Parents were recruited from a children's hospital-based pediatric complex care program. Three researchers performed directed content analysis of all references to social media in interview transcripts in an iterative process to identify themes related to social media use to support care.

Results: Of the 10 parents interviewed, 9 referenced social media use to support the care of their CMC. The social media platform Facebook is used primarily, but other online forums such as Pinterest, yahoo groups, and interactive blogs were also mentioned. Two themes regarding how parents used social media to support care emerged: information exchange and emotional support. Information exchange subthemes included: contributing to or acquiring information from the collective wisdom of online communities (e.g., recommendations for education strategies, diet/feeding plans and home design to accommodate the needs of CMC), contingency or crisis planning (e.g., organizing equipment, planning for post-surgical home care, and obtaining emergency equipment like a backup generator), and acquiring or trading medical supplies. Emotional support subthemes included: commiserating about the shared experiences of parents with CMC (e.g., challenges of employing in-home caregivers, sleep deprivation due to nighttime care, and frustration with health care experiences) and developing friendships or mentoring relationships through online communities.

Conclusion(s): Parents used social media in a variety of ways to support the care of their children with medical complexity. Including social media as an element of comprehensive care planning for CMC is likely important. Future interventions optimizing information exchange and emotional support through social media platforms may influence outcomes for CMC and their parents and enhance the experience of the social media communities.

PREDICTORS OF SUCCESSFUL EMERGENCY DEPARTMENT DIVERSIONS FOR CHILDREN WITH MEDICAL COMPLEXITY IN A COMPLEX CARE PROGRAM

Mary Ehlenbach; Gemma Warner; Kristan Sodergren; Carisa Baker; Melissa Mellum; Teresa Wagner; Theodore Bach; Jessamy Rogstad; Ryan Coller

Background: Children with medical complexity (CMC) utilize costly health services that often begin in the emergency department (ED). Complex care programs combine expertise in medical complexity, the child, and the social context, and may reduce ED utilization. Little is known about patient characteristics or clinical scenarios amenable to ED diversion.

Objective: Identify 1) characteristics of complex care program ED diversion interventions and 2) CMC characteristics associated with experiencing an ED diversion.

Design/Methods: Prospective cohort study of CMC enrolled in one pediatric complex care program from 9/1/2016-12/1/2017. ED diversions were defined as program interventions for acute episodes which clinical staff expected would typically lead to an ED evaluation recommendation if different healthcare providers had been contacted. Diversions were identified daily by staff, and uncertain episodes were discussed at weekly meetings until consensus was achieved. A nonclinical staff member determined through medical record review whether an ED visit occurred within 7 days of a diversion. Logistic regression identified associations between 1) diversion characteristics and presence/absence of an ED visit; and 2) CMC characteristics of having a successful diversion.

Results: Of 129 CMC continuously enrolled in the complex care program during the study period, 38% had one or more diversion. ED visits within 7 days occurred in 10% of diversions. Among 181 ED diversions, 83% were handled by phone and 55% were for issues with existing action plans. The most common chief complaint was respiratory distress (26%). Common interventions were reassurance and precautions for seeking ED care (84%), daily phone follow-up (51%), and medication changes (38%). ED visits after diversions were more likely with chief complaints of irritability (OR 3.18, 1.13-8.9) or fever (OR 6.40, 2.4-18.31). Diversions with subsequent ED visits were not associated with mode of contact, presence of an action plan for the issue, or specific intervention activity. CMC were more likely to experience a diversion if they depended on a larger number of medical devices (AOR 1.37, 95% CI 1.06-1.78) and had shorter travel time to the complex care program location (AOR 0.99, 0.98-1.00).

Conclusion(s): In one complex care program, interventions to avoid ED visits were common and involved a variety of chief complaints and clinical responses. Diversions failing to prevent ED visits may be driven by clinical scenarios difficult to manage remotely.

FATAL STROKES CAUSED BY FIBROMUSCULAR DYSPLASIA IN A CHILD WITH CYSTINOSIS

Jonathan E. Fliegel; Shahriar Salamat; Jeffrey Clark; William Yerges Case Presentation: An 8 y.o. girl with cystinosis collapsed on a playground, was unresponsive and had "stiffening and clenching". She was confused for 2 hours then recovered. Vital signs and neurologic exam were normal. A non-contrast head CT showed no fracture or hemorrhage. She had a headache but no fever nor recent illness and she had no history of syncope or seizures. During a 4 day hospitalization vital signs and neurologic exams were normal, except she did not recall the event. Labs, ECG, telemetry and video EEG were normal, even during a brief episode of confusion. Two nights after discharge, she returned to a local ED for right-sided stiffening and facial droop that resolved. Neurology was consulted, evaluated her in clinic the following day and admitted her. Overnight video EEG captured multiple spells but no seizures. An MRI/MRA showed a left PCA stroke, multiple infarcts and basilar artery occlusion. Over the next day, her condition worsened and she underwent lysis of a basilar artery thrombosis. After a repeat MRI/MRA showed extensive new infarcts, her family withdrew life support.

Discussion: Her initial stiffening and confusion were consistent with a seizure. Her quick recovery after both events, her CT with no findings of stroke, her normal EEG and neurologic exams all aligned with a seizure diagnosis. Since her diagnosis of cystinosis at 10 weeks of age, our patient had been compliant with cysteamine therapy. Some children with cystinosis exhibit neurologic findings but there are no reports of seizures or stroke. We rely on clinical neurologic exams to guide our evaluation. Remarkably she had a normal neurologic exam even after her initial MRA that revealed extensive vasculopathy. In retrospect her persistent headaches and dizziness may have been symptoms of stroke, but may also occur with seizures. Her autopsy confirmed acute infarcts of her pons, midbrain, cerebellum and left temporal and occipital lobes. Intimal and medial changes in her basilar, carotid and middle cerebral arteries were diagnostic of fibromuscular dysplasia (FMD). These non-inflammatory arteriopathies may be asymptomatic or may result in occlusion, stenosis, or dissection as we saw in her case.

Conclusions: A) Clinical diagnosis of pediatric stroke is challenging. In this case, her normal neurologic exams were misleading in the face of her extensive abnormalities in cerebral vasculature caused by FMD. B) Strokes involving the posterior circulation may present with subtle, non-specific and transient symptoms. C) Head CT scans have limitations in diagnosing strokes. Non-contrast head CTs are useful in acute settings to assess for fractures or hemorrhages. Without contrast, they cannot outline vascular abnormalities. In addition, the thick mastoid bone leads to loss of sensitivity and detail in the posterior fossa including areas of posterior cerebral circulation. D) An anchoring bias (that her case represented an atypical seizure) may have led to a delay in performing her MRI/MRA and subsequent stroke treatment. Nonetheless it is unlikely that her outcome would have been different given her extensive FMD. E) Though common things do occur commonly, uncommon things can occur. There are no previous reports of cystinosis and FMD occurring together.

MARIJUANA PROMOTIONS ON SOCIAL MEDIA: ADOLESCENTS' VIEWS ON POLICIES AND PREVENTION

Aubrey D. Gower; Jesse Gritton; Bradley Kerr; Marina C. Jenkins; Megan A. Moreno.

Background: Exposure to positive marijuana messages is associated with an increased risk that a youth will use marijuana. Current regulations around recreational marijuana businesses on social media are sparse and inconsistent.

Objective: The purpose of this study was to engage youth in discussion of their perspectives on marijuana business promotions on social media in Washington State.

Design/Methods: Adolescents ages 15-20 years in Washington state were recruited using purposeful sampling. Focus groups were used to understand adolescents' attitudes and perceptions regarding marijuana businesses on social media. Trained facilitators used a semi-structured guide including showing example Facebook and Twitter posts from marijuana businesses (Figure 1) and encouraging discussion. All focus groups were audio recorded and manually transcribed. Qualitative analysis was conducted using the constant comparative method.

Results: A total of 32 adolescents with average age 17 years (SD=0.6), 71% female, 18.7% Caucasian, participated in 5 focus groups. Among the sample, 40% reported previous use of marijuana. Adolescents' discussion focused on recommendations for policy in two main areas: 1) Policies to restrict underage access to marijuana social media pages. As one participant stated, "you have access to [the social media page] without being 21 and I think that's a problem, like I don't think they should be able to put their products directly out there 'cause anyone can access Twitter." 2) Participants proposed regulation of content that social media companies can post on social media. Adolescents specifically supported policies to limit content that was appealing to youth, such as popular culture, young-appearing models and suggesting health benefits. An example quote was, "I'm thinking [marijuana businesses] shouldn't be allowed to use children or anything associated with children and the memes that they post. This post is so similar to like memes that a lot adolescents engage in."

Conclusion(s): Adolescent recommendations can be utilized towards informing standardized restrictions on social media promotions by marijuana companies for states with legal use of recreational marijuana.

DELAYED UMBILICAL CORD CLAMPING IS NOT ASSOCIATED WITH ACUTE KIDNEY INJURY IN VERY LOW BIRTH WEIGHT NEONATES

Matthew W. Harer; Ryan M. McAdams; Mark Conaway; Brook D. Vergales; Dylan M. Hyatt; Jennifer R. Charlton

Background: Acute kidney injury (AKI) occurs in up to 40% of very low birth weight (VLBW) neonates and is associated with higher mortality, longer hospital stays and an increased risk of developing chronic kidney disease (CKD). Delayed cord clamping (DCC), which is recommended in premature neonates, reduces blood transfusion needs and improves transitional circulation and survival. We hypothesize that DCC is associated with a decreased incidence of AKI secondary to improved renal perfusion in the first week of life.

Objective: We sought to determine if DCC is associated with reduced incidence of AKI in a retrospective single center cohort of VLBW neonates.

Methods: We reviewed the medical records of VLBW neonates admitted to a level IV neonatal intensive care unit (NICU) at the University of Virginia from 01/2013 to 12/2016. This time frame was chosen due to the diversity of patients who received immediate cord clamping (ICC), DCC, or umbilical cord milking (UCM) and the type of cord management was at the discretion of the clinician. Neonates who had missing data (n=9) or a combination of DCC and UCM (n=12) were excluded. AKI was defined by the neonatal modified KDIGO (Kidney Disease and Improving Global Outcomes) criteria excluding urine output. Statistical analysis was performed using SAS 9.4.

Results: Of 299 neonates reviewed, 278 were included in the final analysis and no significant differences were noted in birth weight, gestational age or gender between the groups (Table 1). The overall AKI incidence was 27.3% without differences between the groups (DCC 24.8%; ICC 28.5%; UCM 32.4%; p=0.62). The DCC group had reduced blood transfusions and higher Apgar scores at 1 and 5 minutes (Table 1) but the highest initial hematocrit was in the ICC group, while the hematocrit at 48-72h was not different between the groups. After adjusting for significant variables, the odds of developing AKI following DCC compared to ICC was 0.70 (CI 0.33-1.49, p=0.39). There was no significant reduction in the stage of AKI between the DCC and ICC groups (table 2).

Conclusion: After adjusting for confounding factors, DCC was not associated with a decreased incidence of AKI. This study further supports the safety of DCC in VLBW neonates and long-term follow-up studies are needed to determine if DCC improves renal function following discharge from the NICU.

QUALITY IMPROVEMENT APPROACH TO PROVIDING EDUCATION TO YOUTH LIVING WITH HIV TO SUPPORT TRANSITION FROM PEDIATRIC TO ADULT HEALTHCARE

Sheryl Henderson; Teresa Meyer; Eustacia Ikeri; Solomy Ntambi; Jaylene Thompson; Joseph McBride; Timothy Markle; Maia Stitt **Background:** Youth living with HIV can be supported in their transition from pediatric to adult healthcare by having a structured process to help them develop knowledge about HIV and skills to navigate the healthcare system. We are using a quality improvement approach to develop a transition program for youth living with HIV and attending the University of Wisconsin HIV Comprehensive Care Clinic (UWHCC).

Baseline: At the initiation of the project, there were 15 youth (ages 12 to 25) followed in the Pediatric, Adolescent and Young Adult clinic of the UWHCC. Surveys were provided to seven youth (ages 18 to 25) during clinic visits to establish a baseline understanding of their HIV knowledge and healthcare skills. Once baseline was established, PDSA cycles were started for focused improvement.

Results: On the initial survey, 1 of 6 (17%) youth could name their CD4 cell count and medications whereas 6/6 (100%) knew how to contact their social worker and arrange transportation. Lack of knowledge about HIV was identified as the most pressing problem to address. To do this, providers changed approach to education during clinic visits. They specifically defined the transition process and incorporated more visual and teach back methods. In a follow up survey, 100% (4/4) patients could name their CD4 cell count and medications. A different survey identified videos as patients' preferred method of receiving information.

Conclusion: Having accurate knowledge about one's own health is an important factor in success in health care transition. Providers should identify and use teaching methods that are geared toward the patient's learning style.

Next steps: We have developed a whiteboard video that describes basic HIV physiology and how to live well with HIV. We will use this in the clinic for education and assess its effectiveness through pre- and post-surveys.

PREDICTING NON-MEDICAL PRESCRIPTION DRUG USE AMONG COLLEGE STUDENTS

Reese H. Hyzer; Jonathan D'Angelo; Megan A. Moreno

Non-medical prescription drug use (NMPDU) is common on college campuses nationwide and has negative psychological and physical consequences. Self-efficacy, how people perceive their capability in accomplishing tasks, has been linked to NMPDU in adolescents. Little is known about other predictors of adolescent NMPDU.

The purpose of this study is to test self-efficacy, alcohol use, peer influence, other substance use, and gender as possible predictor variables of NMPDU among college students. Secondary analysis of data from interviews of college juniors from a longitudinal study will be analyzed using linear regression. Results will help identify risk factors for NMPDU among college students, leading to better recognition and prevention.

THE PEDIATRIC BRAIN CARE CLINIC: A MULTIDISCIPLINARY FOLLOW-UP CLINIC FOR CHILDREN WITH ACQUIRED BRAIN INJURY.

