



Department of Pediatrics
UNIVERSITY OF WISCONSIN
SCHOOL OF MEDICINE AND PUBLIC HEALTH

Spring Research Week 2019

Celebrating Research and Learning



Pediatric Research Week 2019

Tuesday, May 28, 2019 in 1335 AFCH. Faculty and Fellows are welcome.

8-9 AM – Panel discussion: “Taking a Scholarly Approach to Quality Improvement”

Wednesday, May 29, 2019 in 1335 AFCH. Faculty and Fellows are welcome.

8-9 AM – “Ethical Considerations in Pediatric Research”

Norman Fost, MD, - Professor Emeritus, Pediatrics and Bioethics

Thursday, May 30, 2019 in HSLC 1345:

7:30AM – Pediatrics Grand Rounds – “Clinical and Basic Research Advances for Congenital Diaphragmatic Hernia” *

David J. McCulley, MD - Neonatology & Newborn Nursery

8:30AM - “Important Research Updates” (relevant to faculty, fellows & residents involved in research and/or research proposal development/submission)

James E. Gern, MD – Allergy, Immunology & Rheumatology

Kimberly D. Stevenson – Business Services Research-Administration

Friday, May 31, 2019 in HSLC 1325 and Atrium:

12:00-12:30 PM – Lunch

12:30-1:00 PM –Keynote – “Unlocking the Physician-Scientist-Educator-Advocate Within”

Christian M. Capitini, MD - Pediatric Hematology/Oncology

1:00-2:30 PM – Oral Presentations

1:00 - “Near Infrared Spectroscopy Detects Acute Kidney Injury in Preterm Neonates”

Claudette N. Adegboro, MD - Neonatology and Newborn Nursery Fellow

1:15 - “Newborn Screening Alone Insufficient to Improve Pulmonary and Mortality Outcomes for CF”

Christina Barreda, MD - Pulmonology and Sleep Medicine Fellow

1:30 - “Incidence and Significance of Elevated Transaminases in Infants with Failure to Thrive”

Kristen A. Marten, DO - PL3 Resident

1:45 - “The Pediatric Asthma Risk Score (PARS) Predicts Atopic and Non-atopic Asthma Better than the Asthma Predictive Index”

Eric M. Schauburger, DO, PhD - Allergy, Immunology, and Rheumatology

2:00 - “Infant Mortality Rates in Wisconsin Using Direct Adjustment Method”

Brandon D. Tomlin, MD - PL2 Resident

2:15 - “Perceived Consequences of Work-related Technology”

Sarah A. Webber, MD - Hospital Medicine

2:30-5:00 PM – Poster Reception (with light hors d’oeuvres) in HSLC Atrium

ORAL PRESENTATIONS

1:00-1:15PM - Near Infrared Spectroscopy Detects Acute Kidney Injury in Preterm Neonates

Adegboro C, Harer M

1:15-1:30PM - Newborn Screening Alone Insufficient to Improve Pulmonary and Mortality Outcomes for CF

Barreda C, Collier R, Farrell P, Laxova A, Eickhoff J, Braun A, Rock M

1:30-1:45PM - Comparison of Infant Mortality Rates in Wisconsin Using Direct Adjustment Method

Tomlin B, McAdams R, Kaluarachchi D

1:45-2PM - Incidence and Significance of Elevated Transaminases in Infants with Failure to Thrive

Marten K, St Clair N, O'Connell D, Sklansky D

2:00-2:15PM - The Pediatric Asthma Risk Score (PARS) Predicts Atopic and Non-atopic Asthma Better than the Asthma Predictive Index

Schauburger E, Biagini Myers J, Martin L, Kroner J, Ryan P, Bernstein D, Lockey J, LeMasters G, Arshad S, Kurukulaaratchy R, Khurana Hershey G

2:15-2:30PM - Perceived consequences of work-related technology

Webber S, Babal J, Moreno M, Shadman K

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1 - Development of Progress Note Assessment and Plan Evaluation (PNAPE) Tool

Bentley N, Waterman H, Kelly M, Sklansky D, Nackers K, Gorski D, Shadman K

2 - The effect of antenatal indomethacin on extremely preterm neonatal kidney function

Brichta C, Harer M

3 - Relationship between 1-month ferritin level and risk factors for iron deficiency in NICU patients

Brichta C, Norlin S, Kling P

4 - Case Series: Outcomes in Children with Plexiform-Neurofibromas and Neurofibromatosis

Damodharan S, Mission P, Patel N, Puccetti D

5 - Analysis of ex vivo expanded and activated clinical grade human NK cells after cryopreservation

Damodharan S, Walker K, McDowell K, Bouchlaka M, Drier D, Sondel P, DeSantes K, Capitini C

6 - Development of Anterior Uveitis in a Patient with Mucocutaneous and Genital Ulcers: A Case Report

Carver A, Fliegel J

7 - Effect of Parental Media Rules on Nighttime Awakenings in Adolescents

Enzenberger A, Moreno M

8 - Anterior Cutaneous Nerve Entrapment Syndrome (Acnes) Presenting in an Adolescent Female as Regional Abdominal Pain

Golec A, Fliegel J

9 - Can post-operative near infrared spectroscopy monitoring in neonates detect cardiac surgery associated acute kidney injury?

Gorski D, Harer M, Al-Subu A, Lasarev M, Sayed I

- 10 - Neonatal Intubation Simulation with Virtual Reality and Haptic Feedback**
Griest C, Hale I, Campagna J, Kelley J, Martin S, Tomlin B, McAdams R
- 11 - Diuresis in Adolescents Hospitalized for Treatment of Severely Disordered Eating**
Hammer D, Shadman K, Sklansky D
- 12 - Utilization of ECGs in Pediatric Murmur Evaluations**
Harris R, Hokanson J, Maginot K, Von Bergen N
- 13 - Youth with Type 1 Diabetes prefer in-person over online peer engagement**
Harris R, Logel S, Bekx T, Pollock T
- 14 - Preterm very low birth weight neonates lack renal function follow-up after acute kidney injury**
Huang H, Harer M
- 15 - Tri-Ponderal Mass Index is a Useful Marker for Cardiovascular Fitness in Children**
Kevern J, Eickhoff J; Carrel A
- 16 - Glycemic Control Improves with Treatment of Gender Dysphoria in Adolescents with Type 1 Diabetes Mellitus**
Logel S, Bekx T, Rehm J
- 17 - Monitoring for Patients with Bronchiolitis: State of Protocol Adherence and Order Accuracy**
MacKay S, Shadman S, Yngsdal-Krenz R
- 18 - Parental media rules for today's adolescents: prevalence and predictors**
Omernick KE, Moreno MA
- 19 - Pediatric dyslipidemia screening by pediatricians and family medicine physicians: Current practices and future directions.**
Sleeth C, Peterson A, Hokanson J
- 20 - Mauriac Syndrome: A Rare But Recognizable Complication of Diabetes Mellitus in Adolescents**
Smith M, Carrel A
- 21 - Quality Improvement Initiative: Infant CPR Education for Caregivers of Patients Admitted for BRUE**
Syu S, Smith W, Koffarnus K, Horsley W, Walker H, Sklansky D, Shadman K, Kelly M
- 22 - See, Do, Teach: A Pilot Study to Evaluate the Impact of Visual Art Experiences on Burnout**
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- 23 - Under PRESSure**
Tedford N, Brichta C, Hammer D, Butteris S, Shadman K, Edelman F, Bartosh S
- 24 - Change in Resident Knowledge and Perceptions of Daily Progress Notes following an Educational Intervention**
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- 26 - Use of point-of-care lung ultrasound to diagnose the etiology of acute respiratory failure in a pediatric intensive care unit.**
DeSanti R, Al-Subu A, Cowan E, Lasarev M, Kory P

- 27 - Impact of point-of-care ultrasound training within a medium-sized pediatric intensive care unit**
DeSanti R, Kamps N, Malkani T, Cowan E, Srinivasan S, Al-Subu A
- 28 - Clinical utility of chromosomal microarray analysis for precise diagnosis and risk assessment of pediatric neoplastic disorders**
Guo F, Frater-Rubsam L, Horner V
- 29 - A Quality Improvement Initiative to Decrease Acute Kidney Injury Related to Co-Administration of Vancomycin and Piperacillin-tazobactam**
Gusland D, Nachreiner J, Bogenschutz M, Strayer J, Semanik M, Schulz L, Henderson S
- 30 - Standardization of EMR documentation in children with adrenal insufficiency**
Naik Y, Logel S, Pollock A, Connor E
- 31 - Real world experience with Medtronic Mini med 670 G pump system in children with Type 1 Diabetes Mellitus**
Naik Y, Van Den Langenberg B, Bekx MT
- 32 - Distinct innate immune cell maturation during the first year of life is associated with farm exposure**
Lang A, Fye S, Chasman D, Evans M, Barnes K, Bendixsen C, Gern J, Ong I, Seroogy C
- 33 - Implementation of Point of Care Ultrasound (POCUS) to Identify Central Catheter Tip Location in the Neonatal Intensive Care Unit**
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- 34 - Prenatal Farm-Derived Exposures are Associated with Atopic Dermatitis Risk in Infancy**
Steiman C, Evans M, Olson B, Barnes K, Bendixsen C, Seroogy C, Gern J
- 35 - Case report expanding the phenotypic and genotypic spectrum of SETD5 variants**
Williams K, Hall A, Rice G, Pollock A
- 36 - Positive Screen for Sleep Apnea in Adolescents with Polycystic Ovary Syndrome Is Independent of BMI and Metabolic Risk**
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Beverley K, Steffen J, Heyrman J, Shahi P, and Pattnaik B
- 40 - Two-site regional oxygen saturation and capnography monitoring during resuscitation after cardiac arrest in a swine pediatric ventricular fibrillatory arrest model**
Al-Subu A, Hacker T, Eickhoff J, Ofori-Amanfo G, Eldridge M
- 41 - Feasibility and Safety of Aerosol Bronchodilators Delivery Through High Flow Nasal Cannula in Pediatric Patients with Respiratory Distress**
Al-Subu A, Nguyen V, AlAli Y, Yngsdal-Krenz R, Lasarev M, Hagen S
- 42 - Learners, Teaching, & Education Systems Factors: Pediatric Faculty Perspectives of Impact on Wellbeing**
Babal J, Shadman K, Moreno M, Webber S
- 43 - Comfort and Perceived Value: Parent Views of Trainee Participation in Pediatric Care**
Babal J, Sklansky D, Moreno M
- 44 - Viewpoints of pregnant mothers and community health workers on prenatal care in Lweza Village, Uganda**
Carlson M, McAdams R, Kkonde A

- 45 - PBX1 is required for diaphragm formation and postnatal alveologenesis**
Doherty A, Stokes G, Genthe W, Brix M, McCulley D
- 46 - Impact of Family-Centered Tailoring of Pediatric T1D Self-Management Resources**
Fiallo-Scharer R, Rajamanickam V, Chewing B, Palta M, Wetterneck T, Wysocki T, Cox E
- 47 - Colorado High meets Wisconsin Jump Around**
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- 48 - Content validity of the PROMIS® pediatric family relationships measure for children with chronic illness**
Flynn K, Kliems H, Saoji N, Svenson J, Cox E
- 49 - Human monocytes educated with exosomes from TLR4 primed mesenchymal stem cells treat acute radiation syndrome by promoting hematopoietic recovery**
Forsberg M, Kink J, Hematti P, and Capitini C
- 50 - Youth Appeal in Recreational Marijuana Promotions Across Three Social Media Platforms**
Jenkins M, Kerr B, Scheck J, Gower A, Moreno M
- 51 - Perinatal Characteristics are Associated with Free Thyroxine Levels of Preterm Infants on Day of Life Thirty**
Kaluarachchi D, Lasarev M, Colaizy T
- 52 - Instagram & Body Positivity among Female Adolescents & Young Adults**
Kelly L, Daneshjoo S, & Moreno M, University of Wisconsin-Madison, Department of Pediatrics Social Media Adolescent Health Research Team (SMAHRT)
- 53 - Risk of Adolescent and Young Adult Problematic Internet Use Based on Communication Medium Used with Parents**
Kerr B, D'Angelo J, Moreno M
- 54 - Parent's Knowledge and Beliefs of Mindfulness**
Mathur M, Babal J, Neuman M, Kerr B, Eickhoff J, Moreno M
- 55 - Developing a Shared Plan of Care for Youth with ADHD**
Mathur M, Neuman M, Babal J
- 56 - Comparing Using Prototype Willingness Model and Theory of Reasoned Action for Recreational Marijuana Use**
Lai T, Bradley R, Kerr B, Moreno M
- 57 - Cord blood-derived exosomal Contactin-2: a biomarker for brain health of neonates at risk for iron deficiency?**
Marell P, Blohowiak S, Georgieff M, Kling P, Tran P
- 58 - Asthma Action Plans Significantly Improved Asthma Control Test for Pediatric Patients with Initial Poor Asthma Control**
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- 59 - Parents Perceive Pediatric Asthma Action Plans to be Highly Valuable**
Pletta K, Kerr B, Eickhoff J, Allen G, Jain S, Moreno M
- 60 - In vivo Gene Manipulation to Study Disease Mechanisms**
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- 61 - Standardization of patent ductus arteriosus (PDA) management using a clinical and echocardiographic scoring system decreased PDA ligation rates**
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- 62 - Characterization of protein expression and retinal structure upon GABA Receptor Deficiency**
Ramachandran N; Shahi P, Ebbinghaus B, Hoon M, Pattnaik B
- 63 - Parental interest in medical group visits for overweight children**
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- 64 - Spirometry and Impulse Oscillometry Trajectories in an Inner-City Longitudinal Birth Cohort at High Risk for Asthma.**
Ramratnam S, Lockhart A, Calatroni A, Bacharier L, Jackson D, Wood R, Kattan M, O'Connor G, Visness C, Gergen P, Gern J
- 65 - Immune Effects of Ruxolitinib on Gamma Delta T Cells in vitro**
Rinella S, Capitini C, Ott M
- 66 - A gene mutation gone NONSENSE**
Srinivas A, Beverley K, Shahi P, Pattnaik
- 67 - Calling all Educators: Introducing a Comprehensive Guide to Global Health Education**
St Clair N and Butteris S, on behalf of the Program Director's Guide to Global Health Education Author Group
- 68 - Improving Immunization Systems for Children By Engaging Pediatric Societies: Using Non-Traditional Partnerships To Build Local Capacity**
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- 69 - Knowledge and Attitudes Regarding LTBI Treatment Among the Tibetan Monastic Population Living in India: Recommendations for the Zero TB Campaign**
Starke S, Borchardt N, Topgyal S, Dorjee K, Paster Z, Conway J
- 70 - Test date and clerkship timing impact on USMLE Step 1 performance**
Stillwell C, Tatar R, Cowan E, Nackers K, McIntosh G, Chheda S, Seibert C
- 71 - A Genetic Model of Diaphragmatic Hernia, Lung Hypoplasia, and Pulmonary Hypertension**
Stokes G, Giangela M, Genthe W, Brix M, Wynn J, Shen Y, Chung W, McCulley D
- 72 - In Vivo Vaccine Against Neuroblastoma is Safe and Effective After Bone Marrow Transplant**
Tippins K, Bates P, Capitini C, Walker K
- 73 - CXCR4 blockade of T cell acute lymphoblastic leukemia causes systemic disease in an NSG model allowing ruxolitinib and venetoclax to synergistically treat cancer burden**
Walker K, Kabakov S, Zhu F, Olson S, Rui L, Capitini C
- 74 - Spillage, caregiving and erosion: An exploration of pediatric faculty perspectives of the intersection of wellness and work-life conflict**
Webber S, Babal J, Moreno M, Shadman K
- 75 - Perception of Quality Improvement Metrics: Impact on Pediatrician Wellness**
Shadman K, Babal J, Moreno M, Webber S
- 76 - Increased autoimmunity to collagen type V in hyperoxia exposed neonatal rats**
Braun R, Jankowska-Gan E, Eldridge M, Goss K, Meyer K, Burlingham W
- 77 - Sex Differences in Senescence-Related Gene Expression in a Rat Model of Bronchopulmonary Dysplasia**
Wanek S, Braun R, Eldridge M

78 - Role of DNA repair gene in estrogen receptor alpha expression following neonatal hypoxic ischemic encephalopathy

Chanana V, Kemanli P, Zafer D, Hanalioglu D, Serebin M, Amborn K, Frober M, Hackett M, Ferrazzano P, Auger A, Levine J, Cengiz P

79 - Microglial Responses to Traumatic Injury in the Developing Brain

Zafer D, Ozaydin B, Kemanli P, Novak B, Benedict C, Kintner D, Cengiz P, Ferrazzano P

80 - MRI Markers of Outcome after Severe Pediatric TBI

Yeske B, Kirk G, Guerrero J, Alexander A, Ferrazzano P

Resident Abstracts

****PAS Poster Presentation**

DEVELOPMENT OF PROGRESS NOTE ASSESSMENT AND PLAN EVALUATION (PNAPE) TOOL

Bentley N, Waterman H, Kelly M, Sklansky D, Nackers K, Gorski D, Shadman K

Background: Daily progress notes are vital cross disciplinary communication tools. The electronic medical record has influenced progress note content and length. Previously developed note assessment tools, such as the Physician Documentation Quality Instrument (PDQI-9), have not focused on the assessment and plan of the note, which are often most informative.

Objective: Develop a reliable and valid tool to evaluate the assessment and plan of resident daily progress notes.

Design/Methods: A committee of pediatric resident, hospitalist and critical care physicians generated a list of common pitfalls associated with daily progress notes. A standardized ideal progress note assessment and plan was developed using a cause and effect diagram, literature review, consultation with billing expert and institutional documentation best practice guidelines. From this ideal state, a progress note evaluation tool (PNAPE) was developed using Modified Delphi technique. Four faculty experts used PNAPE and PDQI-9 to independently review resident progress notes identified from a convenience sample from each intern on the hospitalist service in fall 2017. Inter-rater reliability of the PNAPE was assessed using intraclass correlation coefficient (ICC). External validity was assessed by correlation between mean PNAPE and PDQI-9 scores using Pearson's coefficient.

Results: The PNAPE was developed and utilized to assess a series of notes. In all, 13 Notes were assessed with an ICC of 0.85. Pearson's r is 0.63 between mean PNAPE and PDQI-9 scores.

Conclusion: These findings suggest that the PNAPE is a reliable and valid tool for evaluation of resident progress note assessment and plan by expert assessors. Next steps will include use of PNAPE to track note quality over time, provide feedback and to assess notes in other inpatient settings and specialties.

****PAS Poster Presentation**

THE EFFECT OF ANTENATAL INDOMETHACIN ON EXTREMELY PRETERM NEONATAL KIDNEY FUNCTION

Brichta C, Harer M

Background: Indomethacin is one of the most effective tocolytics used to prevent preterm birth. It has known fetal kidney effects of reducing urine output resulting in oligohydramnios. Many retrospective neonatal studies have also shown maternal NSAIDs to be a significant risk factor for neonatal acute kidney injury (AKI). However, prior studies have not compared the renal effects of antenatal indomethacin on exposed and unexposed extremely preterm neonates.

Objective: Evaluate the effect of antenatal indomethacin exposure on extremely preterm neonatal kidney function and AKI in the first week of age.

Design/Methods: A retrospective cohort study was conducted and included all neonates born <29 weeks at a 44 bed level III neonatal intensive care unit between January and September 2018. Neonatal AKI was defined by the modified neonatal KDIGO definition including urine output. Statistical analysis was performed with GraphPad Prism.

Results: 29 infants were included for analysis. Indomethacin exposed mothers (n=8) received a median number of 8 indomethacin doses over an interquartile range of 3-11 days prior to delivery. Only infant gestational age was statistically different (p=0.047); otherwise, infants were closely matched (Demographics Table 1). Notably, all mothers received at least one dose of betamethasone and all infants received caffeine in the first week. AKI occurred in 62.5% of infants exposed to maternal indomethacin compared to 33.3% of those unexposed (p=0.154). There was no significant difference between the stages of AKI, peak serum creatinine, day 1-3 serum creatinine or urine output; although, the daily and overall average serum creatinine during the first week trended higher in the indomethacin exposed group (Kidney outcomes Table 2 & Creatinine Figure 1).

Conclusion: In this small, single center retrospective cohort study, preterm neonates <29 weeks gestation born to mothers treated with indomethacin did not have more AKI or renal dysfunction compared to neonates born to unexposed mothers. Due to the prolongation of pregnancy with indomethacin, kidney function may recover prior to birth and overt renal dysfunction may have resolved in utero. Subtle kidney function changes may still exist and are not detected with current creatinine and urine output monitoring techniques. Future prospective studies utilizing advanced biomarkers are needed to determine how antenatal indomethacin affects extremely preterm neonatal kidney function.

****PAS Poster Presentation**

RELATIONSHIP BETWEEN 1-MONTH FERRITIN LEVEL AND RISK FACTORS FOR IRON DEFICIENCY IN NICU PATIENTS

Brichta C, Norlin S, Kling P

Background: Premature babies are at-risk for developing iron deficiency anemia (IDA), which can result in long-term cognitive and behavioral deficits. Many risk factors for developing IDA in term infants are known, but less is known about infants in neonatal intensive care units. Limited available data in non-iron fortified preterm breastfed infants show that plasma ferritin levels <70 mcg/L at 1 month-of-age predict developing IDA at 6 months-of-age.

Objective: To examine the relationship between historical risk factors for developing IDA and ferritin levels in NICU infants at 1 month-of-age.

Design/Methods: A retrospective single cohort analysis was conducted in NICU infants <33 weeks gestation or born small for gestational age. The institutional guidelines recommend beginning oral iron supplementation (2 mg/kg/d) at 2 weeks if an infant is feeding and obtaining a ferritin level at 1 month-of-age. Historical risk factors for developing IDA were recorded: prematurity, small or large for gestational age (SGA or LGA), maternal obesity (BMI \geq 35 at birth), multiple gestation, maternal anemia, infants of diabetic mothers (IDM), non-Caucasian ethnicity, and Medicaid coverage. Low 1-month ferritin levels (ferritin <70 mcg/L) were identified. Data are presented as geometric mean (95% CI).

Results: In 155 at-risk infants, the geometric mean ferritin at 1 month was 133 mcg/L and 13% had low ferritin levels. Independently each risk factor did not impact the 1-month ferritin level; however, the percentage of infants with low ferritin levels increased as their number of risk factors increased ($p=0.04$). Compared to those with normal levels, infants with low ferritin levels were of lower gestational age [30.2 (29.3-31.1) vs. 31.5 (31.0-32.1), $p=0.03$], higher Z-score for birth weight [0.59 (-0.86 to 1.6) vs. -0.34 (-0.57 to -0.11), $p=0.03$], and exhibited more IDA risk factors [3.3 (2.7 to 4.2) vs. 2.6 (2.4 to 2.8), $p=0.01$]. Despite oral iron supplementation, 61% of repeat ferritin levels at 6 months-of-age were still low.

Conclusion: A substantial number of ferritin levels fell below the proposed cutoff suggesting that NICU infants appear to be at-risk for developing IDA. Although individual IDA risk factors did not impact the 1-month ferritin levels, the greater number of risk factors an infant had at birth predicted having a low level. Monitoring of iron status in the NICU and during the first 6 months may be important for optimizing iron status and cognitive development.

DEVELOPMENT OF ANTERIOR UVEITIS IN A PATIENT WITH MUCOCUTANEOUS AND GENITAL ULCERS: A CASE REPORT

Carver A, Fliegel J

Background: Behcet's disease is a rare inflammatory disorder usually seen in Eastern populations, but can be seen in other populations as well. The most common feature of Behcet's is recurrent mucocutaneous ulcers, but other findings that support the diagnosis are urogenital lesions and cutaneous involvement (variety of rashes possible). Ocular involvement, such as uveitis, is less common but can progress to blindness if not treated. Treatment usually involves a short pulse of high dose steroids, along with starting either immunosuppressive therapy or immune modulator therapy as a maintenance regimen.

Case Report: A 15-year-old female with history of generalized anxiety presents to her PCP with oral lesions and mouth pain. Approximately 1.5 weeks prior she developed mouth sores on her posterior pharynx, along with throat pain, low-grade fevers and NBNB emesis, while on a trip to Panama. Her sores continued to worsen and she had a 1-day history of dysuria and bilateral lower extremity rash prior to her clinic visit.

The patient's exam was notable for injection of the left conjunctiva, large open sores on her upper and lower lips, lesions on her posterior pharynx and a lesion on the periphery of her labia majora. She also had 1-3 cm blanching papules over her distal lower extremities bilaterally. Initial lab work included a CBC with diff, CMP, ESR, CRP, CK and blood culture. Notable results included an elevated WBC of 11.5 (K/ul) with elevated neutrophils (9,200 /ul), an ESR of 52 and a CRP of 3.8.

During her admission, she developed worsening conjunctival injection and blurry vision in her left eye. Ophthalmology was consulted and noted anterior uveitis on exam. Our patient was started on steroid and mydriatic eye drops and rheumatology was consulted who diagnosed Behcet's disease. She was started on 3 days of high dose steroids and methotrexate; shortly after initiating these therapies, all of her symptoms began to rapidly improve.

Discussion: Although uncommon, Behcet's does still occur at an incidence rate of 0.12 to 7.5 per 100,000 in European and American populations. The development of anterior uveitis in a patient who already had mucocutaneous and genital lesions was suggestive of an underlying inflammatory disease and crucial in helping us switch our differential from primarily infections to more rheumatologic causes.

CASE SERIES: OUTCOMES IN CHILDREN WITH PLEXIFORM-NEUROFIBROMAS AND NEUROFIBROMATOSIS

Damodharan S, Mission PL, Patel NJ, Puccetti DM

Background: Neurofibromatosis, type 1 (NF1) is a common predisposing chronic disease arising in early childhood, with an incidence of approximately 1:3000. Though NF1 displays a wide range of phenotypic variability, the primary feature of the disease is peripheral nerve sheath tumors called neurofibromas. Less is well known regarding the broader neurocognitive and social-emotional profile in presentations with more complex tumor growths, namely PNFs, which are present in at least half of the NF1-affected population.

Objective: This case series seeks to examine neurocognitive outcomes, social-emotional functioning, and family burden in young children diagnosed with Neurofibromatosis, type 1 (NF1) with early growing plexiform neurofibromas (PNFs).

Design/Methods: Participants with NF1 and PNFs (n=2) aged 6-7 years completed comprehensive neuropsychological evaluations and parents completed measures of quality of life, social-emotional/behavioral functioning of child, parental stress, family adaptability, and family cohesion.

Results: Outcomes suggest broad neurocognitive dysfunction (e.g., executive functioning deficits, attention problems, visual-motor delays, and poor motor coordination), social-emotional challenges (e.g., symptoms of anxiety and depression, and poor social skills), and familial distress.

Conclusion: Findings indicate the value of early and frequent monitoring of children with PNFs in medical systems and multi-disciplinary teams, and the importance of early intervention for both children and families.

ANALYSIS OF EX VIVO EXPANDED AND ACTIVATED CLINICAL GRADE HUMAN NK CELLS AFTER CRYOPRESERVATION

Damodharan S, Walker KL, McDowell KA, Bouchlaka MN, Drier DA, Sondel PM, DeSantes KB, Capitini CM

Background: Natural killer cells can display potent anti-tumor activity. However, one factor limiting their clinical use is the difficulty generating large numbers of cells to allow for multiple sequential infusions into patients. Consequently, several methods have been developed to expand and activate NK cells in vitro. Infusion of fresh NK cells is generally preferred to the administration of cryopreserved cells because of concern that cryopreservation diminishes NK cell activity.

Objective: To compare freshly expanded/activated NK cells to those that have been cryopreserved.

Design/Methods: We performed 5 qualification runs incubating NK cells in a WAVE bioreactor with IL-2 and a feeder cell line (K562-CD137L-mbIL15) under GMP conditions. The resulting fresh and cryopreserved NK cell products were characterized and compared.

Results: Following an 11-day incubation period, NK cells expanded 28 – 194 fold (median 56 fold) with a purity of 72 – 93% (median 86%). Purity increased to 80 – 99% (median 99%) after CD3 depletion using the CliniMACS® cell processing system. Analysis of cryopreserved NK cell products demonstrated excellent recovery and viability of CD56+ cells. Both fresh and cryopreserved NK cell products showed significant increases in Granzyme B and NKG2D, but not in PD-1. Both NK cells products exhibited enhanced killing capacity compared to pre-expanded PBMC. Freshly expanded/activated NK cells generated high levels of IFN γ , which was abrogated by JAK1/JAK2 inhibition with ruxolitinib. In contrast, cryopreserved NK cells showed lower production of IFN γ compared to pre-expanded PBMCs, and IFN γ levels were unaffected by JAK1/JAK2 inhibition.

Conclusion: NK cells that have been expanded and activated using IL-2 and the K562-CD137L-mbIL15 feeder cell line show significantly enhanced functional capacity, even after cryopreservation. The use of sequential NK cell infusions, along with an anti-GD2 immunocytokine, is currently being tested in a clinical trial for children with relapsed neuroblastoma.

EFFECT OF PARENTAL MEDIA RULES ON NIGHTTIME AWAKENINGS IN ADOLESCENTS

Enzenberger E, Moreno M

Background: Cell phones and social media are an integral part of adolescents' lives with 75% of teenagers owning their own phone and 71% with a Facebook page. It has been well established that this media use has multiple effects on adolescent health including sleep disruption. Pediatricians routinely recommend that parents set boundaries regarding screen time, such as screen-free zones or screen-free times, though the data to help direct which types of rules are most effective is limited.

Objective: The purpose of this study was to investigate if and which type of rules are effective in preventing nighttime awakenings experienced by adolescents due to their phones.

Design/Methods: We conducted a cross-sectional online survey of adolescents ages 12-14 recruited from Qualtrics panels in May 2017. The survey assessed technology use, family rules, and nighttime awakenings from phones. Logistic regression analysis was used to evaluate associations between parental rules and nighttime awakenings. Results were adjusted for age, race, gender, and parental education.

Results: A total of 1153 adolescents completed the survey. Participants had a mean age of 13.6 (SD=1.1), 49% were male, 73% were Caucasian, and 60% had at least one parent who had completed a college degree. Among participants, 74.4% owned their own phone and 63.6% reported having some type of parental rules regarding media use. With regards to specific rules: 20.5% of all participants reported that they follow rules regarding screen-free times while 8.1% reported following rules regarding screen-free zones. A total of 17.3% of adolescents reported nighttime awakenings due to phone notifications. Adolescents who owned their own phone were more likely to be awakened by their phones compared with those who didn't own their own phone (OR=1.75, CI: 1.16, 2.63). The use of screen-free time rules was not associated with nighttime awakenings; however, those with screen-free zone rules were nearly three times more likely to be awakened by their phones (OR=2.88, CI: 1.62, 5.14).

Conclusion: Adolescents with their own phones were more likely to be awakened by their phones at night, but there was no significant protective effect of parental rules regarding screen-free times or zones. This data suggests that the most important variable on presence of nighttime awakenings is the ownership of a phone. The unexpected increase in nighttime awakenings for those who had screen-free zone rules suggests that adolescents may be disregarding media rules or that screen-free zone rules do not include bedrooms.

ANTERIOR CUTANEOUS NERVE ENTRAPMENT SYNDROME (ACNES) PRESENTING IN AN ADOLESCENT FEMALE AS REGIONAL ABDOMINAL PAIN.