Madeline Janke; Lynne Sears; Paige Mission; Karen Carpenter; Cassandra Meffert; Alanna Kessler-Jones; Peter Ferrazzano

Objective: The Pediatric Brain Care Clinic at the University of Wisconsin's Waisman Center for Human Development is a multidisciplinary clinic for the evaluation and management of children with acquired brain injury. The goal of this project is to describe the demographics, injury mechanisms, comorbidities and clinical assessments in our population of children recovering from brain injury.

Method: Our clinical database of 725 patient encounters (576 individual patients over a 4 year time period) was reviewed for this quality improvement project aimed at improving our understanding of this patient population in order to optimize the clinical assessments, interventions and counseling we provide at hospital discharge and in our clinic. Descriptive statistics were used to summarize demographics and clinical characteristics.

Results: Our multidisciplinary clinic is composed of providers in neurology, neuropsychology, critical care and occupational health. Clinical assessments include a neurologic exam, a structured interview including psychiatric screening measures, the Immediate Post-Concussion Assessment and Cognitive Test (ImPACT) in children ≥11 years old, a neuropsychological minibattery in children aged 4-10, and the Bayley Scales of Infant and Toddler Development in children ≤3 years old. In our clinical cohort of children with acquired brain injury, we found a male predominance (57%), and a bimodal age distribution (peaks at age ≤1 and 17). Most patients are recovering from traumatic brain injury (TBI, 88%) and repair of congenital cardiac defect (10%). The most common causes of TBI included motor vehicle accident (38%), falls (24%) and sports-related (24%). Sixty percent of patients with mTBI demonstrated mild impairment (scores <5%ile) in at least one cognitive domain, and 10% in multiple domains. Additionally, TBI resulted in a large amount of missed school (80% ≥2 days, 30% ≥7 days) and was associated with a high incidence of psychiatric diagnoses (50% with pre-injury diagnosis, 30% with new post-injury diagnosis).

Conclusions: Most children in our clinic present with TBI or after congenital heart surgery. TBI results in a large burden of missed school days, and is associated with a high incidence of psychiatric symptoms. This information will be used to improve pre-discharge counseling in this high-risk population, and to optimize the clinical evaluations performed in our clinic.

VACCINATION DISCUSSION AMONG PARENTS ON SOCIAL MEDIA

Marina C. Jenkins; Aubrey D. Gower; Megan A. Moreno

Purpose: A growing number of parents are opting out of vaccinations for their children, which presents a prominent public health risk. Studies have shown that parents are now more likely to look to Web 2.0 communities, such as blogs, than rely on medical expertise for health advice, particularly on vaccination. However, there is scant literature outlining how parents contribute to online discussion of vaccination. In addition it remains unclear whether a difference exists in online dialogue regarding childhood versus teen vaccines. The purpose of this study was to understand parent vaccination opinions expressed online and inform efforts to improve vaccination coverage.

Methods: Content analysis was conducted to evaluate a sample of online comments on popular, parenting blog posts related to vaccination. Page selection was conducted by a Google search of the terms "top parenting blog vaccination posts", and sites were selected based on specified inclusion criteria, such as parentfocused and parent-written. This sample was analyzed using an adapted codebook, vetted through inter-rater reliability testing. Variables included stance: pro, con, or neutral; argument rhetoric, including emotionalization or credibility-based; and whether the comment violated CDC vaccination guidelines. Comments recognized as aggressive or accusatory towards another position were recorded into an "attack" category. Descriptive statistics were used to compare types of rhetoric and content by stance of the commenter.

Results: 9 blogs were included, from which 244 comments were analyzed. The highest percentage of comments (44.3%) and blog posts (67%) were pro-vaccine. Credibility-based arguments were used in 27.5% of all comments, 22.5% utilized arguments of emotionalization, and 21.7% used fact-based arguments. The most common argument rhetoric was providing, requesting, or evaluating source credibility for both pro- and anti-vaccine comments (24% and 36%), e.g., "I can guarantee that NONE of the research includes a well-done, valid, peer-reviewed article demonstrating a major danger associated with vaccinations." 25% of comments were considered violations of CDC vaccination guidelines, e.g., "The reality is it is harmful to the community when you vaccinate." 27% of all comments fell into the "attack" category, of which over half (60%) took the position of pro-vaccination, e.g., "Not vaccinating your kids is CHILD ABUSE." While most references to vaccines were non-specific, it was found that adolescent-specific vaccines were mentioned significantly less than childhood vaccines, only making up 7.3% of all specific vaccine references (N=123) and were more often pro-vaccine by 17% (55.6% vs 38.6%). Comments referencing childhood vaccines were more likely to contradict CDC guidelines (27.2%) compared to adolescent vaccines (11.1%).

Conclusions: The high percentage of comments deemed as an attack on another individual or position, or as contradictory to CDC verified information, is evidence that online forums may not be a supportive or reliable environment for open discussion and information seeking for parents. Adolescent-serving clinics should use this data to understand arguments often utilized in support of anti-vaccination in efforts to improve vaccine coverage and dialogue with parents.

FAMILY-IDENTIFIED OUTCOMES OF HOME-BASED CAREGIVING FOR CHILDREN WITH MEDICAL COMPLEXITY

Anna Jolliff; Anne Thurber; Nicole Werner; Nadejda Doutcheva; Emily Meyer; Michelle Kelly; Gemma Warner; Mary Ehlenbach; Ryan J. Coller

Background: Children with medical complexity (CMC) require substantial care at home, which is primarily delivered by family caregivers. Family-identified outcomes of home-based caregiving, however, are underdeveloped and therefore poorly represented in existing research.

Objective: To understand the outcomes of home-based caregiving which CMC families identify as most important. **Design/Methods:** Participants were primary caregivers of CMC (N=10) who were enrolled in a complex care program (CCP). Semi-structured in-depth interviews of caregivers took place in CMC homes and elicited discussion of daily routines, barriers, facilitators, and outcomes of caregiving. Inductive thematic analysis was performed by three members of the research team to identify and elaborate upon themes.

Results: CMC primary caregivers were 80% female with median 36 years of age (range 27-49) and provided health care at home for median 55 hours/week (range 7-168). CMC were median 6 years of age (range 1-15), had median 5 organ systems affected by chronic conditions (range 3-7), and were enrolled in the CCP for a median 1.7 years (range 0.6-4.2). Caregivers identified three primary outcomes as the most important in providing care for the CMC. These included: 1) Providing high-quality medical care in the home, both by informal (family) and formal (professional) caregivers; 2) Minimizing care-related strain, including environmental, social, and financial stressors in the home; and 3) Strengthening the familial bond, which included attending to the non-medical care of the CMC, responding to the needs of each family member, and working towards family cohesion.

Conclusion(s): Although family caregivers of CMC prioritize medical outcomes when providing care at home, their concerns extend into the creation of a cohesive family ecosystem in which each member is able to thrive. Caregivercentered outcomes of home-based caregiving for CMC which evaluate social, financial and environmental homeostasis are missing from most common measures of CMC health and health services. Refining these measures will provide a more comprehensive representation of CMC health and direct interventions to support CMC caregivers.

RUXOLITINIB TREATED HUMAN NATURAL KILLER CELLS INCREASE APOPTOSIS OF T-CELL ACUTE LYMPHOBLASTIC LEUKEMIA IN VITRO

Sabrina A. Kabakov; Kirsti L. Walker; Christian M. Capitini

There is an urgent need for effective but less toxic treatments for relapsed or refractory T-cell acute lymphoblastic leukemia (T-ALL). Natural killer cells (NKCs) are part of an individual's innate immune system that specifically target virally infected or malignant tumor cells. We have identified that inhibiting the JAK1/2 pathway using ruxolitinib accelerates maturation of NKCs. I hypothesize that ruxolitinib augments NKCs cytotoxic properties against Jurkat cells (T-ALL cell line) in vitro. I will test my hypothesis using a Chromum51 (51Cr) assay which measures short-term NKC killing and flow cytometry to confirm the killing assays through measuring NKC markers of cytokine production, activation, and cell adhesion. I expect that treatment of NKCs with 1.25uM ruxolitinib will decrease cytokine producing (CD56bright) NKCs as proven in the flow cytometry assay, but enrich for apoptotic killing (CD56dim) NKCs in the 51Cr assays against Jurkat cells. Success of this study will provide critical preliminary data to support testing ruxolitinib-treated human NKCs in an in vivo model of T-ALL and support a novel clinical treatment for T-ALL.

DETECTION OF CONGENITAL HYPOTHYROIDISM IN PRETERM INFANTS WITH TARGETED MULTIPLE NEWBORN SCREENING PROGRAM IN WISCONSIN

Dinushan C. Kaluarachchi; Jens C. Eickhoff; Sandra J. Dawe; David B. Allen; Mei W.Baker

Background: The reported 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 primary congenital hypothyroidism and delayed TSH elevation (dTSH). Delayed TSH elevation was sub divided to severe (TSH >100 μ IU/mI) and mild (TSH >15 μ IU/mI). Univariable logistic regression analysis was performed to identify demographic factors associated with dTSH. Multivariate logistic regression analyses were performed to adjust for potential confounders.

Results: Total of 3134 preterm infants born at gestational age 22-31 weeks 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 1.5%. Incidence of primary CH was 0.1% Incidence of dTSH was 1.4% (severe 0.5%, mild 0.9%). Birth weight and initial TSH level were identified as independent predictors for dTSH.

Conclusion: Overall incidence of CH was 1.5% in preterm infants born <32 weeks with targeted multiple NBS in state of Wisconsin. Birth weight and Initial TSH level was also associated with dTSH.

LOW DOSE SUBCUTANEOUS TESTOSTERONE IS EFFECTIVE FOR INITIATION OF GENDER-AFFIRMING HORMONE TREATMENT IN TRANSGENDER YOUTH

Lauren Kanner; Brittany Allen; Jennifer Rehm

Background: Testosterone (T) therapy as gender-affirming hormones are recommended for pubertal initiation in femaleto-male (FTM) transgender adolescents, alone or in combination with pubertal-blocking therapy (GnRH agonists). Although intramuscular T has typically been used in management of both adolescent and adult FTM patients, in FTM adults weekly subcutaneous (SQ) T dosing recently has been recommended as an efficacious and preferred alternative dosing method for maintenance hormone therapy. Despite this, the use of SQ T for initiation of hormonal therapy in FTM youth has not been reported.

Objective: To assess the biochemical and clinical effectiveness of SQ T alone and with GnRH agonist use in FTM youth at (1) initiation of gender-affirming hormones and (2) after one year of therapy.

Study Design: Retrospective chart review of FTM youth (n= 41) prescribed weekly SQ T (enanthate or cypionate) seen in a university adolescent gender clinic over a 2-year period. T levels extracted from charts were measured at time points after the 4th dose of SQ T both at initiation and following any subsequent dose adjustments. Biochemical effectiveness was defined as serum total T levels > 100 ng/dL goal range. Clinical effectiveness was defined by (1) patients reports of menstrual suppression and (2) patient reported satisfaction with physical changes. Data was analyzed and stratified by concomitant use of GnRH agonists.

Results: Initial SQ T dosing was 25mg/week in 38 patients and 12.5mg/week in 3. T levels after 4 administration of initial dose were >100 ng/dL (227 +/- 75 ng/dL) in 40/41 (Figure 1). GnRH use had no discernible effect of T levels at any time point (Table 1). Patients on SQ T for at least 1 year (n = 22) did not differ in T level or final dose irrespective of GnRH agonist use). Nineteen of 22 achieved menstrual suppression by 1 year and 21 of 22 had satisfaction with physical changes within a year of starting therapy.

Conclusions: In FTM youth, weekly SQ T is biochemically and clinically effective and well-tolerated for initiation of gender affirming hormone treatment, either alone and in combination with GnRH agonists. Total T levels observed in response to dosage levels are variable, necessitating individual titration. Given known benefits of SQ T in FTM adults, SQ T administration provides improvements in dosing convenience, cost and pain for adolescent FTM patients and should be considered for first line administration route and additionally be considered for youth with male hypogonadotropic hypogonadism requiring T replacement.

BMI BETTER PREDICTOR OF INSULIN RESISTANCE COMPARED TO WAIST CIRCUMFERENCE IN OBESE ADOLESCENT GIRLS

Lauren Kanner; Jennifer Rehm; M Tracy Bekx; Jens Eickhoff; David B Allen; Ellen L Connor

Background: Insulin resistance (IR), type 2 diabetes and metabolic syndrome have been associated with visceral fat. Elevated BMI increases risk for IR and metabolic syndrome. Increased waist circumference (WC) has been linked to risk in pediatric and adult populations. Puberty may affect use of WC to predicting risk for IR. Hyperandrogenism (HA), seen in polycystic ovarian syndrome, is associated with both IR and abdominal adiposity that may increase WC, which may make WC a tool for prediciting IR. However, adolescents experience body proportion changes and increased IR with puberty.

Objective: Determine if targeted measurement of WC in obese adolescents with and without HA predicts IR better than BMI. **Methods:** %BMI, WC and BMI z-score were correlated with fasting insulin and glucose, and HOMA-IR in postmenarchal adolescent girls with (HA group) and without (non-HA group) HA.

Results: Forty-nine subjects with HA (mean age 15.9 yrs) and 42 without HA (mean age 14.3 yrs) met inclusion criteria. There were no differences in BMI-z-score, WC, or laboratory values between the groups(Table 1). About 10% had abnormal glucose tolerance but 87 had IR. Although WC was significantly associated with fasting insulin levels, %BMI and BMI z-score correlated more strongly with fasting insulin than WC did. HOMA-IR was significantly correlated with BMI z-score in the non-HA group and trended towards significance for BMI z-score and %BMI in all subjects and WC in the HA group only (Figure 1).

Conclusions: Fasting insulin and HOMA-IR correlated better with %BMI and BMI z-score than with WC. %BMI (global adiposity) predicted insulin elevation better. WC (visceral adiposity) was only useful for those without concurrent HA, suggesting other hormone abnormalities might affect using WC for adolescent IR risk prediction, when body proportions are evolving. Although previous literature supported use of WC in other populations for predicting IR and metabolic syndrome, this study suggests adolescents, undergoing body changes including adipose redistribution, may require other anthropometric measurements to assess risk, especially if with concurrent HA. Further study of adolescent and adult populations with varying comorbidities is warranted.