Golec A, Fliegel J

Background: Anterior cutaneous nerve entrapment syndrome (ACNES) is an underdiagnosed chronic pain condition caused by the entrapment of cutaneous intercostal nerves within the lateral border of the rectus abdominis muscle. This syndrome frequently presents as chronic abdominal pain, and may be confused for other causes of abdominal pain such as cholelithiasis, gastritis, and abdominal migraine.

Case Report: A 17-year-old adolescent female with history of anxiety disorder, bipolar disorder, and migraine presented with two weeks of worsening right upper quadrant abdominal pain. The pain had begun insidiously a month prior, and became sharp and persistent. The pain worsened with sitting up or walking. It was associated with nausea and vomiting. There was an absence of headache and lower gastrointestinal symptoms. The pain was refractory to over-the-counter pain medications, and persistent even with rest. Workup, including labs (CBC, CMP, lipase, UA), CT abdomen, and ultrasound of the pelvis and ovaries, was within normal limits. She had been started on amitriptyline after one week of severe symptoms for treatment of possible abdominal migraine.

Initial inpatient management with intravenous fluid rehydration and aggressive treatment of migraine symptoms proved ineffective. Pain was minimally responsive to non-opioid medications, and would persist throughout her awake state. She had worsening pain with standing up or walking, but noted that the pain would subside with lying flat or with sleep. However, the pain never completely abated. During serial abdominal examination, it was noted that her tenderness to palpation was most exquisite along the right side near the lateral border of the rectus abdominis muscle. The pain was distributed along the T12 and L1 dermatomes. Deep palpation of the visceral organs did not produce exquisite pain or other symptoms, consistent with a likely diagnosis of ACNES. Pediatric anesthesia was consulted for further pain evaluation and management, and concurred with the likely diagnosis. An ultrasound-guided peripheral block of the ilioinguinal and iliohypogastric nerves was performed as both a diagnostic test and therapeutic measure. The patient had complete relief of pain following the procedure, and was able to discharge home on the same day.

Discussion: ACNES is a difficult diagnosis to make without astute physical exam and knowledge of the syndrome's presentation. Owing to the rarity of this condition, most patients will undergo extensive and expensive evaluation in non-medical home settings, such as immediate or emergency care.

****PAS Poster Presentation**

CAN POST-OPERATIVE NEAR INFRARED SPECTROSCOPY MONITORING IN NEONATES DETECT CARDIAC SURGERY ASSOCIATED ACUTE KIDNEY INJURY?

Gorski D, Harer M, Al-Subu A, Lasarev M, Sayed I

Background: Neonates are at high risk for cardiac surgery associated acute kidney injury (csAKI) and csAKI is independently associated with in-hospital morbidity and mortality. Renal and cerebral rSO₂ monitoring with near infrared spectroscopy (NIRS) correlates with mixed venous saturations and lactate levels while providing an assessment of regional oxygen supply and demand. Recent studies in children less than 1 year of age have showed an association between renal rSO₂ trends and csAKI but have not independently evaluated the highest risk group, neonates < 30 days of age.

Objective: Evaluate the relationship of cerebral and renal rSO₂ trends in the first 24 post-op hours with csAKI in the first 7 days post-op in neonates < 30 days of age who underwent surgery on cardiopulmonary bypass (CPB).

Design/Methods: A single-center retrospective cohort study in a pediatric intensive care unit (PICU) at a tertiary care children's hospital between Jan 2012 and Aug 2016. Neonates less than 30 days of age admitted after surgical repair on CPB and who received invasive mechanical ventilation for at least 24 hours were included, no exclusion criteria were used. AKI was defined by the modified neonatal KDIGO definition including urine output. NIRS monitoring with Invos NIRS 5100C and neonatal sensors, every 1 hour cerebral and renal rSO₂ values recorded.

Results: 59 patients met inclusion criteria and 47 (80%) developed AKI in the first 7 post-op days. CPB time correlated with stage of AKI and the 3 neonates with stage 3 AKI had the longest CPB times. Ordinal logistic regression revealed significant associations between stage of AKI and pre-op creatinine level (aOR 0.50 per 0.15 mg/dL; CI 0.28-0.89) and CPB time (aOR 1.83, CI 1.17-2.86) but not with cerebral or renal rSO₂. Analysis of rSO₂ values over the first 24 post-op hours showed no renal correlation but the 24-hour average cerebral rSO₂ value was associated with stage 1 AKI (Figure 2, 65.6 vs. 73.5, p=0.03).

Conclusion: csAKI was extremely common in our targeted population. Cerebral and not renal NIRS values were associated with csAKI during the first 24 hours after surgery. Further analysis is needed to evaluate the differences between single ventricle and biventricular repair patients whose baseline saturations affect rSO₂ values. Prospective continuous NIRS monitoring studies are needed in neonates undergoing cardiac surgery to further evaluate its ability to detect csAKI.

NEONATAL INTUBATION SIMULATION WITH VIRTUAL REALITY AND HAPTIC FEEDBACK

Griest C, Hale I, Campagna J, Kelley J, Martin S, Tomlin B, McAdams R

Background: Intubation of neonates and infants is a critical skill to learn during residency training and is an ACGME requirement for pediatric residency graduation. However, many graduating pediatric residents still feel inexperienced in intubation. To promote intubation skills, residency programs often use simulated mannequins, usually as part of a larger simulation lab. While mannequins simulate airway anatomy, these models tend to be unrealistic, expensive, and are unable to simulate movement, secretions, and changes in the airway.

Objective: To create an affordable, transportable, virtual reality neonatal intubation model that integrates haptic feedback to better mimic actual experiences and improve intubation skills.

Design/Methods: A 3D airway model was developed using 2D Compute Tomography neonatal airway images layered in 3DSlicer software. This model was integrated into a neonate body created in Blender, and subsequently rigged for movement. Accurate breathing animation was added to the neonate and a 3D radiant warmer was created to represent a realistic NICU environment. A 3DSystems Touch haptic device was implemented to manipulate a laryngoscope mode and provide realistic somatosensory feedback upon collisions with the neonate in virtual space. Together, these features were linked to interact and create a Unity-based simulation in which the user may physically interact with a customizable neonatal model.

Results: We developed a 3D neonatal airway model that can be further refined by adding more movement, as well as soft body physics, and accurate tissue physical properties. The addition of a second haptic device will provide virtual endotracheal tube control and change the visual interface from a screen to a Virtual Reality headset. Long term goals are to package the simulation into a game type program with varying difficulties and performance feedback. The final product should also be contained in a transportable case that is able to be used in any setting with a power outlet.

Conclusion: We speculate that virtual reality with haptic feedback systems will become the cornerstone of future medical training. With further enhancement, our 3D neonatal airway model may be an ideal method to improve intubation skills in infants.

DIURESIS IN ADOLESCENTS HOSPITALIZED FOR TREATMENT OF SEVERELY DISORDERED EATING

Hammer D, Shadman K, Sklansky D

Background: Adolescents with weight loss secondary to disordered eating may require hospitalization for close monitoring during refeeding. Negative fluid balance has been observed with initial inpatient refeeding, and may drive electrolyte testing and concerns about surreptitious water loading given the expectation that inpatients should have positive daily fluid balance reflecting insensible losses.

Objective: Characterize fluid balance during refeeding in adolescents admitted to inpatient general care for medical stabilization of severely disordered eating.

Design/Methods: In this retrospective study, all patients aged 12-18 years with a diagnosis of anorexia nervosa admitted to our tertiary care hospital for refeeding and medical stabilization from 10/1/2013 to 9/30/2018 were included. Electronic medical records were reviewed to collect demographics anthropomorphic measures, fluid intake and output, length of stay, and days to weight gain. Means were calculated for net fluid balance during the hospitalization and at 5 and 7 days after admission, which were chosen to capture almost all patients prior to discharge. Linear regression with Pearson's r was used to assess correlations between admission age, creatinine level, and percent ideal body weight (IBW) with net fluid balance.

Results: Over the 5-year study period 59 patients were admitted, all of whom were included in this analysis. Average net fluid status was -2.37 liters (L) at hospital day 5 and -3.09 L on hospital day 7, with 75% and 73% of subjects were still demonstrating diuresis at day 5 and day 7 of hospitalization, respectively. Patients had a mean of 8.3 days of diuresis prior to the first day of positive fluid balance. There was a small correlation between % ideal body weight and net fluid status at 5 and 7 days, $r=0.32$ and $r=0.36$, respectively, with significant linear trend tests ($p<.05$, $p<0.01$ respectively) There were no significant linear trends found between age or creatinine level on admission and net fluid output. No patients experienced required transfer to higher level of care or fluid replacement.

Conclusion: Diuresis was associated with refeeding for adolescents with severely disordered eating. Additional diagnostic testing and dietary scrutiny may not be needed when observed in this patient population.

UTILIZATION OF ECGS IN PEDIATRIC MURMUR EVALUATIONS

Harris RE, Hokanson J, Maginot KM, Von Bergen N

Background: Heart murmurs are a common indication for referral to pediatric cardiology. An electrocardiogram (ECG) is often used as part of the evaluation. However, the usefulness of an ECG in assessment of heart murmurs remains unclear.

Objective: The purpose of this study was to evaluate the impact of ECGs during heart murmur evaluation and the potential downstream effects.

Design/Methods: Retrospective chart review was performed on all patients referred to pediatric cardiology from 2008-2018 for heart murmur evaluation who also had an ECG at their visit. ECG was determined to be normal or abnormal at the time of the clinical evaluation based on the clinic note. If the clinician did not make a clear statement whether the ECG was normal or abnormal, normality was inferred if no further testing or evaluation was recommended, based on ECG interpretation. If additional testing was obtained, those results were designated as normal or abnormal. A Chi-Square test was used to determine significant statistical difference between the two groups.

Results: The majority of patients, 222/255, (87%) had normal ECGs. In the normal ECG group, echocardiogram was obtained in 64/222 (29%) of which 15/64 (23%) were abnormal. Abnormal ECGs were noted in 33/255 (12.9%) and additional testing was done. The additional testing included echocardiogram (32), Holter monitor (3), chest x-ray (1) and repeat ECG (2). In the abnormal ECG group with additional testing, 8/33 (24%) had abnormal findings. The figure depicts the breakdown of abnormal and normal ECGs and subsequent test results, if performed. Patients with abnormal ECGs were more likely to have additional testing (p value <0.001). Abnormal echocardiogram findings were not more likely in those patients with abnormal ECGs (p value 0.6). Overall, the majority of patients were diagnosed with innocent heart murmurs (80.7%).

Conclusion: The majority of patients with murmurs had normal ECGs ~90% and no additional testing was done in ~70% of these patients. Patients with abnormal ECGs were more likely to get additional testing, and approximately 80% of these had normal echocardiograms. When an echocardiogram was obtained, an abnormality was found in roughly 20%, regardless of ECG findings. Of those with normal ECGs, 6% had echocardiogram abnormalities, but only 18% of the abnormal ECG group had echocardiogram abnormalities.

****PAS Poster Presentation**

YOUTH WITH TYPE 1 DIABETES PREFER IN-PERSON OVER ONLINE PEER ENGAGEMENT

Harris R, Logel S, Bekx T, Pollock T

Background: As of 2012, the reported incidence of Type I Diabetes (T1DM) was 21.7 per 100,000 youths (0 to 19 years of age)¹. Chronic illnesses, such as diabetes, can lead to social isolation, autonomy struggles, low self-esteem, and decreased quality of life, particularly in adolescence. In a growing population of adolescents with T1DM, devoting time to address these concerns can be quite difficult.

Objective: The purpose of our study was to better understand social support desired among teenagers with T1DM.

Design/Methods: Teenage patients from an academic pediatric medical center were recruited to attend a diabetes interest group event called Teen2Teen Diabetes, through Facebook, the institution's pediatric endocrinology website, and clinic flyers. The aim of the event was to better understand the type of mentoring and support youth with diabetes desired. Parents and teens were surveyed regarding how they were enrolled, what they enjoyed about the event, and suggestions for future events.

Results: Out of the estimated 350 teenage patients at our institution with T1DM, 12 patients (ranging from 13-16 years old) and their parents participated, with parents and teens in separate groups. Teens shared advice regarding diabetes management with each other. Survey unanimously revealed that teens preferred to meet in-person rather than via technology such as texting or Facebook. They particularly enjoyed meeting other teens who understand what they are going through. For future events, teens suggested in-person events with their peers including bowling, cooking classes, ice cream socials or sporting events.

Conclusion: Our participants expressed preference in engaging with their peers in person rather than using social media or technology. They enjoyed connecting with others that can relate to their chronic illness. Forming a support system with others who have Type I Diabetes can help teens troubleshoot various issues that arise with their chronic illness and reminds them that they are not alone. Our aim is to host events quarterly for teens to get together, one event will be a cooking class in which our group has received a grant to host this as a free event for participants.

PRETERM VERY LOW BIRTH WEIGHT NEONATES LACK RENAL FUNCTION FOLLOW-UP AFTER ACUTE KIDNEY INJURY

Huang H, Harer M

Background: Preterm very low birth weight (VLBW) neonates are more susceptible to acute kidney injury (AKI) than term neonates. AKI in the neonatal intensive care unit (NICU) results in increased mortality, increased length of hospitalization and higher blood pressure prior to discharge. Given the significant short-term effects of AKI, there has been increased attention to the follow-up care of neonates with AKI. The current recommendations from the Kidney Disease Improving Global Outcomes (KDIGO) guidelines suggest evaluation of renal function be done 3 months after an AKI episode. We hypothesized that follow-up care of patients discharged from the Meriter NICU with a history of AKI would not meet current recommended guidelines.

Objective: To review the follow-up care of the VLBW preterm neonates born in the year of 2014 who developed at least one episode of AKI during their NICU hospitalization.

Design/Methods: This is a retrospective cross-sectional study reviewing the electronic medical records of preterm neonates admitted to our 42-bed level III Neonatal Intensive Care Unit (NICU) in the year of 2014 with birth weight < 1500 grams (VLBW). We classified the stage of AKI based on the neonatal AKI KDIGO definition (sCr only).

Results: 67 preterm neonates were born in 2014 with birth weight <1500g. One neonate died on the third day of age and 5 neonates never had a creatinine obtained so were excluded from the analysis. Among the other 61 neonates, 13 were found to have at least one episode of AKI (incidence = 21%). The median number of days prior to discharge when the last sCr was obtained was 13 in the AKI group, and 24 in the no-AKI group (p=0.45) and median sCr did not differ (p=0.094). Within the AKI group, 6 neonates (46%) had AKI listed in discharge summary, and only 1 neonate (8%) had a nephrology follow-up appointment arranged for after discharge. There was no difference in median discharge blood pressure between groups (p=0.59).

Conclusion: Among VLBW neonates who developed AKI, serum creatinine was not routinely obtained within 1 week of discharge, was unlikely to be listed in the discharge summary and current follow-up guidelines for AKI were only followed in 1 patient. In contrast to recent literature, the discharge blood pressure of our AKI group was not higher. Our observations suggest quality improvement projects are needed to improve AKI documentation and ensure appropriate nephrology follow-up for these neonates at substantial risk of developing chronic kidney disease.

****PAS Poster Presentation**

TRI-PONDERAL MASS INDEX IS A USEFUL MARKER FOR CARDIOVASCULAR FITNESS IN CHILDREN

Kevern J, Eickhoff J, Carrel A

Background: Body mass index (BMI) is commonly used in health screening visits to screen for obesity in pediatric patients. However, it has been shown that tri-ponderal mass index (TMI) better correlates with body fat percentage. Research also shows that cardiovascular fitness (CVF) and fatness may be independent markers of health.

Objective: This study aimed to see if TMI correlates with CVF, which would allow TMI to also be used as a marker for fitness level.

Design/Methods: Cross sectional analysis was performed on 886 overweight children referred for lifestyle intervention. 51% of the population was female, mean age was 11.8 ± 3.1 years (Range 4-22), and the mean BMI was 30.1 ± 6.7 . CVF was measured by treadmill testing for VO₂. Regression analysis of BMI and TMI as predictors of VO₂ was performed.