TWEAKING THE TWEETS: SOCIAL MEDIA POLICIES DURING GLOBAL HEALTH ELECTIVES

Elizabeth Keating; Heather Lukolyo; Heather Crouse; Michael Pitt; Nicole St Clair; Sabrina Butteris

Background: Both social media use and the popularity of global health electives (GHE) have increased dramatically in recent years. Public sharing of photos and descriptions of experiences while on GHE is commonplace, yet sharers may not consider the unique ramifications of these posts when outside of their home training institutions, including privacy violations and host institution perspectives. Social media policies – which have become more of a focus in residency programs – may aid in providing clear expectations to trainees domestically and abroad.

Objective: Determine the prevalence of social media policies among residency programs that offer GHE and assess whether social media/photography guidelines are a part of the GHE predeparture curriculum.

Methods: This study employed a cross-sectional survey design in which program directors and global health educators at pediatric residency programs that offer global health electives were surveyed using REDCap Software[®]. For all quantitative data, proportions of responses were calculated and analyzed using Microsoft Excel 2013[®]. We analyzed qualitative data using a conventional content analysis approach.

Results: The survey was sent to 74 global health educators and program directors, and 49 total responses were received (response rate 66.2%). The majority (60.1%; n=23) of pediatric residency programs that offer GHE have social media policies in place. A sizeable portion (34.2%; 13) of respondents did not know if their institutions had a social media policy. About one-third (35.3%; 13) of respondents stated that their programs had social media guidelines that pertained specifically to GHE, and slightly fewer indicated that social media/photography guidelines were included in their programs' GHE pre-departure curricula (33.3%; 12). A small number of respondents (5.3%; 2) were aware of disciplinary actions enacted against residents for inappropriate social media use during GHE.

Conclusions: This study found that the majority of pediatric residency programs surveyed had social media guidelines, but few had guidelines specific to GHE. Our study suggests that although known social media problems in the context of GHE are rare, they do exist and were reported. Social media guidelines are not routinely a part of the GHE pre-departure curriculum. We propose the incorporation of social media guidelines during pre-departure training for GHE.

TRENDS IN HOSPITAL TREATMENT OF EMPYEMA IN U.S. CHILDREN

Michelle M. Kelly; Ryan J. Coller; Jonathan E. Kohler; Qianqian Zhao; Daniel J. Sklansky; Kristin A. Shadman; Christina B. Barreda; Anne S. Thurber; M. Bruce Edmonson

Background: Although video-assisted thoracoscopic surgery (VATS) is a common pleural drainage procedure in the treatment of children with empyema, recent clinical guidelines endorse chest tube drainage as an acceptable, less invasive first-line alternative. Whether U.S. practice patterns are evolving in this direction is unknown.

Objective: To describe: 1) recent trends in empyema-related discharges of U.S. children, (2) trends in the number and type of associated pleural drainage procedures, and (3) risk factors for having multiple drainage procedures.

Methods: We used survey methods and data from the National Inpatient Sample to generate annual estimates for empyemarelated hospital discharges during 2008-2014 in children ages 0-17 years. Inverse-variance weighted linear regression was used to evaluate linear trends in estimated rates and proportions over the study period. Multivariate logistic regression was used to evaluate discharge- and hospital-level factors associated with having 2 or more drainage procedures.

Results: Empyema-related hospital discharge rates declined from 3.0/100,000 U.S. children in 2008 to 2.0/100,000 children in 2014 (P=0.04, linear trend) after peaking at 4.2/100,000 children in 2009. There was no significant change in the proportion of discharges associated with a code for 1 drainage procedure (66.1% to 64.1%) or codes for 2 or more procedures (22.1% to 21.6%). There was a decrease in the proportion coded for VATS as the only procedure (41.4% to 36.2%, P=0.03). In contrast, there were increases in the proportion coded for chest tube placement as the only procedure (14.6% to 20.9%, P=0.04) and in the proportion coded for for 2 chest tubes (0.9% to 3.5%, <0.01). Overall, the proportion of discharges associated with 1 or more VATS procedures declined (59.1% to 52.6%, P=0.02). Continuous mechanical ventilation was the only factor associated with having codes for 2 or more drainage procedures (adjusted OR: 2.7; 95% CI: 1.8-4.1), while age, gender, payer, having a complex chronic condition, transfer status, hospital size, and census region were not.

Conclusions: Empyema-related hospital discharges in U.S. children decreased by over 30% from 2008-2014 and were associated a decline in VATS utilization. It is unknown whether a continued shift toward chest tube management would further reduce the overall use of VATS or influence the need for multiple drainage procedures.

OFFERING HOSPITALIZED PATIENTS AND FAMILIES REAL-TIME, ONLINE ACCESS TO THEIR INPATIENT HEALTH RECORD: EXPERIENCES ACROSS A CHILDREN'S HOSPITAL

Michelle M. Kelly; Ryan J. Coller; Shannon M. Dean; Anne S. Thurber; Peter L.T. Hoonakker

Background: Patient portals engage patients and families by providing them online access to their electronic health record (EHR) information. Previously limited to ambulatory information, some hospitals now use portals to give hospitalized patients/families access to real-time information from their inpatient EHR. Although pilot studies suggest patients/families are enthusiastic about using these "inpatient portals" the implications on provider workload when used across an entire hospital have not been described.

Objective: To evaluate use of and provider experiences with an inpatient portal application on a tablet computer given to hospitalized patients and families across all units of a children's hospital.

Methods: In this cross-sectional study, English-speaking parents of children <12 years old and adolescents admitted between Feb-June 2017 to an 87-bed tertiary children's hospital were given a tablet computer with an inpatient portal application (MyChart Beside, Epic Systems) to use during their stay. The portal included: real-time vitals, lab results, medication/problem lists, a schedule, educational materials and provider names/photos. Portal use was summarized using tablet metadata and provider (physician and nurse) experiences were assessed using surveys.

Results: Over 5-months, 1,892 admissions were given a tablet computer and 1,502 (79.4%) logged in to the inpatient portal application to view their inpatient health record at least once. No tablets were lost or stolen. Of 101 eligible providers, 96 completed the survey (response rate 95.0%, Figure). They reported that patients/parents asked them questions or expressed concerns about information they found in the portal, including: lab results (44.7% of respondents), medications (12.8%), diagnoses (11.8%), and errors or mistakes in care (3.2%). Few perceived spending more time answering questions related to patient/parent portal use (7.6%) and that the portal increased their workload (8.6%). In all, 91.7% wanted patients/parents to continue to be able to use the portal.

Conclusion: This is the first study to evaluate inpatient portal use across a children's hospital. Almost 80% of hospitalized patients and parents given a tablet computer accessed real-time information from their inpatient health record. The portal facilitated communication on a wide-variety of essential care elements. Despite potential negative implications on their workload, providers overwhelmingly supported ongoing portal use in the hospital.

A SOLAR-POWERED AIR FILTRATION ELEMENT TO DECREASE HOUSEHOLD POLLUTION IN LOW-INCOME SETTINGS: PROTOTYPE DEVELOPMENT

Julie Kessel; Ryan McAdams

Pollution is the largest environmental cause of disease and premature death worldwide. According to the The 2017 Lancet Commission on pollution and health, household air pollution was responsible for an estimated 2.9 million deaths globally in 2015. Air pollution from burning biofuels, typically used of household cooking purposes, produces potentially harmful air particles (particulate matter). Particulate matter can be mechanically filtered out of the air, but this approach requires reliable electricity, which is often unavailable in low income countries. To address this dilema, our objective was to develop a proof-of-concept Solar Powered Air Filtration Element to reduce the amount of particulate matter in the air. If functional, further development of this product may lead to a safe, effective, and useful device to decrease morbidity and mortality from air pollution in low income settings.

NASOPHARYNGEAL MICROBIOME DURING HEALTH AND ILLNESS IN EARLY LIFE

Anna Lang; Kathryn E. Holt; Michael Inouye; Patrick G. Holt; Shu Mei Teo; Howard HF Tang; Louise M. Judd; Robert F. Lemanske; Michael D. Evans; Daniel J. Jackson; James E. Gern

Rationale: There is increasing evidence that the airway microbiome influences the development of wheezing and childhood asthma. Here we characterize the composition of the human nasopharyngeal microbiome in the first two years of life during health and respiratory illness.

Methods: Nasopharyngeal samples were collected from participants in Childhood Origins of ASThma, a prospective birth cohort study in Madison, Wisconsin, yielding 1616 samples from 259 children during periods of health (at 2, 4, 6, 9, 12, 18 and 24 months of age) and 1423 samples during respiratory illness from birth to 36 months. Samples were analyzed for bacterial microbiome composition using 16S rRNA gene deep sequencing, and for common respiratory viruses.

Results: 91% of samples clustered into 11 microbiome profile groups (MPGs), each dominated by one of six genera: Haemophilus, Streptococcus, Moraxella, Staphylococcus, Corynebacterium and Alloiococcus. Periods of respiratory illness were significantly positively associated with MPGs dominated by Haemophilus (OR 3.9, p=8.4x10-16), Streptococcus (OR 3.8, p=8.9x10-18), or Moraxella (OR 2.1, p=3.4x10-12), and negatively associated with MPGs dominated by Staphylococcus (OR 0.22, p=2.5x10-4), Corynebacterium (OR 0.49, p=3.8x10-9) or Alloiococcus (OR 0.25, p=3.7x10-17). These effects remained when adjusting for presence of virus.

Conclusions: 11 MPG dominated early life nasopharyngeal microbiomes, and their frequencies differed between state of health and illness. These MPGs and associations with illness were remarkably similar to those observed in the Childhood Asthma Study (Perth, Australia), demonstrating prototypical, robust patterns of nasopharyngeal MPG composition during early childhood that are reproducibly associated with respiratory illnesses, independent of viral cooccurrence, in two distinct global hemispheres.

ESTABLISHING WORKFLOWS FOR TRANSITION OF YOUTH WITHIN THE PRIMARY CARE MEDICAL HOME FROM PEDIATRIC TO ADULT HEALTHCARE

Mala Mathur

Background: Transition planning for all youth can reduce medical complications, improve outcomes and reduce cost of care. Currently there is no formal workflow for the pediatric to adult transition process within our ambulatory care clinics.

Objective: In this study, we worked to establish ambulatory clinic workflows utilizing Transition Readiness Assessments for youth, counselled and provided patient educational materials to youth, and measured the impact of these tools on all youth, both typical youth and youth with special health care needs (YSHCN).

Design/Methods: We conducted this quality improvement Transition pilot project in two primary care clinics at University of Wisconsin Health System in Madison, WI from March-September 2017. Youth age 15-21 years completed the "Got Transition Readiness Assessments" before routine well checkups during the pilot project. Using these assessments we initiated discussion and provided counselling on Transition to youth and families based on an age specific checklist of questions. After the visit, youth completed a post visit survey about the Transition counselling they received. We examined the results of the assessments and post visit questionnaires and stratified these findings by age and special health care needs

Results: We used Fischer's exact test to compare proportions of YSHCN and typical youth. There were 69 well checks documented for youth ages 15-21 within the two pediatric practices participating in this pilot study (20 YSHCN and 49 typical youth). As a result of the transition counselling, 77% of typical youth were motivated to be independent with managing their healthcare compared with 22% YSHCN (<0.05). Based on the post visit survey, 88% typical youth were likely to find counselling helpful at the well checkup within the medical home compared with 55% YSHCN (>0.05). For both YSHCN and typical youth, there was a statistically significant difference in self-reported confidence of youth to take care of their own healthcare after providing Transition counselling during the well child checkup (>0.05).

Conclusion(s): Transitions in healthcare can be challenging for all youth and especially YSHCN. The findings of this study suggest that even limited counselling regarding transition during the well child check can motivate and increase a youth's self-reported confidence in taking care of and managing their own healthcare. Transition planning can be empowering to all youth- both typical youth and YSHCN.

DEVELOPING A CARE PATHWAY FOR THE DIAGNOSIS OF PULMONARY HYPERTENSION IN PREMATURE INFANTS: COORDINATING MULTIDISCIPLINARY INPATIENT AND OUTPATIENT CARE TO IMPROVE OUTCOMES

Ryan McAdams; Dinushan Kaluarachchi; David McCulley; Jenna Torgeson; Marlowe Eldridge; John Hokanson; Juke Lamers; Vivek Balasubramaniam

Introduction: Infants born prematurely are at significant risk for the development of pulmonary hypertension (PH), which increases the risk of lifelong morbidity and mortality. Early diagnosis and treatment of PH may improve long term survival. Therefore, successful strategies aimed at transitioning infants with PH from the neonatal intensive care unit (NICU) to appropriate outpatient providers are needed.

Objectives/purpose/goals: We sought to develop a care pathway for the identification of PH in survivors of prematurity in the NICU and to enroll these patients in a Pediatric PH Program with coordinated inpatient and outpatient care to optimize outcomes.

Intervention/practice: A multidisciplinary team from the University of Wisconsin Madison, American Family Children's Hospital (AFCH), was established to develop a formalized Pediatric PH Program that spans the inpatient and outpatient clinical settings with services that include a NICU PH screening protocol, consultative service, and standard evaluation and management strategies.

Results: The PH screening protocol was implemented in the NICUs at AFCH and UnityPoint Health-Meriter Hospital. Between April to December of 2017, of the 13 infants (mean GA 26 wk 5 d, mean BW 954g) screened for PH by echocardiogram, 11 who had bronchopulmonary dysplasia, we identified 1 infant with PH (7.7%). In addition, inpatient PH consults resulted in growth of our outpatient PH clinic, currently enrolling over 40 patients, ranging from 2 months to 19 years of age, > 40% of whom are on pharmacologic therapy.

Conclusions: The implementation of a NICU PH screening protocol as part of a comprehensive PH program was able to identify patients with PH that may not have been previously recognized. Due to the complex needs of these children, a multidisciplinary program provides timely clinical evaluation and state of the art treatment strategies to promote improved long-term outcomes. Future work is needed to better understand basic mechanisms of disease and clinical course of pediatric PH in order to improve well-being and long-term outcomes of children with PH in Wisconsin.

NEONATAL INTUBATION SIMULATION WITH VIRTUAL REALITY AND HAPTIC FEEDBACK

Ryan McAdams; Brandon Tomlin

Overview: Respiratory disorders are the leading cause of early neonatal morbidity and mortality worldwide. According to the American Academy of Pediatrics, ~10% of neonates require some assistance to begin breathing at birth, with up to 1% needing extensive resuscitation. Neonates with respiratory failure often require endotracheal tube intubation and airway support with mechanical ventilation to survive. Successful endotracheal tube placement requires quality training and skill acquisition, which is a significant challenge given the current simulation models, which include video instruction and mannequin intubation. Thus, a more realistic training method that better represents both the difficulty of the procedure as well as the stressful external environment may improve physician competency and neonatal outcomes. Virtual reality (VR) is an innovative tool becoming increasingly used in the medical field, particularly for simulations. VR provides a means by which individuals can be visually immersed in a non-physical, yet responsive, environment. Incorporation of haptic feedback devices incorporates somatosensory feedback into the environment as well. Cutting edge medical VR simulations with haptic feedback already exist and represent the future of medical training. Integration of a well-designed virtual environment with haptic devices that imitate a neonatal intubation procedure should provide a more effective means of training. The objective of the current project was to begin to develop a proof of concept VR-simulator with haptic feedback system with the ultimate goal to increase intubation training efficacy. If this approach works, the increased intubation skill attainment using VR simulations with haptic feedback may ultimately lead to safer and more successful intubations, which could improve patient outcomes.

TRAINEE MOTIVATIONS FOR PURSUING GLOBAL HEALTH ELECTIVES

Vanessa McFadden; Nicole St Clair; On behalf of the Project PRIME Investigators (Arteaga G, Bothe D, Butteris S, Conway J, Fischer P, Lauden S, McFadden V, Merry S, Pitt M, Rosenman J, Schubert C, St Clair N, Warrick S, Watts J, Westwater M, Wilson, S)

Background: Demand for global health (GH) electives is growing: nearly one in three medical students participate, and 58% of pediatric residency programs offer them. It is important to understand why trainees seek GH electives in order to screen for ethical concerns and to ensure GH opportunities are aligned with learner goals, yet there is minimal data on motivations.

Objective: To create a descriptive summary of motivations for medical trainees embarking on GH electives. Design/Methods: Project PRIME (Psychosocial Response to International Medical Electives) is a multi-institutional longitudinal survey design study assessing demographic and training conditions that influence emotional responses to global immersion. Thus far, 114 trainees have enrolled, with 90 included in this analysis (those that completed pre-departure surveys). Fifteen options for motivations were surveyed, each with Likert scale responses: Did not influence=1; Neutral=2; Somewhat influenced=3; and Strongly influenced=4. Average participant group scores were compared using unpaired T Tests.

Results: The top three trainee motivations were: "To learn what it is like to practice medicine in a different cultural setting"; "To improve my knowledge of health systems globally"; and "To practice medicine with resource limitations." Trainee groups had similar motivations; however, there were significant differences in scoring among certain groups. Pediatric and med/peds residents gave higher scores for: "To improve my knowledge of health systems globally"; "To better understand health disparities"; and "To gain an understanding of a different culture" compared to non-pediatric residents (3.6 vs 3.3, p=0.04, 3.6 vs 3.2, p=0.01, and 3.5 vs 2.9, p<0.01). Medical students scored higher compared to pediatric and med/peds residents for "To have the opportunity to travel during my medical training" (3.7 vs 3.1, p<0.01) and lower for "To make a positive difference in the world" (3.1 vs 3.5, p=0.04). Medical trainees with prior international work experience scored higher for "To make a positive difference in the world" compared to those with no experience (3.4 vs 3.0, p=0.03).

Conclusions: Trainee groups have similar yet some distinct differences in motivations to pursue GH electives, and are influenced by factors such as prior international work. Trainee motivations should be considered when choosing GH electives. Additionally, programs can offer stateside training that addresses common trainee GH motivations, such as low-resource simulations.

APPROPRIATE USE OF ANTIBIOTICS IN THE NICU VIA USE OF THE SEPSIS RISK CALCULATOR, 24-36 HOUR ANTIBIOTIC TIME-OUTS, IMPLEMENTATION OF STANDARDIZED GUIDELINES AND INDIVIDUALIZED ANTIBIOTIC UTILIZATION REPORTS

Nina Menda; Pam J. Kling; M. Ann Ebert; Dare Desnoyers; Beth Ellinger; Elizabeth Goetz

Background: NICUs are notorious for overuse of antibiotics without proven infections and therefore represent opportune sites for antibiotic stewardship. Exposure to unnecessary antibiotics in neonates is associated with increased mortality, NEC and length of stay. Review of the antibiotic utilization rate (AUR) at UPH-Meriter demonstrated a need to address antibiotic use in the NICU due to excessively high usage rates, which was discrepant with the low incidences of early (EOS) and late (LOS) onset bacterial sepsis.

Objective: By Dec, 2017 the objective was to decrease the AUR from 24.3% to 19.4%, to achieve a 20% reduction in overall use. **Methods:** To address the variability in antibiotic prescription, several interventions were enacted which included: (1) Modifications of protocols for diagnosis and management of meningitis, UTI prophylaxis, fungal prophylaxis; (2) Utilization of the sepsis risk calculator for all infants >34 weeks admitted to the NICU and in term well-appearing infants exposed to chorioamnionitis to determine need for antibiotic therapy; (3) 24-36 hour time-out to review indication and duration of antimicrobial therapy; (4) Improved documentation of dose, duration, indication for antibiotic therapy > 36 hours; (6) Individualized antibiotic prescribing reports; (7) Informational handout for NICU parents about antibiotics; (8) Review of time to positive blood cultures.

The AUR, defined as the total number of patient days that infants were exposed to one or more antimicrobial or antifungal agents per 100 patient days, expressed as a percentage, was tracked daily from Apr 2016-Nov 2017 and abstracted retroactively from Oct 2015-Mar 2016.

Results: With these interventions, the AUR decreased from 24.3% to 10.0%, a 59% reduction. There were 962 fewer doses of antibiotics administered in the NICU in 2016 versus 2015. Even with this reduction in antibiotic use, there was no statistically significant difference in the incidence of EOS, LOS or fungal infections.

Concluisions: Antibiotic stewardship is critical to prevent the spread of antimicrobial resistance. Utilizing the sepsis risk calculator, 24-36 hour antibiotic time-out, implementing standardized guidelines and providing individualized antibiotic utilization reports effectively decreased the AUR by over 50%, without affecting the incidence of bacterial or fungal sepsis, proving antibiotic stewardship methods are both effective and safe.

VASCULAR ENDOTHELIAL GROWTH FACTOR PROMOTES EARLIER VASCULAR RECOVERY IN RETINOPATHY OF PREMATURITY

Olachi J. Mezu-Ndubuisi; Yuyuan Wang; Jamee Schoephoerster; Shaoqin Gong

Purpose: Retinopathy of prematurity (ROP) is a disease of abnormal retinal vascularization in preterm infants which can result in negative visual outcomes, including blindness. Vascular endothelial growth factor (VEGF) is a potent angiogenic factor in ROP pathogenesis, and has several isoforms with the proangiogenic VEGF-A165 predominant in the eye. We hypothesize that intravitreal VEGF-A165 in a sustained release vehicle would promote retinal revascularization in an in vivo mouse model of oxygen-induced retinopathy (OIR).

Method: VEGF-A165-loaded poly(lactide-co-glycolide) (PLGA) microparticles were fabricated using a water-in-oil-in-water double emulsion method. 39 neonatal mice were exposed to 77% oxygen from postnatal day 7 (P7) to P12 (OIR mice), and received intra-vitreal injections of VEGF-A165-loaded (n=15) or empty (n=14) PLGA microparticles to their right eyes. The left eyes of each mouse were controls. After anesthesia, retinal fluorescein angiography (FA) was performed at P20, and vascular parameters were quantified.

Results: VEGF-A165-loaded PLGA microparticles with an average diameter of 4.2 μ m were fabricated. VEGF loading level was 8.6 wt%. Retinal avascular area was significantly reduced in VEGF-treated right eyes (VEGF-RE) (39.5±9.0%) compared to empty microparticles (empty-_RE) (52.4±6.7% treated eyes, or left eye controls (empty-LE (49.5±5.4%), VEGF-LE (52.6±6.1%)) (P<0.0001). Retinal vein dilation (P=0.0001) and retinal artery tortuosity were reduced in VEGF-treated eyes compared to controls (P=0.0007).

Conclusions: Our results agree with our hypothesis that intravitreal injection of selective pro-angiogenic VEGF-A165 encapsulated in PLGA microparticles, capable of sustained release, in OIR mice reduces ischemia-induced vaso-obliteration and promotes recovery from retinal vein dilation and arterial tortuosity, which may prevent pathologic neovascularization. This technique may alleviate the concerns of the systemic effect of non-selective-VEGF blockade on developing organs in current ROP therapy and the need for multiple treatments due to their short-lived effects. Further studies are needed to optimize the pharmacokinetics, dosage, and efficacy of the VEGF-loaded microparticles.

NECESSITY OF ANAEROBIC BLOOD CULTURES FOR IDENTIFICATION OF PEDIATRIC BLOODSTREAM INFECTIONS

Kaitlin F. Mitchell; Heather A. Couch; Sheryl L. Henderson; Derrick J. Chen

Background: There is conflicting evidence in the literature on the necessity of anaerobic blood cultures for the diagnosis of pediatric bloodstream infections. Here we investigated the utility of anaerobic blood culture bottles in addition to aerobic blood culture bottles for the recovery of microorganisms in pediatric blood specimens.

Methods: A retrospective review of positive blood culture records was performed for culture results reported from January 2016 to December 2017. Blood cultures from pediatric patients (<18 years of age) performed at the University of Wisconsin Hospital and Clinics were included in the analysis. Variables collected included patient demographics, volume of blood cultures, microorganism identification, and time-to-positivity.

Results: Of 4292 pediatric blood cultures collected during the study period, a total of 266 were positive (6.2%). Of these, 229 were used to inoculate both aerobic and anaerobic cultures. 42 were used to only inoculate aerobic cultures and were thus used as a comparison group for subsequent analyses. One hundred (44.6% of 224) were positive in both the aerobic and anaerobic bottles, 76 (33.9%) were positive only in the aerobic bottle, and 48 (21.4%) were positive only in the anaerobic bottle. The mean time to positivity (TTP) for aerobic and anaerobic cultures was 22.6 and 21.5 hours, respectively. In the 100 cases where both cultures were positive, the same organism was identified in all but 4 cases. Among the 48 cases with only positive anaerobic cultures, the most commonly identified genera were Staphylococcus (n=24, 50%; n=11 S. aureus), Bacteroides (n=5, 10%), and Enterococcus and Escherichia (both n=3, 6%).

Conclusions: Our findings demonstrate that anaerobic blood cultures are necessary to gain a complete understanding of infection status in pediatric patients. This supports the current consensus for adult blood cultures, stating that both aerobic and anaerobic cultures should be inoculated. While it is often more difficult to obtain sufficient blood volumes from pediatric patients, performance of anaerobic culture should be encouraged when possible.

CORRELATING INFECTION PHENOTYPES WITH TISSUE VIRAL DISTRIBUTION IN CONGENITAL ZIKA VIRUS INFECTION

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Background: Congenital Zika syndrome is a constellation of birth defects that occurs following in utero infection with Zika virus (ZIKV). We hypothesized that higher viral loads and broader viral tissue distribution in the fetus was associated with tissue histopathology and the development of ZIKV-associated birth defects.

Methods: We developed a nonhuman primate (NHP) model that accurately models human disease with prolonged maternal viremia, vertical transmission, fetal tissue dissemination and birth defects. We infected rhesus macaques with 10^4 PFU of a Puerto Rican ZIKV isolate (PRVABC59) in the first trimester and assessed viral tissue distribution and birth defects in their offspring. We delivered fetuses in the second trimester (n=4) and near term in the third trimester (n=5) to evaluate viral tissue distribution and birth defects. We assessed liveborn infants with a postnatal evaluation that included an ophthalmologic exam, hearing evaluation, electroretinography, visually-evoked cortical potentials, brain magnetic resonance imaging and neurodevelopmental assessment. Viral RNA was quantified in fetal and infant tissues by QRT-PCR, and for infectious virus by positive- and negative-strand RNA in-situ hybridization.

Results: Two dams experienced adverse pregnancy outcomes, with a second trimester stillbirth and a miscarriage near term. Three of 5 infants delivered near term underwent comprehensive postnatal evaluations; one of these experienced respiratory distress requiring noninvasive positive pressure ventilation. One stillborn infant had severe ocular defects consisting of a choroidal coloboma, anterior segment dysgenesis and retinal dysplasia, along with widely disseminated ZIKV infection.

Conclusions: Thus, from a total of nine pregnancies evaluated in the study, two had adverse clinical outcomes. Fetal and infant viral tissue distribution analyses are underway to positively correlate viral tissue distribution and ZIKV-associated birth defects.

PREDICTORS FOR WEIGHT LOSS IN OBESE PEDIATRIC PATIENTS WITH LIFESTYLE INTERVENTION

Yashoda Naik; David B Allen; Jens Eickhoff; Cassandra M Vanderwall; Aaron L Carrel

Introduction: Obesity in children is extremely difficult to manage and requires significant motivation to achieve a lifestyle change, since alternative effective treatment options are limited. Determining predictors for likely weight control success or failure could aid in intervention planning and follow-up to improve long-term outcomes.