Results: We found that TMI showed increased ability to predict VO₂ compared to both BMI and BMIz in both females (R²=0.69) and males (R²=0.78). BMI did not predict CVF for females (R²=0.39), but did show moderately strong prediction for males (R²=0.65). BMIz, on the other hand, showed adequate prediction for CVF in both females (R²=0.66) and males (R²=0.7), but was still inferior to TMI.

Conclusion: This study shows that TMI was predictive of VO₂ and could potentially be used in a clinic setting as a surrogate marker for VO₂. As CVF predicts long term health outcomes, tracking TMI may provide a better way to monitor health improvement in overweight and obese patients.

****PAS Poster Presentation**

GLYCEMIC CONTROL IMPROVES WITH TREATMENT OF GENDER DYSPHORIA IN ADOLESCENTS WITH TYPE 1 DIABETES MELLITUS

Logel S, Bekx T, Rehm J

Background: A previous study demonstrated an increased prevalence of gender dysphoria (GD) in adolescents with type 1 diabetes mellitus (T1DM). This interaction between T1DM and GD is not clear, however several studies have provided evidence for an association between psychological stress and type 1 diabetes mellitus.

Objective: The objectives of this study are: 1) to characterize our adolescent patients with T1DM and GD and 2) to review their glycemic control before and after gender-affirming treatment.

Design/Methods: An electronic data extraction was conducted at the University of Wisconsin Hospital and Clinics over 10 years. Inclusion criteria included age 10-21 years, problem list diagnosis of T1DM and GD. Data collected during the 10 year period included information related to T1DM diagnosis and treatment, GD diagnosis and treatment, psychiatric diagnoses and suicide attempts as documented by encounter diagnoses.

Results: Records were available for 749,284 patients age 10-21 years. The prevalence per 1000 for T1DM was 2.69 and the prevalence per 1000 for GD was 0.42. The prevalence of T1DM in adolescents diagnosed with GD was 9.4-fold higher than the prevalence rate of T1DM alone in this same group (25.39 vs 2.69 per 1000).

A diagnosis of both T1DM and GD was found in 8 adolescents. Four adolescents were antibody positive. Antibody test results were not available for the remaining 4 adolescents. Four adolescents received gender-affirming hormone therapy. In these 4, HbA1c improved from an average of 8.5% to 7.2% over the course of 1-4 months. The incidence of psychiatric diagnoses and suicide attempts is characterized in Table 2.

Conclusion: Glycemic control initially improved with treatment of GD after initiation of gender-affirming hormone therapy in adolescents with T1DM. However, this improvement was not sustained. It may be that stress reduction as a result of gender-affirming hormone therapy leads to improved medical compliance in adolescents with T1DM and GD. Next steps include evaluating biomarkers of stress in adolescents with T1DM and GD and determining the prevalence of GD in youth with other chronic diseases.

MONITORING FOR PATIENTS WITH BRONCHIOLITIS: STATE OF PROTOCOL ADHERENCE AND ORDER ACCURACY

MacKay S, Shadman S, Yngsdal-Krenz R

Background: Bronchiolitis is a common reason for admission to American Family Children's Hospital. To provide the right care at the right time, a Clinical Practice Guideline (CPG) exists to guide the monitoring of patients admitted with this diagnosis.

Objective: To define the current state of monitoring and active monitoring orders in patients admitted with a primary diagnosis of bronchiolitis.

Design/Methods: Prospective observational study of general care patients admitted for bronchiolitis during the winter respiratory season (December 1, 2018 - March 31, 2019). Exclusion criteria included: born <28 weeks gestation, unrepaired cyanotic congenital heart disease, pulmonary hypertension, tracheostomy dependence or home oxygen/ventilator use, neuromuscular disease, known immunodeficiency, cancer, and prior observation of monitoring within 36 hours. Children were observed for current monitoring (presence of continuous pulse oximetry and/or telemetry) and respiratory support status. Chart review was conducted to gather demographic, comorbidity, and active order data, which was compiled and organized into three groups for summarization: children on no respiratory support ("OFF"), children on LFNC (LFNC) and children on HFNC ("HFNC-").

Results: A total of 88 patients were observed during the study period: 67 OFF, 6 on LFNC and 15 on HFNC. Most OFF patients had previously required respiratory support (63%) with average time since weaning off of 2-6 hours. Most in the OFF group were observed on neither continuous pulse oximetry (90%) nor telemetry (0%) and most did not have active orders for continuous pulse oximetry (98.5%) or telemetry (98.5%). In the LFNC group, most were observed on continuous pulse oximetry (83%), none were on telemetry (0%) and most did not have orders for continuous pulse oximetry (83%) or telemetry (0%). In the HFNC group, all were observed on continuous pulse oximetry (100%) and few were on telemetry (33%) while most had active orders for continuous pulse oximetry (77%) and few for telemetry (13%). Overall, active orders for pulse oximetry matched observed monitoring status 76% of the time. Active orders for telemetry matched observed monitoring status 90% of the time.

Conclusion: Observed monitoring status was generally appropriate and reflected patient orders in those off respiratory support, but not in patients receiving LFNC and HFNC support. Additional provider education and improvement in the admission order set may better align CPG recommended patient monitoring, active orders, and observed patient monitoring.

**PAS Poster Presentation

INCIDENCE AND SIGNIFICANCE OF ELEVATED TRANSAMINASES IN INFANTS WITH FAILURE TO THRIVE

Marten K, St Clair N, O'Connell D, Sklansky D

Background: Despite guidelines discouraging investigations for infants with failure to thrive (FTT) before adequate nutrition is established, laboratory testing is pursued in 60-90% of cases. Mild transaminase elevations are noted in some cases, potentially prompting further testing. The incidence and significance of transaminase elevation in infants with nutritional FTT is unknown.

Objective: Determine the frequency of transaminase elevation in infants with FTT and characterize their diagnostic outcomes.

Design/Methods: A retrospective chart review was performed for infants <1 year of age with ICD-9 diagnosis codes associated with FTT and z-score lower than -1.64, admitted to the hospitalist service or presenting to gastroenterology clinic between July 1, 2012 and March 31 2017 at a single academic tertiary care system. Patients were excluded for gestational age <35 weeks or prior diagnoses of genetic, metabolic, or cardiopulmonary conditions. Charts were abstracted for demographic, diagnostic, and outcome data from the initial encounter through the subsequent year. Comparisons of diagnostic studies and outcomes between children with and without transaminase elevation were performed using chi-square and Wilcoxon rank sum tests.

Results: Of 670 encounters identified, 95 met inclusion criteria. The majority of patients were Caucasian, born at term, and formula fed at time of admission. Of the 41% of infants with laboratory studies, 11 (27%) had elevated transaminases (ALT 23-138 U/L, AST 46-101 U/L). Patients with and without transaminase elevation did not have significant differences in demographic or presenting characteristics. Patients with transaminase elevation often underwent imaging and additional laboratory investigations, although further investigation was not significantly more common than in children without elevated transaminases (OR 1.17, 95% CI 0.78-1.75). None of the infants with abnormal transaminases required further clinic or hospital encounters for relapsing FTT or developed alternative diagnoses in the following year.

Conclusion: Transaminase elevation is known to occur in adolescents and adults in the starvation state. Our findings indicate that transaminase elevation may be common in infants with FTT, and may not warrant further investigation if the history indicates an isolated etiology of insufficient nutrition.

PARENTAL MEDIA RULES FOR TODAY'S ADOLESCENTS: PREVALENCE AND PREDICTORS

Omernick KE, Moreno MA

Background: Today's adolescents are surrounded by a digital environment of new media and the devices on which to consume it. Little is known about the current landscape of parental media rule setting.

Objective: The purpose of this study was to investigate the prevalence of parental media rules and to identify factors associated with increased parental rule setting. We were particularly interested in whether there were differences in rule setting by gender.

Design/Methods: This cross-sectional survey study using Qualtrics panels recruited adolescents age 12-15 years. The survey assessed ownership and access to media devices and types of social media, and whether there were media rules set by parents at home. We performed bivariate analysis of individual media-related factors including the kinds of devices and social media apps used by teens. We sought to identify which factors were associated with parental rules - those that were found to be significant (p value < 0.05) were entered into a multivariate model. We then tested separate multivariate models by gender.

Results: A total of 1,155 adolescents completed the online survey. Participants were 49.4% female, 73.7% Caucasian and had an average age of 13.6 (SD=1.1) years. Most (81.4%) teens had their own smartphone and 78.2% used some kind of social media. Approximately a third (31.5%) of participants reported that they "strongly agree" that their parents set rules for their media use. In our multivariate model including both genders, the factors associated with increased parental rule setting were owning greater than one media device (OR 2.50, 95% CI: 1.47- 4.26) whereas factors associated with decreased parental rule setting included age >12 years (OR 0.70, 95% CI: 0.52-0.95) and male gender (OR 0.75, 95% CI: 0.58-0.97). In our multivariate models stratified by gender, owning greater than one media device remained significant for both genders (male OR 2.61 P 0.02 95% CI: 1.15 -5.93, female OR:2.48 p 0.01 95% CI: 1.21 - 5.06). The factors found to be significant in girls but not boys included 1) age >12 years (OR 0.65 p 0.04 95% CI: 0.42 - 0.90) and 2) not having a social media profile (OR 1.70 p 0.03 95% CI: 1.04-2.74).

Conclusion: Our findings elucidate the low prevalence of parental media rules despite the near-universal media device ownership and social media use by adolescents. There is a clear opportunity for healthcare providers to encourage parental media rules for adolescent patients. Based on our results, male and older adolescents could particularly benefit from counseling on media rules at home.

PEDIATRIC DYSLIPIDEMIA SCREENING BY PEDIATRICIANS AND FAMILY MEDICINE PHYSICIANS: CURRENT PRACTICES AND FUTURE DIRECTIONS

Sleeth C, Peterson A, Hokanson J

Background: The American Academy of Pediatrics recommends that all children receive dyslipidemia screening between 9-11 and again between 17-21 years old. The American Academy of Family Physicians follows the United States Preventive Services Task Force, which states that there is insufficient evidence for or against routine pediatric lipid screening. A 2017 survey of pediatricians reported that many pediatricians' screening practices do not align with AAP guidelines.

Objective: To evaluate physicians' self-reported screening practices, physicians' rationale behind their individual screening practices, and the attitudes of both pediatricians and family medicine physicians towards earlier screening in the state of Wisconsin.

Design/Methods: A 27-question survey was created using Qualtrics software and was distributed via email to all active members of the Wisconsin Chapter of the American Academy of Pediatrics and the Wisconsin Academy of Family Physicians.

Results: 5.2% of total recipients responded. Pediatric physicians had a higher response rate than family medicine physicians (9.7% versus 3.0%). Respondents' average number of years in practice was 15 (0-39). 65% of respondents were female, and 35% were male. In total, 48% of respondents reported offering cholesterol screening at 9-11 years old for every child, while 44% reported offering selective cholesterol screening. More pediatricians than family medicine physicians reported offering universal screening (72% vs 15%), while the reverse was true for selective screening (23% pediatricians vs 73% family medicine physicians). When asked about future opportunities for screening for inherited cholesterol conditions, 56% of respondents thought it was reasonable to add a test to the state newborn screen, and 49% thought it was reasonable to add a test to the anemia screen performed between 9-12 months of age.

Conclusion: Most Wisconsin physicians who care for children report offering cholesterol screening in some form, either universally or selectively. Screening practices within specialties appeared to follow organizational guidelines, with pediatricians being more likely to offer universal screening and family medicine physicians being more likely to offer selective screening. Regardless of specialty, the majority of respondents thought it was reasonable to screen for genetic dyslipidemias in either the newborn period or at around one year of age. Interestingly, many physicians who do not provide universal lipid screening felt that universal screening at birth or in infancy would be reasonable.

MAURIAK SYNDROME: A RARE BUT RECOGNIZABLE COMPLICATION OF DIABETES MELLITUS IN ADOLESCENTS

Smith M, Carrel A

Introduction: Mauriac Syndrome is a known, but rare complication of insulin-dependent diabetes mellitus, becoming less common with advanced glycemic control. Classical typical features include growth impairment with delayed puberty, cushingoid appearance, and hepatomegaly.

Case Report: We report a case of a 17-year-old male with poorly controlled type 1 diabetes mellitus who presented to our hospital after being stabilized for diabetic ketoacidosis at another facility and transferred for further management of lactic acidosis, elevated transaminases and neutropenia. He was found to have hepatomegaly on exam, with imaging consistent with glycogenic hepatopathy. Transaminitis, lactic acidosis and neutropenia all resolved or improved with tighter glycemic control. Work-up of transaminitis and hepatomegaly was otherwise negative. Chart review of this patient demonstrated decreased growth velocity and previous delay in puberty.

Discussion: There have been increasing reports in recent literature of primarily adolescents with poorly controlled type 1 diabetes mellitus with elevated liver enzymes and hepatomegaly, which is often the only presenting sign of Mauriac Syndrome. Biopsies have shown mild degrees of fibrosis, which has been demonstrated to be reversible. There are scattered reports of associated lactic acidosis associated with Mauriac Syndrome. Only one other report documented accompanying neutropenia; in which, genetic testing showed a mutation in a subunit of the glycogen phosphorylase kinase gene. This case is somewhat unique in that our patient was found to have almost all known reported findings associated with Mauriac Syndrome apart from cushingoid appearance, whereas many others have only 1-2 findings. All reports thus far have demonstrated improvement in all parameters when tighter and adequate glycemic control is established.

Exact etiology of Mauriac Syndrome is not known, but at least one report has shown a possible genetic component, at least when neutropenia was accompanying feature. Early recognition of this rare condition is important to note, as tighter glycemic control has been shown to reverse growth and pubertal retardation as well as liver damage.

**PAS Poster Presentation QUALITY IMPROVEMENT INITIATIVE: INFANT CPR EDUCATION FOR CAREGIVERS OF PATIENTS ADMITTED FOR BRUE

Syu S, Smith W, Koffarnus K, Horsley W, Walker H, Sklansky D, Shadman K, Kelly M

Background: AAP guidelines recommend offering Infant CPR education to all caregivers of infants admitted for a brief resolved unexplained event (BRUE); however, only 32% of caregivers of BRUE admissions at this tertiary children's hospital were offered CPR education.

Objective: To improve the process of offering and providing Infant CPR education to caregivers of patients hospitalized for BRUE.

Design/Methods: A multidisciplinary team of nurse, resident and attending providers met biweekly to identify root causes of failure to provide inpatient Infant CPR education. This analysis led to the creation of: 1) a physician order for Infant CPR education within the electronic health record (EHR), 2) an Infant CPR video to provide caregivers education on bedside tablet computers, 3) EHR documentation of education completion, and 4) a 10-minute training for providers describing the new Infant CPR education process. Surveys were administered to providers to assess their knowledge before and after training. Chi-square analysis was used to compare the proportion of providers agreeing with each 5-point Likert item pre-post.

Results: Of 50 providers surveyed (16 nurses, 27 residents, and 7 attending physicians), most agreed Infant CPR education should be offered to caregivers of BRUE patients (88% to 96% pre-post training, $P=0.27$). Physician knowledge improved regarding how to order education (12% to 97% pre-post), what education is provided (21% to 94% pre-post) and where to find documentation of Infant CPR education (8% to 79% pre-post, all $P<0.0001$). Nurse knowledge of how to provide (44% to 93% pre-post) and document Infant CPR education (44% to 88%, both $P<0.0001$) also improved. Overall, provider understanding of the process to offer Infant CPR education improved (6% to 88% pre-post, $P<0.0001$).

Conclusion: Providers agreed that Infant CPR education is important to offer to caregivers of infants admitted for BRUE. Improving the Infant CPR education process is the first step toward increasing the accessibility and utilization of Infant CPR education for caregivers in the inpatient setting. Next steps include PDSA cycles to evaluate the impact of this new process on providing education to caregivers. Results from this work may inform future expansion of CPR education for other inpatient populations.

****PAS Poster Presentation**

SEE, DO, TEACH: A PILOT STUDY TO EVALUATE THE IMPACT OF VISUAL ART EXPERIENCES ON BURNOUT

Tedford N, Babal J

Background: Research shows that narrative medicine improves physician and trainee wellbeing. However, the impact of visual art experiences on burnout and wellbeing has not been well explored.

Objective: Investigate the impact of visual art experiences on burnout

Design/Methods: Physician trainees and faculty physicians from a Midwest, university hospital completed three visual art themed sessions: observation, creation, and instruction. Participants completed pre and post intervention surveys assessing burnout using the validated single-item measures of emotional exhaustion and depersonalization as well as provided qualitative descriptions of perceived impact of art in medicine. After each session, participants shared written reflections on each visual art experience. A paired t-test and thematic analysis were used for pre and post intervention analysis.

Results: Of the 14 participants, 85% were female, 69% were medical students, and 9 (64%) completed both pre and post intervention surveys. The average burnout measure for emotional exhaustion increased from 3.4 (SD=1.6) to 3.8 (SD=1.3) while depersonalization decreased from 3.2 (SD=0.7) to 2.9 (SD=0.9) after intervention, but this change was not statistically significant for either emotional exhaustion (p=0.4) or depersonalization (p=0.28). Qualitative assessment indicated that visual art experiences were enjoyable and perceived as facilitating a relaxing environment for reflection and interpersonal connection. Five themes were present: (1) increased interpersonal connection, (2) enhanced curious observation, (3) broadened perspective, (4) enabled empathy, and (5) provided an emotional outlet.

Conclusion: Participation in group visual art experiences may improve symptoms of burnout in physician trainees and faculty physicians. Our pilot suggests improved symptoms of burnout as demonstrated by qualitative analysis of written reflections, which indicated visual art experiences provide a space for self-reflection, observation, and potential for burnout prevention through resiliency skill building. However, larger studies are needed to evaluate the impact of group visual art experiences on reducing burnout amongst medical professionals. The medical humanities, specifically visual art experiences, could serve as a vital resource to address physician burnout by implementing interventions in medical education and/or professional training/practice settings to help mitigate burnout and aid in wellbeing.

Under PRESsure

Tedford N, Brichta C, Hammer D, Butteris S, Shadman KA, Edelman F, Bartosh S

Background: Few cases of posterior reversible encephalopathy syndrome (PRES) associated with poststreptococcal glomerulonephritis have been reported.

Case Report: A previously healthy 8-year-old boy presented with generalized tonic-clonic seizure activity in the setting of 1-week history of intermittent emesis, sore throat, and headache. After seizures were aborted, he complained of ongoing headache and had intermittent confusion. There was no history of previous seizures or recent mosquito/tick bites.

Physical Exam: After seizures were aborted, initial physical exam was unremarkable, aside from hypertension, facial/periorbital swelling, and postictal state. The remainder of his vitals were age appropriate except for his systolic blood pressures reading in the 160s mm Hg (99th percentile) while calm. Neurologic exam was significant for intermittent confusion.

Diagnostic Evaluation: Venous blood gas, complete metabolic panel, and complete blood count were notable for elevated serum creatinine (0.69 mg/dL). Head CT was negative for hemorrhage, ischemic stroke, trauma, or signs of increased intracranial pressure. Video EEG showed a postictal state. Head MRI showed with patch FLAIR abnormality and extensive patchy T2 hyperintensities. Lumbar puncture was unremarkable and negative for bacterial growth, enterovirus, arbovirus, or Lyme. Additional workup was remarkable for gross hematuria, elevated urine protein to creatinine ratio (2.13), C3 complementemia (13 mg/dL) and elevated DNase B antibody titers (336 U/mL).

Diagnosis: The symptoms, clinical findings, imaging, and laboratory results in our patient fulfilled criteria for PRES during the course of acute poststreptococcal glomerulonephritis.

Discussion: PRES is caused by various disease pathologies; elevated blood pressure is a common inciting cause. The differential diagnosis includes: renal disease, toxic leukoencephalopathy, cerebral vascular syndromes, infectious/ paraneoplastic/autoimmune encephalitis, acute demyelinating encephalomyelitis, and malignancy. Treatment is supportive care directed at blood pressure control. PRES appears to be reversible in most cases with return to baseline varying in duration. In all cases, radiologic improvement lags clinical recovery.

Conclusion: Complete history and review of vitals are important when evaluating patients and investigating the etiology of seizure activity. Poststreptococcal glomerulonephritis can present in various ways and should be ruled out as a potential etiology of new onset seizure activity. Blood pressure control is the mainstay of treatment for PRES and poststreptococcal glomerulonephritis.

COMPARISON OF INFANT MORTALITY RATES IN WISCONSIN USING DIRECT ADJUSTMENT METHOD

Tomlin BD, McAdams RM, Kaluarachchi DC

Background: Wisconsin has the highest African American infant mortality rates (IMR) in the United States. Rates of preterm birth, a leading cause of IMR, are higher in African Americans than Whites. Since preterm birth rates and gestational age distribution at birth affect IMR, using a direct age adjustment method to compare mortality rates among these populations can avoid an age distribution confounding effect.

Objective: To determine gestational age adjusted IMR for African American and White infants in Wisconsin.

Design/Methods: Total number of births, deaths, and crude IMR for non-Hispanic African Americans and non-Hispanic Whites for gestational age categories of <32 weeks, 32-35 weeks, 36 weeks, 37-38 weeks, 39-41 weeks and >41 weeks from 2011 to 2016 were obtained from Wisconsin interactive statistics on health query system. The African American and non-Hispanic White populations were combined and used as the standard population. Expected number of deaths were calculated for each gestational age category for each race. Gestational age adjusted IMR was calculated for each gestational age category and total population for both African American and White infants.

Results: There were a total of 38,132 live births and 523 deaths in African American infants, accounting for crude IMR of 13.7/1000 live births. There were a total of 292,181 live births and 1417 deaths for White infants, accounting for crude IMR of 4.8/1000 live births. Prematurity rates were 13.4 and 8.9% African American and White infants, respectively. Gestational age adjusted IMR for African American and White infants were 8.9 and 5.3/1000 live births, respectively. Ratio of crude IMR among two races was 2.8. Ratio of gestational age adjusted IMR among two races was 1.7.

Conclusion: Crude IMR was 180% higher in African Americans compared to White infants. After controlling for gestational age at birth, IMR among African Americans was 70% higher than that of White infants in Wisconsin between 2011 and 2016. Higher IMR in African Americans was only partially explained by the increased prematurity rates, with congenital malformations, SIDS, and Accidental deaths being the next most prevalent. Further analysis of causes of deaths and interventions to reduce both prematurity rates and infant deaths in African American population is needed to decrease the high IMR.

CHANGE IN RESIDENT KNOWLEDGE AND PERCEPTIONS OF DAILY PROGRESS NOTES FOLLOWING AN EDUCATIONAL INTERVENTION

Waterman HG, Bentley NL, Sklansky DJ, Kelly MM, Nackers KAM, Shadman KA

Background: Physicians enter residency with variable proficiency in note writing and knowledge of note purpose. Best practice guidelines give learners some direction, but may not provide adequate explanation about the importance and purposes of progress notes.

Objective: To test the efficacy of a workshop intervention on changing resident knowledge, attitudes, and beliefs about progress notes.

Design/Methods: An educational workshop was constructed by residents and faculty stakeholders based on review of the literature, institutional best practices, and a previously designed note assessment tool. Residents from a mid-sized pediatric residency program attended a workshop consisting of best practice didactics and small group work using the tool to assess example progress notes. Participants completed a 22-question online survey (Qualtrics) before and after the workshop to evaluate knowledge of progress note components and attitudes regarding note importance. Pre-post analysis was performed with Chi square testing for true/false questions and Mann-Whitney testing for Likert scale questions.

Results: Pediatric residents (n=26, 79% response rate) completed the pre-intervention online survey, and 23 (70%) completed the post-intervention survey. Accurate response rate improved in 15/20 of the true/false content questions, with a statistically significant improvement in five of them (p<0.01). Overall correct answer percentage increased from 78% to 91% (insignificant change). Resident confidence in their ability to write a note and opinion of note importance increased (p=0.01, 0.04).

Conclusion: This study suggests that a workshop intervention is an effective method of educating pediatric residents on progress note best practices. Further studies should assess the impact of the intervention on sustained resident knowledge and beliefs about progress notes and subsequent note quality.

Fellow Abstracts

****PAS Poster Presentation**

NEAR INFRARED SPECTROSCOPY DETECTS ACUTE KIDNEY INJURY IN PRETERM NEONATES

Adegboro C, Harer M

Background: Acute kidney injury (AKI) occurs in up to 50% of preterm neonates dependent on gestational age. Near Infrared Spectroscopy (NIRS) is used frequently in preterm neonates to measure cerebral tissue oxygenation and optimize neurologic outcomes. Although baseline renal tissue oxygenation (rSO₂) values have been previously established in preterm populations, changes in rSO₂ have not been correlated with standard markers of acute kidney injury (AKI) such as serum creatinine (sCr) and urine output (UOP). We hypothesized that changes in rSO₂ would correlate with and occur prior to changes in traditional neonatal AKI markers.

Objective: To evaluate rSO₂ values in preterm neonates and correlate changes to classic markers of AKI.

Design/Methods: This prospective study was conducted in a 46-bed level III neonatal intensive care unit. All neonates born <32 weeks were eligible for inclusion and there were no exclusion criteria. InvoS neonatal NIRS sensors were applied to the forehead and right flank by 48 hours of age upon parental consent to provide continuous cerebral tissue oxygenation (cSO₂) and rSO₂ values until 7 days of age. AKI was defined by neonatal KDIGO criteria including both sCr and UOP.

Results: 14 of 37 eligible patients were enrolled and completed monitoring (Table 1 Demographics; excluded: n= 11 declined, n=9 investigator or mother absence, n=3 no available monitors). Two patients experienced AKI (Stage 1 and Stage 2) in the first week of age and each patient's rSO₂ values decreased prior to changes in UOP and sCr. Average rSO₂ values for the week were lowest in AKI patients compared to those without AKI (33 vs 64, P=0.044, Figure 1). Patients with AKI also spent the most time with rSO₂<50% (76 vs 7), P=0.022, Figure 2). No adverse events or skin issues have been reported.

Conclusion: Non-invasive continuous monitoring of tissue oxygenation with NIRS can detect AKI in preterm infants. Renal tissue oxygenation values are significantly lower in the first week in patients with AKI and change prior to traditional AKI markers. Compared to previous studies, our tissue oxygenation values are similar and our protocol did not result in any adverse events or skin issues, successfully demonstrating the feasibility of this technology in the smallest and youngest gestational age groups. Further recruitment and analysis are needed to determine the effect of medications and other neonatal interventions on rSO₂ values in this preterm cohort.

****PAS Poster Presentation**

OXYTOCIN CROSSES THE MATERNAL-FETAL BARRIER IN TERM INFANTS

Adegboro C, Harer M, Pattnaik B

Background: It is theorized that OXT levels increase throughout gestation. Limited available data suggests an OXT surge occurs during labor. However, in the absence of labor (i.e. cesarean section [C-section]), the fetus misses these peak levels. OXT has angiogenic properties and has been identified in the retina. It may play a crucial role in augmenting vessel growth in retinal diseases. There is conflicting data on whether oxytocin crosses the maternal-fetal barrier due to its large molecular size and hydrophilic nature.

Objective: To determine whether oxytocin crosses the maternal-fetal barrier in term infants.

Design/Methods: Over a 5-month period, cord blood was collected from 57 term infants > 37 weeks gestational age. OXT levels were compared between infants whose mothers received exogenous OXT (maternal OXT) versus those who did not (no maternal OXT). OXT levels were also compared between infants whose mothers underwent labor (labor) and those who did not (no labor). Samples were preserved at 4°C and plasma extracted from whole blood via centrifugation. Plasma was eluted through a high-performance liquid chromatography column for optimal extraction followed by centrifugal concentration under vacuum. The precipitant was prepared and ELISA was performed.

Results: Of the 57 samples collected, 10 infants had exposure to maternal exogenous oxytocin. The median birthweight was 3420 grams and the median gestational age was 39.1 weeks. The median (IQR) fetal OXT concentration in the maternal OXT group was 143.5 pg/mL (77.2 – 384.2) and in the no maternal OXT group was 77.8 pg/mL (34.8 – 167.9) (p=0.04), Figure 1). The median fetal OXT concentration among infants in the maternal labor group was 100 pg/mL (73.5 – 243.3) in comparison to the no labor group which was 66.4 pg/mL (32.3 – 137.0) (p=0.03), Figure 2).

Conclusion: Fetal OXT concentrations are higher in term infants whose mothers received OXT showing that OXT crosses the maternal-fetal barrier. Fetal OXT concentrations were also higher among term infants whose mothers underwent labor. This suggests OXT is increased by the presence of labor and therefore may play an important role in the onset of labor. Future studies that examine oxytocin levels in preterm infants are needed to determine how OXT crosses the placenta throughout gestation and in turn how it may regulate retinal vasculature during development and disease.

****PAS Poster Presentation**

NEWBORN SCREENING ALONE INSUFFICIENT TO IMPROVE PULMONARY AND MORTALITY OUTCOMES FOR CF

Barreda C, Collier R, Farrell P, Laxova A, Eickhoff J, Braun A, Rock M

Background: The Wisconsin Cystic Fibrosis (CF) Neonatal Screening Project was an RCT that found that infants randomized to (and therefore diagnosed by) newborn screening (NBS) in Wisconsin between 1985 and 1994 had improved nutritional outcomes compared to those who presented clinically. Despite randomization, the NBS group had a higher proportion of patients with severe genotypes and pancreatic insufficiency; they also acquired *Pseudomonas aeruginosa* (PA) at an earlier age. The long-term lung function and mortality outcomes of this cohort is unknown. While the original RCT ended in 2010, the Cystic Fibrosis Foundation Patient Registry (CFFPR) provided longitudinal outcome measures.

Objective: To assess long-term pulmonary and mortality outcomes of patients with CF without meconium ileus (MI) in the Wisconsin Neonatal Screening Project RCT who were randomized to early diagnosis by NBS compared to individuals randomized to present clinically or by age 4.

Design/Methods: Patients who had consented to the original RCT were identified from the CFFPR. Study data included screening assignment (NBS vs clinical), clinical characteristics and outcomes – specifically percent predicted Forced Expiratory Volume in 1 second (ppFEV1) and mortality. A linear mixed effects model with subject specific random effects was used to compare the lung function decline (change in ppFEV1) of subjects without MI between the two groups up to age 26. Differences in survival between the two groups were assessed with Cox proportional hazards models.

Results: From the original RCT, 144 of the 145 subjects had available data. Of those, 36 were ineligible for analysis due to MI or no valid NBS, leaving 109 subjects for analysis: 57 subjects were in the screened group; 52 subjects were in the control group. The rate of decline of ppFEV1 was greater ($P < 0.0001$) in the screened group with a mean loss of 1.78%/year (95% CI 1.65-1.93%) compared to -1.42%/year (95% CI -1.58- -1.26%) in the control group. There were no significant differences in mortality between the two groups.

Conclusion: NBS by itself appears insufficient to improve pulmonary and mortality outcomes for patients with CF. A potential hypothesis for the greater lung function decline in the screened group is an earlier acquisition of PA. Our results indicate that in an era prior to strict infection control, current antibiotics, dornase alfa and CFTR modulators, NBS for CF may be associated with worse pulmonary outcomes. This study underscores the importance of close follow-up of conditions added to the NBS.