Methods: In 485 obese children seen for lifestyle intervention at a multidisciplinary clinic, BMI z-scores were evaluated over a 1 year follow-up period using subject specific linear regression analyses of BMI z-score on time. Responders (stable or decreased BMIz) were defined as subjects with a non-positive regression slope. Univariate and multivariate logistic regression analysis was then conducted to identify baseline predictors for response. Age, BMI percentile, gender, race/ethnicity, socioeconomic status, fasting glucose and readiness for change scores were examined.

Results: Mean age at the initial visit was 11.5±3.3 years and BMIz of 2.2±0.5. 26% of these children were non-Caucasians, with 50% girls, and 35% had public insurance. 59% of these children were identified as responders. Younger age (p<0.0001) and higher BMI percentile (p<0.001) independently predicted response. In children <12 years of age with an initial BMI above the 95th percentile, the predicted responder rate was 70% (95% CI: 66-74%) whereas in children >16 with an initial BMI below the 95th percentile responder rate was 24% (95% CI: 14-38%). A sub-study of readiness for change is in process.

Conclusions: Younger age and higher BMI at initiation of lifestyle intervention predicts weight control success in obese children. While efforts to determine other positive predictors are ongoing, including readiness to change, opportunity to engage and motivate younger children may have a beneficial effect on managing obesity.

STABILIZATION OF BMI IS ASSOCIATED WITH A DECREASE IN VISCERAL FAT IN OBESE CHILDREN.

Yashoda Naik; David B Allen; Jens Eickhoff; R. Randall Clark; Aaron Carrel

Introduction: The BMI z-score (BMIz) is a commonly used metric for assessment of childhood obesity. It remains unclear how changes in BMIz reflect changes in visceral fat and impact metabolic health.

Objective: This study compared changes in fitness (VO2 max), metabolic health and visceral fat (Midriff Fat) over 6 months in obese children with a stable or decreased BMIz (BMIz-down) versus increased BMIz (BMIz-up).

Methods: Ninety obese children, referred to a multidisciplinary clinic for lifestyle intervention were part of this study (mean age 11± 3.1 years, 50% girls, 22% Hispanic). Assessment of body composition (abdominal fat and total fat by DXA), VO2 max testing as marker of fitness, anthropometrics, and metabolic markers were performed at 0 and 6 months. The nonparametric Wilcoxon signed rank test was used to evaluate changes within BMIz-down and BMI-up groups. Comparisons between groups were conducted using Wilcoxon rank sum test.

Results: Sixty-three children (70%) showed a stable or decrease in BMIz score over 6 months. There were no significant differences in total body fat between groups (-1.3 \pm 2.9 vs -0.6 \pm 2.6%, p=0.4); however BMIz-down group showed decrease in visceral fat (-258 \pm 650g versus +137 \pm 528g, p=0.008). The BMIz-down group demonstrated significantly improved fitness as measured by VO2 max (+1.2 ml/Kg/Min, p<0.001), while no significant change in fitness was detected in the BMIz-up group. There were no significant changes detected in either group in metabolic markers (insulin, triglycerides).

Table 1	1: Comparisor	of changes t	from baseline	between g	groups with	BMI z	down
	41						

and Divit 2 up.							
	BMIz DOWN : N = 63			BMIz UP: N = 27			
	Mean	SD	p-value†	Mean	SD	p-value†	p-value‡
Total Body Fat %	-1.3	2.9	0.00015	-0.6	2.6	0.11090	0.4587
Visceral fat (g)	-258	649	0.00458	136	528	0.22477	0.00869
VO2 Max	1.2	2.5	0.00002	0.5	2.4	0.76086	0.08905
HOMA_IR	-1.0	3.2	0.13273	-6.5	-11.5	0.07813	0.31343
Triglycerides	-16.2	49.7	0.10338	-18.4	37.3	0.12695	0.97652
HDL	1.6	9.0	0.39504	-1.7	5.6	0.23828	0.18413

† P-value for evaluating changes within group ‡p-value for comparing changes between groups

Conclusions: The BMIz is a sensitive metric in obese children to predict a significant decrease in visceral fat even if total body fat is not significantly decreased. This decrease is more often associated with an increase in overall fitness level. These findings support that focusing on increasing fitness and keeping BMI stable are successful initial goals for improved metabolic changes in obese children.

UNILATERAL PROPTOSIS IN A EUTHYROID GIRL WITH SUBSEQUENT DEVELOPMENT OF GRAVES' DISEASE.

Yashoda Naik; Cat Nguyen Burkat; Ellen L Connor

Objective: Describe atypical presentation and course of unilateral proptosis in a child. The atypical presentation of this case highlights a diagnostic dilemma for a differential diagnosis including tumors causing unilateral proptosis. The temporal relation of proptosis to development of Graves' disease was prolonged over three years, adding to this dilemma.

Methods: An 11 year old otherwise healthy girl presented to her optometrist with 2-3 years of left eye proptosis, worsening over the past year. She denied eye pressure, diplopia, blurry vision, erythema, foreign body sensation, or dryness. Best corrected visual acuity was 20/20 in the right eye and 20/25 in the left eye. 2.5 mm exophthalmos measuring 17.5-mm. right and 20.0-mm left by Hertel ophthalmometry was present. Differential diagnosis included (epi) dermoid cysts, orbital vascular tumors or malformations, and less likely malignancy. An orbital MRI with contrast was normal. She was then referred to the pediatric endocrine clinic for concern of possible Graves' disease. She was asymptomatic for hyperthyroidism. A family history of hyperthyroidism in the paternal grandfather was present.

TABLE: THYROID FUNCTION TESTS (INITIAL AND SECOND)

Component	Reference Range	Initial	3 weeks later
TSH	0.36 - 4.57 uIU/mL	0.39	0.26
T3, FREE	2.0 - 4.9 pg/mL	4.8	5.6
T4, FREE	0.75 - 1.54 ng/dL	1.00	
THYROID STIM IMMUNOGLOBULIN	<=122 %	120	134
TRAB	<=1.75 IU/L		2.74

Outcomes: She appeared well without weight loss or jitteriness. She had prominent left eye proptosis with upper and lower eyelid retraction, scleral show, and normal appearance of the right eye. There was no eyelid lag, conjunctival chemosis, extraocular muscle injection, or keratopathy. Pupils were equal and reactive, extraocular muscle motility was full, and the optic disc margin was sharp on funduscopic exam. The thyroid was palpable but non-enlarged, smooth and non-tender. There was no hypertension, tachycardia, or bruit noted on exam. There were no tremors on extension of hands. No vitiligo was found. **Conclusions:** Unilateral proptosis with a prolonged euthyroid state is rare in children, and raises the suspicion of a massoccupying orbital lesion. After 3 years of euthyroid status, Grave's disease with proptosis was eventually diagnosed. Additionally, there was prompt improvement in proptosis after starting anti-thyroid medication. Development of bilateral thyroid eye disease or recurrence of unilateral proptosis did not occur in subsequent follow-up of 52 months.

DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF CONTINUITY CLINIC PATIENTS

Megan Neuman; Amy J. Plumb; Laura Houser; Jeff Sleeth; Meriel Rongstad; Brittany Allen; Sadie Skarloken; Derek Spindler; John Frohna

Background: The ACGME requires continuity clinic to provide residents exposure to the spectrum of normal pediatric development at all ages, as well as to special health care needs and chronic conditions. There is limited research describing the clinical content of continuity clinic. This information can allow more robust resident and program self-evaluation, as well as the possibility of program benchmarking.

Objective: To quantify the clinical experiences of residents in continuity clinic, including visit volumes and types, and patient demographics and diagnoses.

Design/Methods: In our Midwestern academic pediatric residency, we have 45 residents at 10 continuity clinic sites. Using billing data for academic year 16-17 continuity clinic encounters, we examined each resident's visits per session, patient age and gender distribution, percentage of preventative visits, payor mix, and patient diagnoses.

Results: Residents had an overall average of 4.7 visits per clinic session. Post-graduate year 1 (PG1) residents had 4.4 visits per session (2.5-8.3), PG2s had 5.0 (3.4-8.0), and PG3s had 4.5 (3.3-5.9). Patient gender distribution overall was 52% male, 48% female; outliers were 75% male for one practice, 62% female for another. Age of patients ranged from 0 to 30 years, patients older than age 24 often had a special-needs diagnosis. Infants less than 1 year old accounted for 18% of visits, teenagers (age 13 -18) made up 20%. Preventative visits accounted for an overall average of 41% of encounters (15-78%). Medicaid as primary payor ranged from 11%-36%, except for the community health center with nearly 100% Medicaid. The top 3 acute visit diagnoses were sore throat, acute otitis media, and cough. Average visits per session did not increase as expected by PG year, primarily due to 2 high volume residents in the PG1 and PG2 years. Outliers in patient gender distribution were in cases of resident-preceptor pairs of the same gender.

Conclusion(s): Our data set offered valuable information for residents and our program. With these data, residents and program leadership can monitor clinic experiences to better achieve individual and program goals. These reports could allow inter-clinic comparisons and inter-program comparisons for standards and benchmarking. If made available more widely, this type of data could also be helpful to accreditation bodies and prospective residents alike.

THE TIMES THEY ARE A CHANGIN': CORRELATION BETWEEN M3 PEDIATRIC SCHEDULES, LEARNING ENVIRONMENT, AND EDUCATIONAL OUTCOMES

Cindy M Nicholson; Raquel Tatar; Kirstin Nackers

Background: Medical students and administrators are often concerned about the effects of clerkship scheduling; however, little research has evaluated the impact of schedule changes on the learning environment or knowledge outcomes. At our institution, global curriculum changes necessitated modifying the required pediatrics clerkship schedule twice in the last several years; no other curriculum changes were made.

Objectives: Taking advantage of this natural experiment, our objective was to determine whether there was a correlation between clinical schedule, and student qualitative feedback, learning environment perceptions, and/or student educational outcomes.

Methods: Students were assigned to: baseline schedule A (Fall 2014, n=53, 3 weeks inpatient, 3 weeks mixed primary care and 1-3 subspecialty clinics), B (Fall 2015, n=58, 2 weeks each inpatient, primary care, and 7+ subspecialty-sampling), or C (Fall 2016, n=48, longitudinal primary care, 3 weeks inpatient, 3 weeks 1-3 subspecialties). Student qualitative comments were collected during exit interviews, coded by theme, quantified and compared using ANOVA. Student learning environment perceptions were assessed using 8-standardized items in end-of-rotation evaluations and compared using t-tests. Educational outcomes included NBME shelf exam and clinical performance evaluation scores and were compared using ANOVA.

Results: Student demographic characteristics were similar during each schedule period. Compared to students on baseline schedule A, those on schedule B offered more qualitative feedback on schedules (81% vs 27%, p<0.001), including more constructive suggestions (p=0.05) and complaints (p=0.001). They also reported more shadowing (p=0.004). However, compared to schedule A, there were no significant differences in mean student learning environment perceptions, shelf exam scores, or clinical performance scores for students on schedules B or C (all p>0.05). Clinical performance scores for students on schedule C were higher than B (44.7 vs 43.7, p=0.006). Further, total clerkship score (which includes both clinical performance and shelf exam, as well as assignment and professionalism points) was lower in schedule B compared to A (p=0.01).

Discussion: Different clinical schedule approaches may influence important educational outcomes. Additional research is needed to understand the impact of inpatient/outpatient service obligations, integration into longitudinal experiences, and preceptor mix on student clerkship outcomes.

TREATMENT OF INFANT FORMULA WITH PATIROMER DOSE DEPENDENTLY DECREASES POTASSIUM CONCENTRATION

Neil J. Paloian; Barbara Bowman; Sharon M. Bartosh

Background: Hyperkalemia is a potentially life threatening complication of chronic kidney disease (CKD). Critical to its management is restriction of potassium intake. This can be challanging in infants despite low potassium formulas. Current ion exchange resins exchange potassium in formula for sodium, but the large sodium load may not be tolerated in children with CKD. Decreasing potassium in formula with patiromer, a new calcium based cation exchange polymer, may be one option to accomplish this.

Objective: To determine if treatment of infant formulas with patiromer decreases the potassium concentation. A secondary objective was to see if non-targeted ions were impacted by patiromer treatment.

Design/Methods: Similac Advance and Similac PM 60/40 were prepared from powder per the manufacturer's instructions to a final volume of 500ml. Pretreatment measurements of potassium, calcium, sodium, magnesium, and phosphorus were obtained. Doses of 2.1g, 8.4g, and 16.8g of patiromer were then added to the formula samples. Measurements were obtained at 30 mins, 60 mins, and 24 hours, being careful not to disturb the medication clearly visible at the bottom of the container.

Results: Following pretreatment with patiromer, the potassium concentration of both formulas decreased (see table). This effect was mild with the 2.1 gram dose but increased in a dose dependant fashion. The potassium decrease was more pronounced in the standard formula, although the final potassium concentration was lowest in the PM 60/40. In general, treating for 60 minutes or 24 hours did not yield substantially greater effects than treating for 30 minutes. Calcium levels increased in both formula groups, mostly in a dose dependent fashion, with only small increases at 60 minutes and 24 hours. There was a decrease in magnesium levels following treatement, especially with the 16.8 gram dose. Sodium levels decreased slightly in the regular formula but there was little effect in the low solute formula. Phosphate levels rose slightly.

Conclusion(s): This is the first study that demonstrates that treatment of infant formula with patiromer decreases its potassium concentration, which occurs in a dose dependent manner. The lowest potassium concentration in both patiromer-treated formulas was lower than human breast milk. Calcium levels increased after treatment and sodium levels decreased slightly with the majority of ion exchange occuring in 30 minutes. Treatment of formula with patiromer is a unique option for managing hyperkalemia without increasing sodium delivery.

OSTEOGENESIS IMPERFECTA WITH HYPOCALCEMIA DUE TO DIGENIC ABNORMALITIES COMPRISING A COL1A1 MUTATION AND A CHROMOSOMAL DUPLICATION DISRUPTING THE CALCIUM-SENSING RECEPTOR

Neil Paloian; Peggy Modaff; Blaise Nemeth; Jennifer Laffin;Rajesh Thakker; Robert Steiner

Background: Osteogenesis imperfecta (OI) is an inherited disorder of structural bone proteins that causes a variety of symptoms, with the most notable being excess or atypical fractures. It is unusual for a patient with OI to have a systemic disorder of calcium metabolism except mild hypercalciuria. Here we present a child with OI and hypocalcemia who was determined to have a duplication disrupting the calcium sensing receptor (CaSR) gene.