USE OF POINT-OF-CARE LUNG ULTRASOUND TO DIAGNOSE THE ETIOLOGY OF ACUTE RESPIRATORY FAILURE IN A PEDIATRIC INTENSIVE CARE UNIT.

DeSanti R, Al-Subu A, Cowan E, Lasarev M, Kory P

Background: Acute respiratory failure (ARF) is a common indication for admission to the pediatric intensive care unit (PICU). Traditionally, chest radiography (CXR) has been utilized as a primary diagnostic test in the PICU despite evidence of low diagnostic accuracy. Point-of-care lung ultrasound (POC-LUS) has emerged as an alternative to CXR in the assessment of critically ill adults with ARF due to its high diagnostic accuracy on patient presentation.

Objective: To assess whether POC-LUS is accurate in determining the etiology of ARF on admission to the PICU.

Design/Methods: This is an on-going prospective observational study, of patients admitted to a 21-bed mixed medical/surgical PICU with a diagnosis of ARF. A POC-LUS is conducted on admission by trained investigators blinded to patient history, examination, and diagnostic testing using a six-zone scanning protocol. Findings were grouped a priori into distinct ultrasound patterns correlating with discrete diagnoses of ARF. The generated POC-LUS diagnosis is compared to the admitting diagnosis of the PICU physician (clinical diagnosis) and to a review of the chart following discharge (final diagnosis). Kappa statistics were used to determine provider agreement with the final diagnosis. Institutional review board approved the protocol (IRB 2018-0711).

Results: Twenty-three of 32 enrolled patients had data available for analysis (72% of sample). There were 10 patients under 1 year of age (median 4.5 months, IQR 0.75 - 8.25 months) and 13 patients over 1 year of age (median 2 years, IQR 1.0 – 4.5 years). There were 7 patients with a final diagnosis of pneumonia (30%), 15 with bronchiolitis (65%), and 1 with asthma (4%). LUS was completed on average 7 hours from PICU admission (S.D. 3.99). POC-LUS demonstrated 48% accuracy in determining the etiology of ARF with a kappa of 0.207 (slight agreement; C.I. -0.089-0.479) while PICU physicians demonstrated 70% accuracy with a kappa of 0.468 (moderate agreement; C.I. 0.212-0.711). Agreement between trainee and expert diagnosis was 65% with a kappa of 0.457 (moderate agreement; C.I. 0.186– 0.718). There were no adverse events attributable to the POC-LUS, one patient dislodged the high flow nasal cannula requiring replacement by the bedside nurse.

Conclusion: In contrast to currently published literature suggesting high utility in differentiating the cause of adult ARF, POC-LUS demonstrated low accuracy in determining the cause of acute pediatric respiratory failure as a stand-alone examination technique on admission to the PICU. This may be due to differences in the incidence of ARF pathologies among adults and children. Determining the optimal role of POC-LUS as an adjunct in the examination of pediatric patients with ARF requires further study

****PAS Poster Presentation**

IMPACT OF POINT-OF-CARE ULTRASOUND TRAINING WITHIN A MEDIUM-SIZED PEDIATRIC INTENSIVE CARE UNIT

DeSanti R, Kamps N, Malkani T, Cowan E, Srinivasan S, Al-Subu A

Background: Adult literature demonstrates that point-of-care ultrasound (POCUS) training can accurately teach exam skills to bedside intensivists while improving diagnostic accuracy and offering the potential to alter management. To date, only a single, large pediatric critical care unit has described their experience demonstrating the same.

Objective: To describe the process of initiating a POCUS education program within a medium-sized academic PICU and evaluate its potential impact on clinical management.

Design/Methods: A review of POCUS exams obtained by providers among a single-center, quaternary, mixed medical-surgical PICU within a children's hospital over a 6-month period (06/01/18-12/31/18) with a description of program development, implementation, and quality assurance.

Results: Six pediatric critical care faculty and 5 fellows participated in a 2-day didactic ultrasound course with hands-on instruction followed by a monthly longitudinal ultrasound curriculum. POCUS exams are performed at provider discretion, for clinical indications with quality assurance provided via off-line review by a provider credentialed in ultrasound. Providers have obtained and documented 54 POCUS exams among three core domains: cardiovascular (22, 41%), lung (21, 39%), and abdominal (2, 4%); there were 9 (16%) combined cardiovascular and lung or cardiovascular and abdominal exams. Exams performed solely for procedural indications were not included. Six exams (12%) demonstrated findings that could immediately alter management and were confirmed via alternative studies; including 2 cardiovascular exams that demonstrated vegetation/clot formation, 1 lung exam that demonstrated absence of pneumothorax prompting evaluation for PE, 1 lung exam that demonstrated large pleural effusions requiring drainage, and 1 abdominal exam that demonstrated free fluid prompting surgical exploration.

Conclusion: Implementation of a POCUS program for pediatric critical care providers among medium-sized PICUs is feasible and offers the ability to immediately impact patient care.

CLINICAL UTILITY OF CHROMOSOMAL MICROARRAY ANALYSIS FOR PRECISE DIAGNOSIS AND RISK ASSESSMENT OF PEDIATRIC NEOPLASTIC DISORDERS

Guo F, Frater-Rubsam L, Horner V

Background: The 5-year survival rate for pediatric neoplastic disorders has increased dramatically in the last 40 years, with 84.8% overall, specifically 90.6% for acute lymphoblastic leukemia (ALL) and 76.8% for neuroblastoma¹. These improvements are mainly due to the correlation of morphologic, immunophenotypic, cytogenetics, and outcome data to risk-stratified consolidation chemotherapy regimens, an effort led by the Children's Oncology Group (COG) ². Structural genomic abnormalities, including balanced chromosomal rearrangements, copy number gains and losses and copy-neutral loss-of-heterozygosity (CN-LOH) represent an important category of diagnostic, prognostic and therapeutic markers for pediatric cancer patients' treatment and management planning. Chromosomal microarray analysis (CMA), due to its higher resolution, no requirement for dividing cells and unique CN-LOH detection has been increasingly incorporated into clinical testing algorithms for neoplastic disease diagnostic workup. It has been reported that CMA reveals additional genomic abnormalities in around 14-54% of hematological malignancy cases that are otherwise normal/ non-informative by karyotype and fluorescence in situ hybridization (FISH)³⁻⁶. Here we present three clinical scenarios to demonstrate how CMA facilitates the detection of submicroscopic copy number abnormalities (CNAs), adds precision with regards to breakpoint locations and the gene content, and further refines the risk stratification for pediatric neoplastic disorders.

Case 1: Chromosome analysis and anaplastic lymphoma kinase (ALK) rearrangement FISH were ordered on a 1-year-old male with neuroblastoma. Chromosome analysis identified additional material of unknown origin on both 1p32 and 9p13, a deletion of 6q13q23 and 9q22q34, and double minute chromosomes. ALK rearrangement FISH was negative. Prompted by the physician, further CMA analysis clarified that the additional material on chromosome 1 is derived from der(1)t(1;17)(p33;q21) and the double minutes are derived from MYCN amplification. The der(1)t(1;17)(p33;q21) results in loss of distal 1p and gain of distal 17q which is a recurrent finding in neuroblastoma and indicates unfavorable prognosis⁷. MYCN gene amplification, the most prognostic relevant genetic alteration in neuroblastoma, is associated with high-risk neuroblastic tumors and poor patient prognosis⁷. CMA confirmed loss of material at chromosome 6q, 9p, and 9q, and further refined the breakpoints. CMA additionally showed a gain of 20p13 and a region of homozygosity on 9p.

Case 2: Chromosome analysis and pediatric ALL FISH panel were ordered on a 3-year-old male for diagnostic ALL work-up. Chromosome analysis showed an abnormal hyperdiploid clone (eight cells) with two extra copies of chromosome 21, gain of an extra copy of the X chromosome, a marker chromosome of uncertain origin (mar). FISH was positive for gain of RUNX1 in 21q22. Mistaking masked near-haploidy for hyperdiploidy could lead to erroneous risk classification and hence risk of treatment failure⁸, therefore, CMA was promoted. CMA not only confirmed the hyperdiploid karyotype, but also revealed monosomy 20 and deletion of most of the long arm of chromosome 13 which are recurrent in ALL and have been associated with increased risk of relapse⁹. In addition, SNP array also showed copy neutral loss of heterozygosity (CN-LOH) of chromosomes 6 and 9 which increase the risk of homozygous inactivation of tumor suppressor genes.

Case 3: Chromosome analysis and pediatric ALL FISH panel were ordered on a 5-year-old male for diagnostic ALL work-up. Both chromosome and FISH panel showed normal results. Further CMA revealed a deletion in 7p12.2 including the IKZF1 gene and a deletion in 9p13.2 including the PAX5 gene. Deletions of the IKZF1 and PAX5 genes are associated with the BCR-ABL1-like high risk subtype of B-cell precursor acute lymphoblastic leukemia within the WHO classification system¹⁰. IKZF1 abnormalities have been reported to predict a poor outcome in B-ALL¹¹.

Conclusion: In summary, CMA technology enables accurate, cost-effective whole-genome analysis at a resolution significantly higher than that of conventional karyotyping and FISH. It provides additional disease specific and potentially clinically actionable genomic information. The integration of CMA into the cytogenetic diagnosis of pediatric malignancies and incorporation such results into COG risk-stratification algorithms will further improve patient care.

A QUALITY IMPROVEMENT INITIATIVE TO DECREASE ACUTE KIDNEY INJURY RELATED TO CO-ADMINISTRATION OF VANCOMYCIN AND PIPERACILLIN-TAZOBACTAM

Gusland D, Nachreiner J, Bogenschutz M, Strayer J, Semanik M, Schulz L, Henderson S

Problem Statement: Co-administration of vancomycin and piperacillin-tazobactam is associated with increased rates of AKI.

Background: There is a growing body of evidence that patients who receive both vancomycin and piperacillin-tazobactam (VPT) are at an elevated risk of developing acute kidney injury (AKI), constituting a modifiable risk factor for AKI. Our first intent was to review our rates of VPT co-administration and identify the number of patients who developed AKI. Our goal was then to decrease the rate of VPT associated AKI by 50% over the following 6 months.

Design/Methods: In July 2018, our Pediatric Antimicrobial Stewardship (AMS) team identified VPT associated AKI as an area for improvement. We then reviewed our in-house data for the preceding 12 months (July 2017 – June 2018). We identified all patients who had received VPT combination therapy, duration of combination therapy, and whether or not they developed AKI- defined as a 50% increase in creatinine from baseline. We planned several interventions including developing and publishing a vancomycin guideline and empiric antibiotic order set, and providing a formal didactic lecture for the pediatric residents. While these interventions were in development, our usual AMS activities continued. The formal AMS program for our medium-size (111 bed) stand-alone children's hospital within a larger university health system was established in 2016. The AMS activities include prospective audit and feedback on antimicrobial prescribing Monday-Friday by a dedicated pediatric pharmacist. The hospitalist, Pediatric ICU and Hematology/Oncology teams round with a pharmacist Monday-Friday. Residents also receive ongoing education about AKI from the Pediatric Nephrology team who is part of the multicenter Nephrotoxic Injury Negated by Just-in-time Action (NINJA) collaboration. Our interventions were ready about 6 months after we had identified this as an area for improvement. We then reviewed the 6 months of data from July 2018-December 2018 to establish our new baseline.

Results: Our first set of data collection identified 52 patients (26 female) who received VPT. Of these, 10 went on to develop AKI (5 female). The average duration of VPT co-administration was 44 hours. Our second review from July 2018 - December 2018 identified 7 patients (6 female) who received VPT. Of these, 1 female went on to develop AKI. The average duration of VPT co-administration during this data collection was 27.7 hours. This represents a 73%

decrease in patients prescribed VPT and an 80% decrease in VPT associated AKI when factoring in the duration of data collection.

Conclusion: By simply identifying VPT co-administration as an area for improvement, we were able to meet our goal of 50% decrease in VPT associated AKI even before our planned interventions were implemented. This likely reflects success of the existing AMS activities, as well as effective communication between Pharmacy, Infectious Disease, and the primary hospital services.

DISTINCT INNATE IMMUNE CELL MATURATION DURING THE FIRST YEAR OF LIFE IS ASSOCIATED WITH FARM EXPOSURE

Lang A, Fye S, Chasman D, Evans M, Barnes K, Bendixsen C, Gern J, Ong I, Seroogy C

Rationale: Early life farm exposure is associated with protection against development of atopic disease and severe respiratory infections. However, the impact of early life farm exposure on immune cell profiles and antiviral maturation on respiratory viral burden remains poorly characterized. We hypothesized that early life farm exposure is associated with differences in the innate immune cell signatures.

Design/Methods: Longitudinally collected blood mononuclear cells from cord (n=108; [non-farm=64;farm=44]) and 1-year old (n=91; [non-farm=50;farm=41]) animal farm-exposed and non-farm rural infants enrolled in Wisconsin Infant Study Cohort were stimulated with rhinovirus A16 (RV) or lipopolysaccharide (LPS) and analyzed with two multiparameter flow cytometry panels. Statistical analysis was performed using Prism 7, SPICE v6, and QluCore Omics Explorer v3.4.

Results: Using principal component analysis, significant age-related differences were seen with both RV and LPS stimulation at 1-year of age compared to cord blood (71 variables and 70 variables, respectively, q-value ≤ 0.05). Monocyte cytokine responses to LPS had a higher frequency of single and dual cytokine producing cells in farm-exposed children compared to non-farm children at 1-year of age (p=0.024). In contrast, RV-induced plasmacytoid dendritic cell function was similar between farm and non-farm infants irrespective of age.

Conclusion: Innate immune cell responses exhibit maturational changes during the first year of life and early life farm exposures are associated with increased monocyte polyfunctionality at 1-year of age. Studies are ongoing to elucidate innate immune signature associations with specific farm-related early life exposures, atopic disease and respiratory viral disease burden.

IMPLEMENTATION OF POINT OF CARE ULTRASOUND (POCUS) TO IDENTIFY CENTRAL CATHETER TIP LOCATION IN THE NEONATAL INTENSIVE CARE UNIT

Meinen R, Bauer A, Devous K, Al-Subu A, Cowan E

Background: Point of care ultrasound (POCUS) is used in the Emergency Department and the Pediatric Intensive Care Unit (PICU) as a rapid diagnostic and procedural tool. There has been a drive in recent years to introduce POCUS into the Neonatal Intensive Care Unit (NICU) to help facilitate central catheter insertion and successful lumbar puncture completion, while also identifying central catheter positioning, assessing lung pathologies, and for functional echocardiography.

Objective: Our objective was to introduce POCUS into two NICUs, located at UnityPoint Health-Meriter and American Family Children's Hospital, and to use it identify the tip location of central catheters, including umbilical venous catheters (UVC), umbilical arterial catheters (UAC), and peripherally inserted central catheters (PICC). Our secondary objective is to be able to provide an educational and credentialing model for the PICU and NICU.

Design/Methods: Following a two-day ultrasound course, and using a Sonosite SII ultrasound machine, neonatal providers performed POCUS within 72 hours of central catheter placement to identify the tip location. Ultrasound findings were not used in medical decision-making by the primary neonatology team, as x-ray remained standard of care.

Results: POCUS was obtained on neonatal patients within 72 hours of central catheter placement (n=42). The location of the central catheter was identified by a neonatal provider in 39 studies (93%). The catheter was found to be in a central location, as defined by in the inferior vena cava-right atrium junction, in 19 studies (45%).

Conclusion: POCUS is a rapid diagnostic tool that helps identify central catheter tip location. This may ultimately be able to replace the gold standard of X-ray, which may lead to a reduction of radiation exposure and time to treatment in the neonatal population. We hope to provide an educational and credentialing model that is applicable to other institutions for implementation of a POCUS program.