Design/Methods: OI genetic testing was performed by DNA sequence analysis of COL1A1. Chromosomal abnormalities were sought by microarray analysis.

Results: The patient is an 8 year old boy who had a fracture at 9 months and blue sclerae. Genetic testing confirmed a c.1821+1G>A mutation in one allele of COL1A1, a causative mutation known to result in OI type I. At age 6 years, his first set of chemistries were obtained and revealed a low total calcium of 7.9 mg/dl (lab normal 9.2-10.8). Follow-up total calcium fluctuated between 7.8 - 9.2 mg/dl and ionized calcium was always low, ranged 4.89-4.95 mg/dl (5.1-5.9). 250H vitamin D levels were consistently above 30 ng/ml and PTH ranged 15.6-26.4 pg/ml (12-88). Urinary calcium/creatinine ratios ranged 0.2-0.9 (< 0.2). Long bone x-rays revealed osteopenia and renal ultrasound was without nephrocalcinosis or stones. Chromosomal microarray was performed as part of a workup for autism and intellectual disability. This revealed a previously unreported 482.3 kb duplication of chromosome 3g21.1. This region includes nine OMIM genes including the CaSR gene, CASR which was disrupted by the duplication event. Parental testing revealed normal COL1A1, but the 3g21.1 duplication was also present in the father, who exhibited mild hypocalcemia (total calcium 8.3 mg/dl) with a PTH 62 pg/ml.

Conclusion(s): Hypocalcemia in a patient with OI should be investigated as this is not a common finding in this population. Our patient with a de novo mutation causing OI was found to have a paternally inherited duplication disrupting CASR suspected of causing autosomal dominant hypocalcemia (ADH), which is consistent with the hypocalcemia and inappropriately normal PTH observed in the patient and his father. Genetic testing led to a management change including discontinuation of calcium supplementation due to the risk of nephrolithiasis. How this specific duplication causes activation of the CaSR and how ADH will affect this patient's bone phenotype are unclear and are under investigation.

TEACHING PEDIATRIC OTOSCOPY: A SURVEY OF FACULTY PRECEPTORS

Caroline Paul; Gary Beck Dallaghan; Alanna HIggens Joyce; Meg Keeley; Corinne Lehmann; Suzanne Schmidt; Kari Simonsen; Cynthia Christy

Background: Acute Otitis Media(AOM) is the most common reason for prescribing antibiotics to children in the United States. Competency in the pediatric ear exam is critical for diagnostic accuracy; yet standardized curricula are still lacking. AOM is very prevalent in the pediatric student's ambulatory learning realm where preceptors are their "frontline" teachers. Data about preceptor teaching practices is unknown. Such scholarship could lead to key learner interventions.

Objective: To identify preceptors' perceptions on teaching otoscopy to pediatric clerkship students

Design/Methods: A 30-item online IRB-approved survey using scaled(1-4) and multiple-choice questions was administered to a purposeful sample of pediatric preceptors at 6 institutions in 2017. A focus group piloted the survey with subsequent survey revision. Peer-reviewed standards guided content. Domains included attitudes, teaching barriers and preceptor practice. Descriptive and inferential statistics were used to analyze the results of the survey instrument.

Results: 181/310 (58%) of preceptors completed the survey. 96% of preceptors reported that all graduating students should be able to perform basic pediatric otoscopy. 78% reported curricula would make their teaching more effective. Common teaching barriers were: the lack of technological devices (77%), presence of cerumen (58%), time to teach with actual patients (46%), and parent or student anxiety (62%, 41%).

42% of preceptors use tympanic membrane bulging as the main AOM diagnostic criteria. 68% of preceptors reported pneumatic otoscopy is important for diagnosis; yet, only 13% use it and 64% do not demonstrate it. 57% of preceptors reported cerumen as a barrier to accurate diagnosis. 43% of preceptors received no training in cerumen removal and 37% reported it as a current difficult skill.

Conclusion(s): We highlight the value of assessing the needs of preceptors to improve the teaching of pediatric otoscopy. Our preceptors' needs were multi-dimensional from curricula and technology needs to coping with student and parent anxiety. Findings suggest disparities among knowledge and skills of preceptors themselves. Many are not using standard 2013 AAP diagnostic criteria, are demonstrating skills that were not taught to them and that are still difficult, and are not performing pneumatic otoscopy even though effusion/mobility is their chosen diagnostic criteria. Standardized curricula and aids for teaching skills in direct patient care are vitally needed for pediatric otoscopy: a topic universally important to our learners and our patients.

THE DECLINE IN COMMUNITY PRECEPTORS: AN EXPLORATION OF PEDIATRICIANS WHO NO LONGER TEACH MEDICAL STUDENTS

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Background: Inability to recruit and retain community preceptors for medical student clinical education is increasingly more difficult (1,2). Many educators are trying to combat this concern by identifying and developing strategies for overcoming barriers. We previously explored the reasons why community pediatricians are motivated to see students (3). The purpose of this study was to explore perspectives from the opposite population of physicians; namely, those who have reduced or eliminated their interactions with medical students. Objective: The purpose of this study is to explore in detail reasons community-based preceptors suspended teaching medical students.

Methods: This is a multi-center qualitative action research study involving semi-structured interviews with communitybased Pediatric preceptors affiliated with 20 institutions. Participating institutions are diverse with respect to geographic location, private vs public, and size of class. Phone or in person interviews are done by site PI or their designee. Sample size is determined by collective saturation, the point in data collection when no new or relevant information emerges, estimated at 3-8 interviews per participating center. Interviews are transcribed and participants are asked to review the transcriptions for intended meaning. Final transcripts are de-identified and a code book will be developed by a team of coders. Through a constant comparative method, codes will be revised as data are analyzed. Disagreements for codes will be resolved through discussion and consensus. Final interpretation of the meaning of identified themes will be decided by the entire research team. Each site has obtained IRB approval prior to conducting interviews.

Results: At the time of submission, one-third of the interviews have been completed, transcribed and reviewed by physician participants. Interviews will be completed by November 30. Analysis will be completed by February 1. Final results will be completed by March 15.

Discussion: Identifying characteristics that deter communitybased preceptors to provide educational experiences to medical students may help COMSEP members and medical schools recruit new and retain current preceptors. Identifying themes emerging from these interviews will guide COMSEP develop strategies for retaining community-based preceptors.

MATERNAL, ANTENATAL, AND INTRAPARTUM RISK FACTORS FOR NEONATAL HYPOXIC ISCHEMIC ENCEPHALOPATHY

Patrick Peebles; Theresa Duello; Jens Eickhoff; Ryan M. McAdams

Background: Hypoxic ischemic encephalopathy (HIE) causes significant morbidity and mortality in neonates. Previously identified medical risk factors for HIE include maternal thyroid dysfunction, placental abruption, fetal growth restriction, severe preeclampsia, and delivery at ≥41 weeks' gestation. Objective We sought to identify maternal, antenatal, and intrapartum risk factors for HIE.

Design/Methods: We conducted a single center, retrospective case-control study using PeriData.Net[®] for singleton births \geq 36 weeks' gestation born between 2009-2016. Neonates with HIE were defined as having medical record documentation of HIE, plus one of the following: 1) APGAR \leq 3 at 5 minutes or \leq 5 at 10 minutes, 2) seizures, or 3) death. Controls were defined as neonates born at \geq 36 weeks' gestation without documentation of HIE who survived to discharge. Neonates with major congenital anomalies or chromosomal disorders were excluded. All comparisons were adjusted by gestational age at birth and gender.

Results: Twenty-eight neonates with HIE and 25,845 control neonates were identified during the study period. Median gestational age at birth was 40 weeks 3 days for neonates with HIE and 39 weeks 4 days for control neonates. Three (11%) neonates with HIE died prior to discharge. Neonatal HIE was associated with maternal thyroid disease (OR 3.9, 1.5-10.3), placental abruption (OR 34.7, 11.7-103.1), preeclampsia with severe features (OR 26.2, 2.7-258.6), maternal antidepressant use (OR 3.5, 1.2-10.1), maternal illicit drug use (OR 4.8, 1.1-20.4), and maternal alcohol use during pregnancy (OR 11.0, 1.5-81.9). There was no significant association detected between neonatal HIE and maternal intrapartum fever, or clinical chorioamnionitis.

Conclusion: Neonatal HIE is associated with maternal thyroid disease and maternal antidepressant, illicit drug, and alcohol use during pregnancy. Inflammatory conditions, such as chorioamnionitis and fever, were not associated with HIE. Women with thyroid dysfunction and antidepressant, illicit drug, and alcohol use may warrant additional screening during pregnancy given the increased risk for neonatal HIE.

ASTHMA IN SIBLINGS AND RISK FOR CHILDHOOD ASTHMA

David L. Peloza; Mike D. Evans; James E. Gern; Robert F. Lemanske; Dan J. Jackson

Rationale: Sibling asthma as a risk factor for childhood asthma inception has not been extensively evaluated. We hypothesized that having an older sibling with asthma would increase asthma risk.

Methods: 289 newborns at high-risk based upon parental histories of asthma and/or allergy were enrolled in the Childhood Origins of Asthma (COAST). Asthma was diagnosed at 6, 8, 11 and 13 years based on physician diagnosis of asthma, patterns of medication use and symptoms. The relationship between older sibling and parental asthma and subsequent asthma was analyzed using logistic regression.

Results: Rates of asthma according to family history at ages 6-13 years were 19-23%, 27-31%, 36-39%, and 40-49% for children without family history of asthma, parental asthma, sibling asthma, or both parental and sibling asthma, respectively. Asthma in older siblings was associated with increased odds of asthma at ages 6, 8, 11, and 13 years (OR 1.95, 95%CI 1.09-3.48, p=0.03; OR 2.15 95%CI 1.19-3.87, p=0.01; OR 2.06, 95%CI 1.11-3.84, p=0.02; OR 1.88 95%CI 1.00-3.56, p=0.05, respectively). Parental asthma was not associated with a significant increase in risk.

Conclusions: In our high-risk birth cohort study, older sibling asthma was associated with an increased risk of asthma. Both genetic and environmental factors shared by siblings are likely to contribute to this increased asthma risk. Our inclusion criteria required at least one parent to have respiratory allergies, which may explain why parental asthma was not a significant risk factor.

PREDICTORS OF ADOLESCENTS' CLUB DRUG INITIATION WITHIN THE FIRST YEAR OF UNIVERSITY

Daniel Pham

Introduction: Over 18 million people in the United States over the age of 18 have used ecstasy and over 3.3 million have used ketamine in their lifetime. While there have been studies that have investigated adolescent drug initiation via Social Learning Theory, it remains unclear whether an adolescent's peers' discussion of these 'club drugs' (defined as ecstasy and ketamine) on Facebook correlate with that adolescent's intention to use those drugs.

Purpose: The purpose of this study is to investigate peers' behaviors and attitudes (BAs) in online and offline settings as predictors of college freshmen's club drug initiation.

Methods: This one-year, longitudinal, secondary analysis involved incoming college freshman students from a Midwestern and Northwestern university who were randomly selected from registrar lists for recruitment. During the summer before and after freshman year, participants completed phone interviews assessing their club drug-related attitudes, intentions, and behaviors. Additional variables included percentage of friends who approved and used club drugs, as well as percent of friends and close friends who posted Facebook references to them. For this secondary analysis of club drug initiation, participants who used club drugs prior to freshman year were excluded. Binary linear regression models were used to measure correlations of year 1 peer offline BAs (combination of friends' approval and use) and peer online BAs (combination of percent of friends and close friends posting about alcohol) for a participant's club drug initiation at year 2. Result: Of the 338 participants from the original study, an analysis was done on 332 of those participants. 6 participants were excluded due to previous club drug use. Of the remaining 332 participants, 175 (56%) were female, 233 (74%) were Caucasian, 184 (55%) were from the Midwestern University. Of these 332 participants, 13 (3.9%) initiated club drug use during freshman year. Peer's BAs online was not statistically significant, X2(2) = 0.131, p < .94. Peer's BAs offline was statistically significant, X2(2) = 10.991, p < .004. The model explained 12.5% (Nagelkerke R2) of the variance and correctly classified 95.4% of cases.

Conclusion: Our study supports the social learning theory in predicting club drug initiation through offline but not online peer attitudes and behaviors. College healthcare clinics can use this information to provide necessary resources to college social groups who may be more likely to use club drugs. Incoming college freshmen can also use this information so they could implement preventative or harm-reducing strategies before initiating in club drug use.

ELECTRONIC HEALTH RECORD (EHR) QUALITY TOOLS IMPROVED USE OF ASTHMA ACTION PLANS IN A PRIMARY CARE PEDIATRIC SYSTEM

Karen Pletta; Gail Allen; Sanjeev Jain; Bradley Kerr; Megan Moreno

Background: Over 6 million US children have asthma resulting in 800,000 asthma-related emergency room (ER) visits per year. Asthma Action Plans are recommended for patients to improve asthma control but are not consistently utilized in busy pediatric primary care clinics.

Objective: The purpose of this project was to develop EHR quality tools to improve the use of Asthma Action Plans (AAPs) for pediatric patients toward the goal of reduced asthma-related ER visits.

Design/Methods: Our primary care pediatric clinic system includes 8 clinics with 44 providers serving 46,000 patients, approximately 10% of whom have asthma. The Plan-Do-Check-Act quality improvement method was followed to use the EHR asthma registries and to develop team-based tools including well-child check and outreach workflows. Pediatricians updated the registry lists to accurately include patients with asthma. At well-child checks, pediatric staff gave patients Asthma Control Tests (ACTs) and pediatricians completed AAPs that were given to patients. An EHR registry workbench was developed to track ACTs, AAPs, flu shots and ER visits. Outreach calls were done by staff to patients overdue for ACTs; updated information was then forwarded to providers who completed AAPs which were sent to patients. Registry reports were distributed to providers with monthly ACTs, AAPs and ER visits to show progress and encourage continued involvement. Rates of AAP and ER use were evaluated at baseline (5/1/2015),1 year (T1) and 2 years (T2). We used McNemar's Chi-squared test for proportions.