**PAS Poster Presentation

STANDARDIZATION OF EMR DOCUMENTATION IN CHILDREN WITH ADRENAL INSUFFICIENCY

Naik Y, Logel S, Pollock A, Connor E

Background: Adrenal crisis can lead to severe morbidity and mortality, particularly when treatment is delayed by lack of awareness of prior adrenal insufficiency (AI) diagnosis. Early recognition of AI is aided by (1) clarity and uniformity of AI diagnosis documentation in the electronic medical record (EMR), (2) a readily available stress dose treatment plan for illness or injury and (3) medical alert identification (ID).

Objective: This quality improvement project aimed to increase uniformity and visibility of AI diagnosis and stress dose plan in the problem list in the EMR and to increase use of medical alert ID.

Design/Methods: Data from patients seen in pediatric endocrinology clinic who had glucocorticoids listed in their medication list were electronically extracted (n=407). Manual chart review of these patients identified those children with confirmed AI (n=183), underlying AI etiology and use of medic alert ID. For those with confirmed AI, EMR documentation of AI diagnosis in the problem list and stress dose plan were assessed.

Root cause analysis was mapped and metrics were determined to impact a change (see Figure 1: Fish bone diagram). As AI-diagnosed patients came to clinic, the care team was prompted to document diagnosis of AI and stress dose plan in the EMR problem list, use of medical alert ID in clinic notes, and use of "smart text" to create uniformity in documentation.

Success of intervention was assessed by comparing all three measures (problem list AI and stress dose documentation gap, and presence of medical alert ID in clinic notes) at baseline and 6 months post intervention.

Results: Top ten AI etiologies in these patients are shown in Table 1. At baseline, 44% (n=83/183) had AI documented in problem list, 14% (n=27/183) had a stress dose plan in problem list. Documentation of ID bracelet was present in 14% (n=26/183) of patients.

After 6 months, of 162 patients at risk of adrenal insufficiency, 81% had successfully improved documentation (132/162) for AI and 71% (116/162) had a stress dose plan in the problem list. Documentation of ID bracelet was present in 34.5% (56/162). Table 2: data comparison baseline and 6 months.

Conclusion: Increasing uniformity of AI documentation in the EMR is feasible and improves care of children with AI by increasing awareness of risk for adrenal crisis and appropriate treatment. Next steps include a flowsheet row in EMR to facilitate medical alert ID documentation in clinic notes and EMR pop-up alert for AI at-risk patients.

****PAS Poster Presentation**

REAL WORLD EXPERIENCE WITH MEDTRONIC MINI MED 670 G PUMP SYSTEM IN CHILDREN WITH TYPE 1 DIABETES MELLITUS

Naik Y, Van Den Langenberg B, Bekx MT

Background: Type I diabetes mellitus (T1D) management is complex with daily adjustments in insulin regime. In 2016, an automated insulin delivery system (“hybrid closed loop”) was approved by the FDA. As a recent technological invention, real world experience studies are few, especially in the pediatric setting

Objective: The goal of this project is to describe experience with the hybrid closed loop in an academic pediatric practice including rate of successful transition to Auto Mode at first follow up visit, and review potential barriers.

Design/Methods: We performed a chart review to identify children, (1-18 years old), with T1D, who were prescribed the hybrid closed loop (Medtronic Mini Med 670 G) system. Data collection included baseline demographic metrics, utilization of hybrid system, review of blood glucose patterns at first follow up visit (2-6 months), change in HbA1c, and challenges with system.

Results: Eighty-three patients (11%) were prescribed the hybrid closed loop pump with average age 14 years and average DM duration of 7.3 years. Sixty-four children (48% male) had a follow up visit at time of review.

At first follow up visit, a quarter of patients were successful in complete transition (Auto Mode greater than 80% of time), 41% were new to pump therapy. Meanwhile, 37.5 % remained in 100% Manual Mode. One third achieved sensor wear > 85%. Table 1.

Comparison at first follow up visit between Transitioned (those in auto mode > 80%) to those Not Transitioned demonstrated at baseline a lower A1c. ($p < 0.001$) but no other significant difference. (Table 2). Both groups had a decrease in HgbA1C at follow up with an implied overall reduction of 0.32 (95% CI: 0.06—0.59) ($p=0.018$).

Challenges with transition to Auto Mode included difficulty with calibration, frequent alarms, sensor adhesiveness, and irritation and pain at the site of sensor. Frustration was expressed by one third of patients

Conclusion: As a new tool for diabetes management, the Medtronic Mini Med 670 G pump offers great potential. Our data demonstrates successful transition to Auto Mode at first follow up visit in a quarter of patients, even those new to pump therapy. With time, we anticipate a larger percent to fully transitioned to auto mode with benefits of greater time in range and less hyperglycemia. Main barriers to full transition included difficulty with technology, hence technical support with phone call or group sessions may help address barriers.

PRENATAL FARM-DERIVED EXPOSURES ARE ASSOCIATED WITH ATOPIC DERMATITIS RISK IN INFANCY

Steiman C, Evans M, Olson B, Barnes K, Bendixsen C, Seroogy C, Gern J

Background: Atopic dermatitis (AD) during infancy is significantly less prevalent in Wisconsin children from farm families compared to non-farm children. We hypothesized that specific farm-derived exposures, including prenatal contact with farm animals and animal feed, are inversely associated with AD development in infants.

Design/Methods: Mothers completed questionnaires about environmental exposures starting at 13-weeks gestation. AD was defined as parental report of a healthcare provider’s diagnosis of AD. Fisher’s exact test was used to analyze effects of individual animal and feed exposures. Chi-square test for trend was used to analyze effects of animal exposure diversity by number of species.

Results: Among children (ages 2 to 48 months) in the farm group ($n=104$), prenatal exposures to poultry (AD rate: 3% vs 28%, $P=0.003$), pig (4% vs 25%, $P=0.04$) and feed grain (13% vs 34%, $P=0.02$) were associated with reduced rates of AD. The risk of AD was further influenced by diversity of animal species exposure. Prenatal exposure to greater numbers of animal species was associated with reduced rates of AD (0 animals 43%, 1-2 animals 31%, 3-4 animals 16%, 5-6 animals 6%, $P=0.01$).

Conclusion: Maternal contact with farm animals (poultry, pig, and diversity of exposure) and feed grain during pregnancy was inversely associated with development of AD in Wisconsin farm children. These findings are consistent with studies in Western Europe and suggest that prenatal contacts with farm-derived exposures additively reduce the risk of developing AD in early life.

CASE REPORT EXPANDING THE PHENOTYPIC AND GENOTYPIC SPECTRUM OF SETD5 VARIANTS

Williams K, Hall A, Rice G, Pollock A

Background: The SET-domain-containing 5 gene (SETD5, MIM 615743) encodes a methyltransferase shown to regulate histone acetylation, transcription, cell cycle, and embryonic development. SETD5 is highly expressed in brain and genetic variants have been described in individuals with developmental delay, intellectual disability, and autism. SETD5 is also postulated to be the critical gene for the 3p25 microdeletion syndrome, which causes severe to profound intellectual disability, motor and speech delays, autism, and distinctive physical features (microcephaly, micrognathia, ptosis, and cleft palate).

Case report: We report a 4-year-old girl born small for gestational age with multiple syndromic features (upslanting palpebral fissures, epicanthal folds, right ear pit, micrognathia, webbed neck, and low posterior hairline). Her development is delayed in gross and fine motor skills, but language, social skills, and cognitive abilities are age-appropriate. Medical history includes recurrent episodes of acute otitis media and tympanostomy tube placement. Family history is negative for developmental delays, autism, or birth defects. Dilated eye exam revealed myopia, but no other structural abnormalities. Echocardiogram showed a small PFO versus ASD, but no other structural abnormalities. Skeletal survey was normal. Initial genetic evaluation included chromosome analysis (Wisconsin State Lab of Hygiene, Madison, WI) to exclude Turner syndrome and showed 46 XX. Microarray analysis (Mayo Medical Labs, Rochester, MN) was normal. Subsequent RASopathy multi-gene panel (BRAF, CBL, HRAS, KRAS, MAP2K1, MAP2K2, NRAS, PTPN11, RAF1, SHOC2, and SOS1, Gene Dx, Gaithersburg, MD) was negative. Trio whole exome sequencing (Prevention Genetics, Marshfield, WI) revealed a novel de novo 10.3 kb deletion in SETD5 [NM_001080517.1, arr(GRCh37) 3p25.3 (9487466_9497789) x 1]. The deletion encompassed exons 14-17 with breakpoints in introns 13 and 17 and was reported as likely pathogenic. Proband was also hemizygous for a maternally-inherited novel missense variant of unknown significance in SETD5 (c.2300G>A, p.Arg767His). Rate of weight gain slowed after about 9 months of age. Linear growth velocity was steady in infancy and began declining by 15 months of age. At age 3, bone age matched chronological age. Head circumference was normal. Growth hormone therapy was initiated at 4 years of age and linear growth velocity increased from 5.5 cm/year to 12 cm/year during the first 4 months of treatment. Detailed neurodevelopmental testing is planned to better characterize cognitive function.

Conclusion: This case highlights the utility of whole exome sequencing in identifying novel gene variants that cause genetic syndromes. In contrast to other reported individuals with SETD5 variants, the proband described here had short stature and age-appropriate language, social skills, and cognitive abilities, expanding the phenotypic spectrum for SETD5 disorders.

**PAS Poster Presentation

POSITIVE SCREEN FOR SLEEP APNEA IN ADOLESCENTS WITH POLYCYSTIC OVARY SYNDROME IS INDEPENDENT OF BMI AND METABOLIC RISK

Zevin E, Bekx MT

Background: Polycystic ovary syndrome (PCOS) is common in adolescents, and in adults PCOS is associated with increased risk of obstructive sleep apnea (OSA) even when controlling for BMI. The Endocrine Society PCOS guidelines recommend screening overweight and obese adolescents with PCOS for symptoms suggestive of OSA. Both the prevalence of and predictive factors for OSA in adolescents with PCOS remain uncertain.

Objective: To evaluate the prevalence of OSA in adolescents with PCOS and the association of potential risk factors for the development of OSA with both positive OSA screening and confirmatory testing.

Design/Methods: We performed a retrospective chart review of all adolescents with newly diagnosed PCOS in a multidisciplinary PCOS clinic over 2 years. Diagnosis of PCOS was made by Androgen Excess Society criteria. The presence of snoring and/or excessive daytime fatigue was considered a positive OSA screen. Patient characteristics and laboratory results including age, race, BMI, obesity class, waist circumference, hemoglobin A1c, HDL, and triglycerides were analyzed for association with a positive screen. This study was IRB-approved.

Results: Of 38 patients newly diagnosed with PCOS, 33 (87%) were screened for symptoms of OSA and 11 screened positive. There was no significant difference in anthropomorphic measures or laboratory data between patients with and without a positive screen (Table 1). The 11 patients who screened positive were all referred to sleep clinic. Six attended the appointment, 5 underwent polysomnography, and 2 were diagnosed with OSA and prescribed CPAP. Of the remaining 5 patients referred, 3 did not respond to schedule requests, 1 sought outside sleep evaluation, and 1 pursued tonsillectomy instead.

Conclusion: One-third of adolescents newly diagnosed with PCOS have symptoms suggestive of OSA. Positive OSA screen was not associated with elevated BMI or increased waist circumference in our adolescent patients with PCOS. Of those referred, only half of patients completed sleep clinic evaluation for OSA. Untreated OSA can compound metabolic risks already present in patients with PCOS. Therefore, it is important to screen all adolescents with PCOS for OSA and refer those with a positive screen for definitive diagnosis and treatment. Further identification of barriers to follow up in sleep clinic needs to be addressed.

Faculty/Staff/Student Abstracts

TWO-SITE REGIONAL OXYGEN SATURATION AND CAPNOGRAPHY MONITORING DURING RESUSCITATION AFTER CARDIAC ARREST IN A SWINE PEDIATRIC VENTRICULAR FIBRILLATORY ARREST MODEL

Al-Subu A, Hacker T, Eickhoff J, Ofori-Amanfo G, Eldridge M

Background: To investigate the use of multi-site regional oxygen saturations (rSO₂) and end tidal carbon dioxide (EtCO₂) to assess the effectiveness of resuscitation and return of spontaneous circulation (ROSC). Materials and

Design/Methods: Eight mechanically ventilated juvenile swine underwent 28 ventricular fibrillatory arrests with open cardiac massage. Cardiac massage was administered to achieve target pulmonary blood flow (PBF) as a percentage of pre-cardiac arrest baseline. Non-invasive data, including, EtCO₂, Cerebral rSO₂ (C-rSO₂) and Renal rSO₂ (R-rSO₂) were collected continuously.

Results: Our data demonstrate the ability to measure both rSO₂ and EtCO₂ during CPR and after ROSC. During resuscitation EtCO₂ had a strong correlation with goal CO with $r=0.83$ ($p<0.001$) 95% CI [0.67-0.92]. Both C-rSO₂ and R-rSO₂ had moderate and statistically significant correlation with CO with $r=0.52$ ($p=0.003$) 95% CI (0.19-0.74) and 0.50 ($p=0.004$) 95% CI [0.16-0.73]. The AUCs for sudden increase of EtCO₂, C-rSO₂, and R-rSO₂ at ROSC were 0.86 [95% CI, 0.77-0.94], 0.87 [95% CI, 0.8-0.94], and 0.98 [95% CI, 0.96–1.00] respectively.

Conclusion: Measurement of continuous EtCO₂ and rSO₂ may be used during CPR to ensure effective chest compressions. Moreover, both rSO₂ and EtCO₂ may be used to detect ROSC in a swine ventricular fibrillatory arrest model.

FEASIBILITY AND SAFETY OF AEROSOL BRONCHODILATORS DELIVERY THROUGH HIGH FLOW NASAL CANNULA IN PEDIATRIC PATIENTS WITH RESPIRATORY DISTRESS

Al-Subu A, Nguyen V, AlAli Y, Yngsdal-Krenz R, Lasarev M, Hagen S

Background: High flow nasal cannula (HFNC) is commonly used to provide respiratory support to pediatric patients with respiratory failure. Although the use of bronchodilators via HFNC has been described, the feasibility and safety of aerosol bronchodilators delivery are controversial. This study aimed to evaluate whether HFNC system can be safely used to deliver aerosol nebulized bronchodilators at lower gas flow rates, increase patient comfort, and minimize respiratory therapist (RT) bedside time when compared to traditional interfaces.

Design/Methods: A retrospective chart review of all pediatric patients who were admitted to the Pediatric Intensive Care Unit (PICU) in a tertiary care children's hospital and required nebulized bronchodilators between December 2017 and June 2018.

Results: A total of 205 nebulized bronchodilators were administered to 28 children. Thirty-one percent of nebulized bronchodilators were given using a nebulization system integrated into HFNC. All nebulized treatments resulted in increase in heart rate by average of 9.98 ($se=3.19$) bpm when HFNC was used and 0.64 ($se=1.17$) bpm when traditional interfaces were used, an excess of 9.34 (95% CI: 2.30–16.4; $p<0.001$) bpm. RT bedside time was significantly longer for HFNC nebulized treatments ($p=0.031$). Subjective level of comfort was not statically different when nebulized bronchodilators were delivered using HFNC or traditional interfaces. The mean PICU length of stay was not statistically different between patents who received some aerosol nebulized bronchodilators via HFNC versus those who received all bronchodilators through traditional interfaces ($p=0.378$).

Conclusion: Aerosol bronchodilator delivery using HFNC is feasible and safe at low gas flow rates. However, the use of HFNC does not improve patients' comfort and it increases respiratory therapists' bedside time. Further prospective randomized studies are needed to determine the efficacy and efficiency of aerosol therapy delivered through HFNC and potential patient-oriented outcomes.

****PAS Poster Presentation**

LEARNERS, TEACHING, & EDUCATION SYSTEMS FACTORS: PEDIATRIC FACULTY PERSPECTIVES OF IMPACT ON WELLBEING

Babal J, Shadman K, Moreno M, Webber S

Background: Many pediatricians report burnout and low professional fulfillment, signs of poor provider wellbeing. While it is assumed that academic pediatricians garner professional fulfillment from teaching, little is known about the perceived intersection of teaching and pediatrician wellbeing.