Results: Total number of patients in the asthma patient registry was 4392 at baseline, 3423 at T1 and 3298 at T2. The number of patients with an AAP was 667 (15%) at baseline, 1587 (46%) at T1 (<0.001) and 2120 (64%) at T2 (p <0.005).

The number of patients with an ER visit in the past 1 year was 74 (1.68%) at baseline, 54 (1.58%) at T1 (p= 0.6) and 47 (1.43%) at T2 (p= 0.5).

Conclusions: Our primary care pediatric system developed an EHR asthma registry and associated team-based tools and workflows that led to an increased and sustained use of AAPs. The number of ER visits fell but this was not statistically significant. We found that our asthma ER visit rate was consistently low at < 2%. EHR asthma registry, tools and standardized workflows allow for continued monitoring of asthma care. Next steps will be to evaluate if AAPs decrease missed school or work days for families; this will be valuable to understand outcomes of AAPs for children with asthma.

MATERNAL STRESS AND DEPRESSION ARE ASSOCIATED WITH DEVELOPMENT OF A HIGH- WHEEZE, LOW-ATOPY PHENOTYPE IN THEIR YOUNG OFFSPRING

Sima K Ramratnam; Agustin Calatroni; Leonard Bacharier; Daniel J. Jackson; Avraham Beigelman; Robert A. Wood; Meyer Kattan; George T. O'Connor; Cynthia M. Visness; Peter J. Gergen; James E. Gern

Rationale: Environmental exposures in early life may result in a specific respiratory phenotype later. We sought to determine whether exposure to maternal stress and depression prenatally and in early life influences the development of specific longitudinal phenotypes of childhood wheezing and atopy in a high-risk, urban birth cohort.

Methods: The Urban Environment and Childhood Asthma (URECA) study examined a birth cohort at high risk for asthma with parental history of allergic disease and/or asthma through age 7 years (n=442). From birth to age 7, we annually assessed maternal stress using the 4-item Perceived Stress Scale and maternal depression using the Edinburgh Postnatal Depression Scale. Respiratory phenotypes describing longitudinal atopy, wheeze, and lung function were identified using a latent class mixture model. Differences among these phenotypes in maternal stress and depression were examined using analysis of variance.

Results: We identified 5 phenotype groups of childhood wheezing and atopy: 1) low wheeze, low atopy ("LW-LA," n=117); 2) low wheeze, high atopy ("LW-HA," n=81); 3) transient wheeze, low atopy ("TW-LA,"n=75); 4) high wheeze, low atopy ("HW-LA," n=101); and 5) high wheeze, high atopy ("HW-HA," n=68). Significant differences were found across phenotypes in maternal depression and perceived stress for all time points examined, with the highest reported values in the HW-LA group.

Conclusions: Our results demonstrate that early life exposures in children at high-risk for asthma to maternal stress and depression are specifically associated with the HW-LA respiratory phenotype.

PULMONARY DEAD SPACE FRACTION AND REGIONAL OXYGEN SATURATION AS EARLY PREDICTORS OF CLINICAL OUTCOME AFTER PEDIATRIC CARDIAC SURGERY

Imran A. Sayed; Scott Hagen; Victoria Rajamanickam; Petros V. Anagnostopoulos; Marlowe Eldridge; Awni Al-Subu

Objectives: To determine the prognostic value of both pulmonary dead space fraction (AVDSf) and regional oxygen saturation (rSO2) during the first 24 post-operative hours in children with congenital heart disease (CHD) who underwent cardiac surgery.

Design: A single center retrospective cohort study. Setting: Pediatric intensive care unit (PICU) in a tertiary care freestanding children's hospital. Patients: Critically ill children and infants with CHD, younger than 18 years of age who were admitted to the PICU intubated and received invasive mechanical ventilation for at least 24 hours between January, 2012 and August, 2016 after undergoing surgical repair on cardiopulmonary bypass (CPB). Interventions: None. Measurements and Main Results: 315 patients underwent CHD repair with CPB during our study period. 103 patient encounters were included and divided into survival and non-survival groups. Non-survival group included patients who had mortality within 30 days of PICU admission (n=10). Mean AVDSf at 24 hours for non-survivors was 0.29 + 0.07 and for survivors was 0.15 + 0.06. AVDSf was significantly higher amongst nonsurvivors at 24 hours (p=0.01), for every 0.1 increase in the AVDSf the odds of mortality were increased by 4.9 [95% CI=1.9-12.2, p=0.0005]. Using the receiver operating characteristic (ROC) model, the area under the ROC curve for AVDSf was 0.87 [95% CI, 0.76-79], an AVDSf > 0.25 at 24 hours postoperatively was an independent predictor of hospital mortality with sensitivity and specificity of 83% and 81% respectively. In a simple linear regression model with line fitting analysis, the non-survivors compared to the survivor group had higher cerebral rSO2 in the first eight hours followed by lower values until 24 hours. This interaction between the two groups with change over time was statistically significant (p=0.01). Such differences were not observed to be statistically significant amongst the groups, for the renal rSO2 values over time. Conclusions: Increased AVDSf values at 24 hours post operatively is associated with mortality and prolonged length of mechanical ventilation in patients with CHD. The decline of cerebral rSO2 values in the first 24 hours post-operatively was associated with mortality after pediatric cardiac surgery.

SEX DIFFERENCES SEEN IN ESTROGEN RECEPTOR ALPHA EXPRESSION AND THE EFFECT OF TESTOSTERONE

Molly Serebin; Dila Zafer; Vishal Chanana; Kaylyn Freeman; Makaia Frober; Katharine M. Amborn; Margaret B. Hackett; Peter A. Ferrazzano; Pelin Cengiz

Background: Expression and actions of neurotrophins and their receptors may account for female resistance to hypoxiaischemia (HI) related brain injury. Treatment with a selective tyrosine kinase B (TrkB) agonist (7,8-dihydroxyflavone [7,8-DHF]) results in neuroprotection only in female hippocampal neurons in an ERα dependent way following in vitro ischemia. This neuroprotection seems to be mediated by increased ERα mRNA and protein expressions following in vitro ischemia. Our findings thus reveal that female-specific up-regulation of ERα expression, and hence greater ERα crosstalk with TrkB results in neuroprotection only in female hippocampal neurons. Thus, we hypothesize that sex differences in ERα expression and neuroprotection following in vitro ischemia are programmed by the perinatal hormonal environment mainly perinatal exposure of testosterone (T).

Method: Sexed hippocampal primary neurons cultured from P1 ERÎ \pm WT and KO C57BL/6J mice exposed to oxygen-glucose deprivation (OGD) and reoxygenation (REOX) on DIV 7. Cells were treated with either normoxic media or 7,8-DHF during REOX. Cells were stained, imaged (confocal microscopy) and analyzed (Image J) for cell survival (Calcein, PI), p-TrkB and MAP-2 at 24 h REOX. To study the effect of OGD and presence of T, ERÎ \pm WT male and female cells were treated with either T or VC starting from DIV2 while male neurons were treated with VC. On DIV7, cells were exposed to 4 h of OGD followed by 3 h of REOX. ER mRNA was detected using qPCR. ANOVA with a Bonferroni post-hoc test used for analysis.

Results: 7,8-DHF treatment significantly increased p-TrkB immunoexpression (p=0.0023) and rescued the cell survival (p=0.048) only in ERÎ \pm WT female neurons after OGD/REOX in an ERÎ \pm dependent way. OGD/REOX increased ERÎ \pm mRNA expressions by 3 folds (p= 0.001) in female neurons compared to male normoxic, OGD and female normoxic neurons. T exposed female neurons failed to show this increase in the ERÎ \pm mRNA upregulation (p< 0.001) and expressed same level of ERÎ \pm mRNA as male neurons.

Conclusion: 7,8-DHF enhances neuroprotection only in $ER\hat{1}\pm$ WT female hippocampal neurons following in vitro ischemia in an $ER\hat{1}\pm$ dependent way. TrkB mediated neuroprotection that is dependent on the $ER\hat{1}\pm$ expression seem to be influenced by the perinatal hormonal environment.

FEEDING DURING HIGH FLOW NASAL CANNULA FOR BRONCHIOLITIS: ASSOCIATIONS WITH LENGTH OF STAY AND ADVERSE EVENTS.

Kristin Shadman; Patrick O'Donnell; Daniel J. Sklansky; Michelle M. Kelly; M. Bruce Edmonson; Christina B. Barreda,; Gemma Warner; Anne S. Thurber; Ryan J. Coller

Background: Bronchiolitis is the most common cause of hospitalization in children under 2 years of age. High flow nasal cannula (HFNC) reduces work of breathing and intubation rates in patients with bronchiolitis; however, best practice for feeding during HFNC administration, and the impact of feeding on length of stay (LOS) or feeding-related adverse events, are unknown.

Objective: To identify if feeding exposure during HFNC is associated with 1) LOS or 2) feeding-related adverse events.

Methods: Retrospective cohort study of patients aged 1-24 months receiving HFNC for bronchiolitis at a children's hospital 1/1/2015-3/1/2017. Exclusions included pre-existing dysphagia, respiratory support, or admission diagnosis of aspiration pneumonia. Feeding exposures during HFNC, were categorized using a structured tool as: 1) any feeding during HFNC (vs NPO throughout); 2) fed within 24 hours of HFNC initiation by any modality; or 3) exclusive oral feeding throughout. Primary outcome was time to discharge from end of HFNC. Relationships between time to discharge and feeding exposure were evaluated with three Cox proportional hazards models - unadjusted, adjusted, and propensity-weighted. Covariates included demographics, prematurity, passive tobacco smoke exposure, day of illness on admission, unit of HFNC initiation, respiratory rate at HFNC initiation, blood gas, and need for intubation or non-invasive ventilation prior to HFNC. Secondary outcomes were time to discharge from HFNC initiation, aspiration, intubation after HFNC, and 7-day readmission.

Results: Patients (n=128) had a mean age 7.3 months (SD 7.1) and presented on day of illness 4.8 (SD 2.3). Prior to HFNC, 10% required higher respiratory support (3% mechanical ventilation). Former preterm infants were 12% of the sample. During HFNC, 36% were NPO throughout, 40% were fed within 24 hours, and 42% were exclusively orally fed. Overall, time to discharge after HFNC was 49.0 hours (SD 50.4). In adjusted models, less time to discharge was shorter with any feeding (vs NPO) (HR 2.0; 95%CI 1.3-3.1) feeding within 24 hours by any modality (HR 1.5; 1.0-2.3) and exclusive oral feeding (HR 1.9; 1.2-3.0). Propensity-weighted models were similar. Adverse events were rare and not associated with feeding exposures (p>0.05 for aspiration, intubation, or 7-day readmission).

Conclusion: Time to discharge appeared shorter for children fed during HFNC. None of the studied feeding exposures during HFNC for bronchiolitis was associated with feeding-related adverse events in this single-center study.

EARLIER DISCHARGE TIME FOR PEDIATRIC INPATIENTS ASSOCIATED WITH DISCHARGE TIMING TOOL

Daniel J. Sklansky; Anne S. Thurber; Qianqian Zhao; Sabrina M. Butteris; Kristin A. Shadman; Michelle M. Kelly; M. Bruce Edmonson; Christina B. Barreda; Ryan J. Coller

Background: Hospital discharge requires coordinated communication, particularly regarding discharge timing, which impacts patient flow, Asatisfaction, and resource utilization. **Objective:** To (1) describe the implementation of a discharge timing tool in the electronic medical record (EMR), and (2) evaluate its association with discharge timing.

Design/Methods: Multidisciplinary teams developed a "confirmed discharge time (CDT)" designation that any health care worker could enter into the EMR documenting the discharge time agreed upon by medical teams, family, and ancillary staff. The CDT was visible to all providers in the EMR to encourage services to prioritize discharge processes for patients with upcoming discharge. Five phases informed by Plan-Do-Study-Act (PDSA) cycles were studied including (1) pre-implementation, (2) initial implementation, (3) Department of Pediatrics financial incentivization, (4) EMR discharge navigator workflow adaptation, and (5) maintenance. Statistical process control charts tracked bi-weekly CDT use and percent of discharges before noon. Median discharge time and length of stay (LOS) were measured for each phase, and analyzed for differences with Wilcoxon Rank Sum testing.

Results: There were 20,133 discharges during the study period. Figure 1 depicts statistical process control charts for CDT use and discharges before noon. Mean CDT use increased from zero to 71% in the maintenance phase, with special cause variation detected after initial implantation and each implementation change. Special cause variation in discharges before noon was observed after initial implementation, with a 5.12% absolute increase from 20.56% to 25.68%. Discharge time was earlier and LOS was shorter in the maintenance phase than in the preimplementation phase (14:18 vs 14:40, p<0.001, and 44 hours vs 47 hours, p<0.05).

Conclusion: Use of a discharge timing tool was maintained in this single institution study, and may be associated with a small, but significant, increase in before-noon discharges and earlier median discharge time. Future studies should explore which populations are most responsive to discharge timing collaboration.

CONFOUNDING EFFECT OF TRAINING YEAR ON MILESTONES-BASED ASSESSMENTS BY PEDIATRIC FACULTY

Daniel J Sklansky; Melissa A Cercone; Kathleen A DeSantes; Megan F Neuman; John G Frohna

Background: Many residency programs use milestones-based end of rotation assessments to inform clinical competency committee (CCC) decisions. No studies have examined whether assessment scores of residents assigned by faculty are affected by resident training year. The common trend of higher milestones scores associated with higher training year could be affected by unconscious anchoring bias related to training year status, confounding competency-based assessments.

Objective: To determine if resident sub-competency scores increase more rapidly in the 6 month period between CCC sessions that corresponds to promotion from first to second year status (between-year) compared to the 6 month periods contained within the first and second training years (within-year).

Methods: Two residency classes were studied over three academic years at our mid-sized residency program. In preparation for semi-annual CCC sessions, end of rotation milestones-based sub-competency assessments were aggregated into a summary score for each resident. For resident classes beginning in 2014 and 2015, we calculated "improvement scores" by measuring the difference in aggregate scores between fall and spring of training year 1 (first within-year), spring of training year 1 and fall of training year 2 (between-year), and fall and spring of training year 2 (second within-year). Residents who left the program or changed classes were excluded. Mean improvement scores were compared using a T test assuming unequal variances.

Results: A total of 4,363 individual sub-competency assessments were made by faculty for 25 pediatric residents. First and second within-year improvement scores were similar, at 0.264 and 0.176 (p=0.23), respectively. The mean between-year improvement score of 0.385 was significantly greater than the mean within-year improvement score of 0.220 (P=0.05), showing nearly double the rate of milestone score improvement in the time interval capturing training year promotion.

Conclusion: Our data suggest that milestones-based assessment by pediatric faculty may be influenced by resident training year, as demonstrated by accelerated milestones score increases during the time period spanning training year promotion. Further studies should evaluate efforts to minimize the potential non-competency anchored effect of training year status on milestones score assignment.

FARM EXPOSURE INFLUENCES SKIN MICROBIOTA IN INFANCY

Cheryl Steiman; Douglas Fadrosh; Michael Evans; Rose Vrtis; Brent Olson; Kathrine Barnes; Christine Seroogy; Casper Bendixsen; Susan Lynch; James E. Gern

Rationale: Wisconsin dairy farm children are less likely to develop atopic dermatitis (AD) compared to non-farm. We hypothesize that there is a more diverse skin microbiota in farm-raised infants compared to non-farm and a less diverse skin microbiota in subjects who develop AD.

Methods: Parents reported by questionnaire if a healthcare provider diagnosed the child with AD at clinic visits (2, 9, 12, 18, 24 months) and phone calls (6, 15, 21 months). We sampled the antecubital fossa of 2-month-old subjects (n=187) and profiled the microbiota by sequencing the V4 region of the 16S rRNA gene. We used alpha diversity (Faith's phylogenetic diversity) and beta diversity (unweighted UniFrac) to analyze effects of farm-status. We used alpha diversity (Shannon diversity), beta diversity (weighted UniFrac) and taxon relative abundance comparisons (zero-inflated negative binomial regression) to analyze effects of AD-status.

Results: AD was significantly less prevalent in the farm group; this relationship was age dependent with strong differences in the second year of life (p=0.004). The farm group had significantly higher skin microbial diversity (p=0.013) and distinct community compositions (p<0.001, R-2=0.020). AD was associated with distinct bacterial communities (p=0.039, R-2=0.015), with a trend (p=0.086) towards lower diversity. AD was significantly depleted for a Corynebacterium taxon (q=0.047).

Conclusions: Wisconsin dairy farm-raised infants have a more diverse skin microbiota compared to non-farm. A less diverse microbiota and early-life depletion of Corynebacterium are risk factors for developing AD. These findings suggest that the 2-month skin microbiota of farm-raised children may contribute to the reduced incidence of AD later in life.

THE NOVEL EARLY USE OF DEXMEDETOMIDINE IN THE MANAGEMENT OF PEDIATRIC TETANUS

Andrea M. Talukdar; Guelay Bilen-Rosas; Michael Wilhelm; Awni Al-Subu

Introduction: Tetanus is a neurotoxin-mediated disease characterized by muscle spasms, rigidity, airway compromise, and sympathetic overactivity. Due to decreasing incidence, many providers in developed countries lack experience with tetanus. This case will discuss the use of dexmetomidine to prevent autonomic dysregulation.

Case Presentation: A previously healthy, unimmunized six year old male presented with tetany, trismus and risus sardonicus. He was admitted to the PICU due to acute hypoxemic respiratory failure requiring mechanical ventilation. He met criteria for severe tetanus with increased risk for autonomic instability and mortality. He was treated with tetanus immunoglobulin, metronidazole, IV magnesium, and a midazolam infusion as well as muscle relaxant to control spasms. He was started on dexmetomidine to minimize potential autonomic instability, which is the leading cause of mortality and morbidity due to tetanus in developed countries. As an alpha-1 agonist with effects on heart rate and blood pressure, dexmetomidine may minimize autonomic complications. Due to the expected course of tetanus and to minimize oral stimulus causing spasms, he underwent tracheostomy on hospital day 8. During his course, he did not experience any autonomic dysregulation or arrhythmias. Recognition of the tetanus pathophysiology and choice of sedative medications, including dexmedetomidine, led to successful discharge from the hospital after four weeks with minimal complications.

Conclusion: While there are few published cases reporting the use of dexmedetomidine in the treatment of tetanus-induced autonomic instability after it has developed, we believe the avoidance of autonomic instability in this patient was directly related to the early use of an alpha-2 agonist. To our knowledge, this is the first report of preemptive use of dexmedetomidine in a pediatric patient with systemic tetanus. Further studies are needed to determine if dexmedetomidine may prevent autonomic dysfunction in tetanus.

A HEALTHY LIFE FOR A CHILD WITH MEDICAL COMPLEXITY: 10 DOMAINS FOR CONCEPTUALIZING HEALTH

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Background: Children with medical complexity (CMC) generate 40% of child Medicaid expenditures despite being ~3% of the pediatric population. There is currently no consensus framework to guide selection of the most important and feasible CMC health outcomes to measure and pursue. **Objective:** To use a diverse national sample of stakeholder experts to develop a consensus set of core outcome domains that will allow identification or development of specific CMC health outcomes that are foreseeably measureable in clinical settings.

Design / Methods: National snowball sampling of parent, provider, health plan, and research experts identified 164 invitees for Group Concept Mapping (GCM), a rigorous and validated mixed methods approach. GCM respondents first completed internet-based idea generation by providing unlimited short free-text responses to the focus prompt, "A healthy life for a child or youth with medical complexity includes: _". The resulting 707 statements were then synthesized through inductive content analysis and reduced via selection editing to 77 unique ideas. Participants then sorted ideas into clusters based on conceptual similarity and rated each item on perceived importance and measurement feasibility. Responses were then analyzed using multidimensional scaling and hierarchical cluster analysis and mapped via GCM software. A cluster solution best representing distinct outcome domains was chosen by the research team. Results: 110 participants (67.1%) completed brainstorming, with broad national representation. A cluster map representing 10 domains of CMC health outcomes best fit the data; the 10 domains are: 1) basic needs, 2) inclusive education, 3) child social integration, 4) current child health-related quality of life, 5) long-term child and family self-sufficiency, 6) family social integration, 7) community system supports, 8) health care system supports, 9) high-quality patient-centered medical home, and 10) family-centered care (Figure 1). 17 outcomes representing 8 of the 10 domains were rated as both important and feasible to measure ("go-zone") (Table 1).

Conclusions: GCM identified a rich constellation of health outcome domains for CMC that, to our knowledge, no one is measuring in entirety. The breadth of go-zone items across domains suggests a near-term opportunity to test and implement measures of health for CMC that align with the broader view of health that has emerged from this research.

NK CELLS MAY IMPROVE ANTITUMOR EFFECTS IN MICE VACCINATED WITH IMMUNOSTIMULATORY AGN2A CELLS

Katharine E. Tippins

The goal of the present research is to investigate the possible role of natural killer (NK) cells as an effective immunotherapeutic agent when used in conjunction with neuroblastoma cells (AgN2a) modified to express immune costimulatory molecules CD54, CD80, CD86, and CD137L. Efficacy of the NK cell treatment was assessed using a vaccine model in which mice were given a bone marrow transplant followed by two rounds of AgN2a cell vaccines, the second coupled with the additional NK cell treatment. After the vaccine course, mice were challenged with 2e6 neuroblastoma cells and monitored for clinical scores and tumor development. In vitro experiments also assessed the ability of NK cells to expand in the presence of the modified AgN2a. The data from these experiments showed that NK cell are able to successfully expand in vitro under varying ratios of AgN2a to NK cells. Preliminary data from the mouse immunization model has also shown that NK cells improve the anti-tumor effects of the AgN2a vaccine without causing any unintended graft vs. host effects. Further study into this work could yield interesting applications in a clinical setting in which tumor-specific vaccines could be created and used to generate anti-tumor effects in patients.

DEVELOPING WEB-BASED EDUCATION MODULES ON PEDIATRIC SLEEP DISORDERS FOR PRIMARY CARE PROVIDERS: AN INTERDISCIPLINARY APPROACH

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Objectives: Primary care practitioners receive little education on pediatric sleep disorders during training, yet frequently encounter children and adolescents who may have significant sleep-related issues. There is a lack of high-quality education for primary care providers regarding diagnosis, referral, and management of these patients. Our objective was to create educational materials with an interdisciplinary focus to fill this gap.

Methods: Pediatric Pulmonary Centers (PPC) are federallyfunded leadership training programs which provide interdisciplinary education regarding the care of Children with Special Health Care Needs, especially those with pulmonary and sleep disorders. An ad hoc sleep committee consisting of physicians, nurses, respiratory therapists, social workers, nutritionists, pharmacists, psychologists, and family advocates was convened. Each PPC provided personnel and funding to contract with an instructional technology group to complete a web-based, educational product.

Results: The ad hoc committee developed a process of identifying an overarching theme and specific disorders for each module. Each PPC spent 9 months writing the modules, using an iterative process including: a single pilot module, monthly committee calls, an in-person pair-share review process, and review by subject matter experts. The modules topics are: Introduction to Sleep Health (normal sleep, infant safe sleep, sleep hygiene); Pediatric Insomnia; Sleep Disordered Breathing (snoring, central and obstructive sleep apneas); Parasomnias (sleepwalking, nightmares); Hypersomnolence Disorders; and Movement Disorders in Sleep (rhythmic movements, bruxism, restless leg syndrome). Each module utilizes case-based approaches, with an introduction of concepts followed by the case, expert insights, "red flags" and history-taking guided by use of the BEARS Sleep Screening tool.1 Following an evaluation section, each case has an interdisciplinary plan with links to tools assessing sleepiness, a sleep diary, and resources for families. Indications for referral to a sleep specialist are clearly indicated and each case concludes with a follow-up and patient outcome. The modules allow CME credit to be obtained.

Conclusions: Education for pediatric primary care providers in the evaluation and management of sleep disorders is an urgent need. The PPCs developed a web-based resource that uses an interdisciplinary team approach to provide a family centered, culturally competent approach. The sleep modules will be a reliable, accessible, and sustainable resource that meets the needs of primary care providers.

MRI MARERS OF OUTCOME AFTER SEVERE PEDIATRIC TBI

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Background: Severe pediatric traumatic brain injury (TBI) is a major public health concern, affecting over 30,000 children each year. Mortality is high, and many survivors suffer life-long disabilities. While neuroimaging is a primary diagnostic tool in the clinical assessment of TBI, our understanding of how specific neuroimaging findings relate to outcome remains limited. Identification of imaging biomarkers of long-term neurocognitive outcome will improve clinical prognostication after an injury and help to direct rehabilitation strategies.

Methods: 25 Children ≥ 9 years old who had sustained a severe TBI were recruited for MRI scanning 1-2 years post-injury at 15 participating sites. 25 typically developing control subjects also underwent study MRI scanning. All subjects underwent a neuropsychological testing battery within 1 year of MRI scanning. MRI scans included anatomic imaging, diffusion tensor imaging, and resting-state functional MRI. Brain image segmentation was performed using Freesurfer to determine regional volumetrics. Brain and CSF volumes were used to compute a Ventricle-to-Brain Ratio (VBR) for each subject. Corpus Callosum cross-sectional area was determined in the midline for each subject. Group differences between TBI and control subjects were determined, and volumetric measures were correlated with tests of neurocognitive function.

Results: We found significant differences in VBR between TBI and control subjects. Additionally, significant differences in VBR were observed between TBI subjects with good and poor outcome as assessed by the Pediatric Glasgow Outcome Scale-Extended (GOS-E Peds). Additionally, preliminary analysis suggests that VBR may correlate with IQ and processing speed. **Conclsusion:** VBR is a marker of global cognitive function in children recovering from severe TBI. To our knowledge this is the first time that VBR has been correlated with the pediatric version of the GOS-E. Analysis of the relationship between corpus callosum volume and functional outcome is currently underway.

MICROGLIAL RESPONSES TO TRAUMATIC INJURY IN THE DEVELOPING BRAIN

Dila Zafer; Molly Serebin; Becca Novak; Chelsea Benedict; Vishal Chanana; Pelin Cengiz; Peter Ferrazzano

Background: Traumatic brain injury (TBI) is one of the greatest sources of morbidity and mortality in children. Neuroinflammation is known to play an important role in brain injury and recovery after TBI in adults. However, little is known about the neuroinflammatory response to traumatic injury in the developing brain, or how the inflammatory response changes with brain development. Microglia are the primary immune response cell in the central nervous system, and we have previously identified important age-dependent differences in the microglial response to injury in the developing brain. The overall goal of this project is to define regional and age-based differences in microglial response to TBI in the developing brain.

Methods: Controlled cortical impact device was used to induce a cortical contusion in post-natal day 12 and post-natal day 30 rats. T2-weighted MRI was performed a 2 days post-injury, diffusion tensor imaging was performed at 6 weeks post-injury, and Iba-1 immunostaining of microglia was performed at 2 days and 6 weeks post-injury.

Results: T2-weighted imaging demonstrates a parietal contusion with small area of hemorrhage and surrounding area of vasogenic edema. In peri-lesional tissue, ameboid microglia are found to be engulfing neurons. T2-weighted hyperintensity is seen in the ipsilateral corpus callosum. Intense microglial infiltration is seen in the corresponding ergions of the corpus callosum on immunostained sections collected immediately after MRI scanning.

Conclusion: MRI can be used to quantify the contusion in the controlled cortical impact model of TBI in the developing brain. Microglial infiltration into major white matter tracts such as the corpus callosum correlates with areas of T2-weighted signal hyperintensity on MRI.