Design/Methods: In June 2018, focus groups of faculty pediatricians were conducted at a university-affiliated pediatrics department. Questions addressed barriers to wellness and work-related factors with greatest impact on wellbeing. Focus groups were audio recorded, transcribed, and de-identified. All excerpts describing learners and teaching were manually coded using the constant comparative method.

Results: Participants included 47 faculty in 8 focus groups, of whom 55% were female. A small number of comments described positive impact of teaching on wellbeing. "It's a great privilege... to be around young learners that are energized to extract as much as they possibly can....[teaching] helps sustain most of us." A larger subset described negative influences of teaching on wellbeing. Four themes emerged: (1) Perceived institutional devaluation of teaching as an academic pursuit, "If teaching doesn't get you promoted, I don't know what should... I know that it really stresses me out just thinking about it and having to come up with things to do that count because what I'm already doing, I don't think counts enough." (2) Perceived decline in trainee work ethos, "The patients have to be cared for. You're the one answering [pages], and [the residents are] gone. Then they don't have the ownership that you may have had during your training." (3) Perceived disparity in work hour protections and wellness support for faculty as compared to trainees, "I would love to have work-hour restrictions and all those sorts of things... I'm not angry or bitter at [trainees], but...everyone just makes the assumption that you're in charge and you've already figured out how to cope with your 80-hour work weeks." (4) Perceived burdens of teaching, "There's fewer and fewer faculty involved with teaching because of a lack of rewards and more administrative [workload] when you do teach, like the 20-page evaluations of a medical student you spend an hour with."

Conclusion: Teaching may be both protective and detrimental to pediatrician wellbeing. Future studies should further explore teaching-related factors that contribute to a sense of fulfillment and burnout to ensure faculty remain engaged and fulfilled in their work.

****PAS Platform Presentation**

COMFORT AND PERCEIVED VALUE: PARENT VIEWS OF TRAINEE PARTICIPATION IN PEDIATRIC CARE

Babal J, Sklansky D, Moreno M

Background: Affecting up to 22% of adolescents and young adults (AYAs), Problematic Internet Use (PIU) is associated with mental health concerns such as depression. Few studies have explored the influence of parent-adolescent digital communication on AYAs' PIU risk. This study aimed to understand the relationship between parent-child digital communication frequency—via phone call, text, and Facebook—and PIU among AYAs.

Design/Methods: Incoming first year students were randomly selected from registrar lists of a Midwestern and Northwestern university for a five-year longitudinal study. After the third year of college, participants completed phone interviews. Variables included participants' daily Facebook visits, participants' communication frequency with parents via phone call and text, as well as 3 measures of Facebook connection: 1) parent-child Facebook friendship status, 2) child blocking personal Facebook content from parent, and 3) Facebook communication frequency. PIU risk was assessed using the Problematic and Risky Internet Use Screening Scale. Analysis was conducted on participants who reported visiting Facebook at least once per day. Multiple Linear Regression was used, followed by a post-hoc mediation with Hayes Process Macro to further investigate causal relationships among significant variables. Participants included 265 students (81% response rate), of whom 57% were female, 75% were Caucasian, and 59% were from the Midwestern University.

Results: The 151 participants analyzed reported mean Facebook visits per day of 4.28 (SD = 3.34). The Multiple Linear Regression indicated that there was a collective significant effect between participant daily Facebook visits, participant-parent phone calls, texts, and all 3 Facebook connection variables ($F(6, 144) = 2.60, p = .02, R^2 = .10$). However, only two individual items were significant PIU predictors: participant daily Facebook visits was positively associated with increased PIU risk ($b = .04, p = .006$) and being friends with a parent on Facebook was negatively associated with PIU Risk ($b = -.66, p = .008$).

Conclusion: Participant daily Facebook visits was not a significant mediator of the relationship between participant-parent Facebook friendship and PIU risk ($b = -.04, BCa CI [-.1098, .0348]$). Parent-AYA Facebook friendships predicted lower PIU risk for college students. Facebook friendships with AYAs may allow parents to model healthy internet use.

SINGLE AMINO ACID CHANGE IN KIR7.1 LEADS TO THE DEVELOPMENT OF PEDIATRIC BLINDNESS

Beverley K, Steffen J, Heyrman J, Shahi P, and Pattnaik B

Background: Leber Congenital Amaurosis (LCA) is an autosomal recessive genetic condition of the retina that leads to blindness in early childhood. Several mutations in Kir7.1, an inwardly rectifying potassium channel, located in the retinal pigmented epithelium (RPE) apical membrane contributes to an LCA blindness subtype. One mutation, my study focus is on, is a Threonine (T) at position 153 that is converted to an Isoleucine (I). We seek to understand the structural and functional consequences of this specific mutation.

Hypothesis: We hypothesize that the T153I mutation alters the structure of the protein which affects its membrane localization or function, thus leading to the development of LCA.

Design/Methods: We utilized site-directed mutagenesis to generate a GFP tagged T153I mutant plasmid using Kir7.1 WT plasmid as template. Sequences were confirmed through Sanger sequencing. HEK293 cells in culture were transfected with either the mutant or the wildtype plasmid. Western Blotting was performed to assess protein expression, and mass spectroscopy was utilized to confirm the protein identities. Confocal imaging was performed on transfected cells using the Nikon C2-confocal microscope to image nucleus (Hoescht), membrane (WGA-Alexa594) and Kir7.1 (eGFP). Images were subjected to off-line analysis. Whole-cell patch clamp electrophysiology was performed in Ringer's solution at room temperature, and Kir7.1 current was enhanced using Rb⁺ as a charge carrier.

Results: Sequencing showed that our plasmid does, in fact, contain the T to I mutation. Western Blotting confirmed that the T153I mutant produces a full-length protein product and mass spectroscopy confirmed that Kir7.1 is present in the 70 kDa protein bands. Confocal imaging data show that both Kir7.1 and the T153I mutant localize to the membrane and colocalize with WGA. Wildtype Kir7.1 recordings have been analyzed and show normal weak inward rectifying current enhanced by Rb⁺. T153I mutant electrophysiology is being analyzed.

Conclusion: These data indicate that the T153I mutant produces a full-length protein product which trafficked to the membrane and preliminary results reveal that it is a non-functional channel that might alter membrane potential and ionic current of RPE cells to cause blindness.

INCREASED AUTOIMMUNITY TO COLLAGEN TYPE V IN HYPEROXIA EXPOSED NEONATAL RATS

Braun R, Jankowska-Gan E, Eldridge M, Goss K, Meyer K, Burlingham W

Background: Preterm birth affects about 11% of pregnancies worldwide. Lungs are in the critical sacular stage of lung development and susceptible to oxygen-induced lung injury. However, ventilation and supplemental oxygen are required for survival but induce an inflammation resulting in chronic lung disease (CLD) known as bronchopulmonary dysplasia (BPD). BPD is characterized by functional abnormalities including pulmonary hypertension. While the initial inflammation improves, chronic inflammation ensues for a long time. There is dampened production of T-helper 1 (Th1) polarizing cytokines and increased production of Th2/Th17 polarizing cytokines. Th17-mediated immune pathologies are linked to Collagen type V, α 1-tubulin, or vimentin autoimmunity and Th17 cells are strongly associated with pulmonary hypertension, a hallmark of BPD. Since a regulated preexisting Th17 response to Col V exists in humans, monkeys, and mice, we hypothesized that this response is deregulated by hyperoxia exposure.

Design/Methods: Newborn rats were exposed to hyperoxia (85%) or normoxia (21%) for 14 days. Collagen type V reactivity was tested in spleen cells at day 7 after birth by trans-vivo DTH assay. Pulmonary function was tested at day 14. Lung sections were stained with H&E and blood vessels were counted. RT-PCR was used to analyze cytokine expression. RV pressure and collagen was determined after one year.

Results: Collagen type V reactivity was present at day 7 in lung tissue and pulmonary function was compromised at day 14 with RV hypertrophy. At one year of age rats had RV hypertrophy and decreased RV ejection fraction, increased frequency of M2 macrophages in lung tissue, and increased interstitial collagen deposition in females.

Conclusion: Our data suggest that postnatal hyperoxia exposure results in inflammation with acute collagen type V reactivity, RV hypertrophy, and reduced lung function compared to healthy controls. These acute changes result in lasting changes in aged rat including decreased RV function and Th2/Th17 inflammation

****PAS Poster Presentation**

VIEWPOINTS OF PREGNANT MOTHERS AND COMMUNITY HEALTH WORKERS ON PRENATAL CARE IN LWEZA VILLAGE, UGANDA

Carlson M, Kkonde A, McAdams R

Background: Uganda is a low income country with exceptionally high fertility, maternal mortality, and adolescent birth rates. Although the Uganda Ministry of Health has antenatal education guidelines, how these guidelines have been implemented into standardized health education and how pregnant women utilize health facilities remains unclear.

Objective: To identify what prenatal care practices are being provided, what educational topics are being taught, and how women are preparing for pregnancy and childbearing in Lweza, Uganda.

Design/Methods: Household surveys were conducted with central Ugandan women in Lweza who were either currently pregnant or had previously been pregnant. Focus group discussions were conducted with local community members and Lweza Primary School teachers. Interviews were conducted with 6 key informants: three midwives, a traditional birth attendant, a community leader, and a village health team member.

Results: Of 100 household surveys conducted in Lweza, 86% of women did not meet the WHO recommendation of 8 antenatal appointments during their pregnancies. Reasons cited for noncompliance included long wait times (>7 h) at the government health facility, getting education from family members or traditional healers, or being told to not come for antenatal care until 6 months pregnant. While 44% of women reported receiving health education at government health facilities, informant interviews revealed that no standardized antenatal education program exists for pregnant women. Family planning was a topic that respondents felt least educated on. In addition, none of the women recalled learning about post-partum depression (PPD), although 36% of them reported symptoms consistent with PPD. The majority (60%) of women reported using traditional herbs during pregnancy, typically administered by a traditional birth attendant.

Conclusion: Despite the current antenatal education guidelines, learning opportunities exist related to family planning, PPD, and the safety of traditional herbs during pregnancy within the formal healthcare system in Lweza, Uganda. Future studies should focus on ways to overcome barriers to antenatal care, which could include strategies to reduce clinic wait times, and methods to implement community-based education programs; these approaches may help improve health outcomes for Ugandan women who live in village settings similar to Lweza.

ROLE OF DNA REPAIR GENE IN ESTROGEN RECEPTOR ALPHA EXPRESSION FOLLOWING NEONATAL HYPOXIC ISCHEMIC ENCEPHALOPATHY

Chanana V, Kemanli P, Zafer D, Hanalioglu D, Serebin M, Amborn K, Frober M, Hackett M, Ferrazzano P, Auger A, Levine J, Cengiz P

Background: Neonatal hypoxia ischemia (HI) related encephalopathy 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 HI. We recently reported that HI increases hippocampal estrogen receptor 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) improves long-term neurological outcome only in female mice.

Objective: To understand the underlying mechanisms of this upregulation, we investigated the panel of methylating and demethylating genes, and found that *gadd45b* is sexually upregulated in female hippocampi compared to males one day post-HI.

Design/Methods: HI was induced in P9 B6/C57 male and female wild type (WT) and *gadd45* knock out (KO) mice by using Vannucci's HI model. Hippocampi were extracted at 1 day and 3 days after HI for *gadd45b* and ER α mRNA expressions using qPCR, respectively. Recognition and object location memories were assessed at P60+ by novel object recognition (NOR) and location (NOL) tests in WT and *gadd45b* KO mice with and without 7,8-DHF therapy following neonatal HI. The time spent exploring each object was recorded. Then the discrimination ratio (DR) (time spent with novel object divided by total time spent with both objects) was calculated for 5 min exploration time. ANOVA was used for analysis (mean \pm SEM).

Results: The demethylating DNA repair enzyme, *gadd45b*, was significantly upregulated in the ipsilateral female hippocampi compared to male following in HI on day 1 ($p < 0.05$). Increased ER expression in female hippocampi was ablated in *gadd45b* KO female mice ($p < 0.05$) 3 days post-HI. HI decreased the DRs for both NOR and NOL tests in ER WT male (% 28 ± 2 and % 23 ± 3) and female (% 28 ± 9 and % 28 ± 4) mice compared to sham WT male (% 72 ± 5 and % 55 ± 6) and female (% 68 ± 4 and % 71 ± 12) mice ($p < 0.001$), respectively. HI induced decline in recognition and location memories were recovered by 7,8-DHF therapy only in ER WT females for both NOR and NOL tests, respectively [% 64 ± 6 and % 67 ± 4 , ($p < 0.001$)].

Conclusion: Our preliminary studies suggest that *gadd45b* is upregulated in female neonatal mice hippocampi and sexually differences seen in ER mRNA expression is ablated in *gadd45b* KO female mice hippocampi. NOR and NOL tests in *gadd45b* KO mice are underway to explore the role of *gadd45b* in ER-mediated neuroprotection.

IMPROVING IMMUNIZATION SYSTEMS FOR CHILDREN BY ENGAGING PEDIATRIC SOCIETIES: USING NON-TRADITIONAL PARTNERSHIPS TO BUILD LOCAL CAPACITY

Conway J, Akullo A, Omoigberale A, Pulungan A, Kigathi B, Bajracharya B, Worku B, Nwaneri D, Githanga D, Mworozzi E, Gedlu E, Gimenez F, Gunardi H, Foehring Merchant H, Patterson J, Carlos J, Mkopi N, Mwakyusa S, Carter T, Fisher M

Background: Vaccines are one of the most successful health interventions in history, yet one in five children worldwide still lack access. Since 2015, the American Academy of Pediatrics (AAP) and national pediatric societies (NPS) in eight countries across Sub-Saharan Africa and Southeast Asia have identified and shared best practices to support national immunization system improvements through advocacy, education, and targeted action. Four years of implementing capacity-building initiatives for immunization advocacy by and low-middle income country (LMIC) pediatric societies with AAP support have led to improving immunization systems. This country-led process yields step-wise action plans which allow for each society to act upon self-identified priorities effectively.

Design/Methods: Implementation phases included: 1) identification of immunization priorities and gaps; 2) advocacy skills training for members; 3) process improvements for developing member engagement and systems; and 4) adapting a sustainability framework to guide further immunization-focused activities of pediatric societies. Peer- to-peer learning and technical assistance was utilized throughout the engagement.

Results: Societies in eight LMICs have increased their support to public and private immunization systems including: advocating to 84 government agencies and policymakers; training approximately 500 health workers and educational outreach for >2000 care providers. Examples of country-specific results include development of an immunization pre-service training curriculum that will reach 86% of health workers in Kenya; creation of a vaccine monitoring system linking public and private data already used by 20% of pediatricians after one year of implementation in Indonesia; and new written commitments for sub-national financing by six permanent secretaries in Nigeria.

Conclusion: Pediatric societies can affect immunization programming at both national and sub-national levels. NPS, like many local civil society organizations (CSOs), have varying levels of institutional capacity. To sustain efforts, capacity-building focused on organizational systems is critical. Additionally, the role of NPS is not well-understood by global, regional, or local partners. Dissemination of project outcomes and tools are needed to engage partners and fully leverage NPS strengths. This model of professional society collaboration could be utilized for other health system strengthening initiatives. Source of funding: Centers for Disease Control

PBX1 IS REQUIRED FOR DIAPHRAGM FORMATION AND POSTNATAL ALVEOGENESIS

Doherty A, Stokes G, Genthe W, Brix M, McCulley D

Background: Congenital diaphragmatic hernia (CDH) is a common and severe congenital malformation, affecting 1 in 3500 live births with a mortality rate of 20-50%. The cause of the high rate of mortality in patients with CDH is due to underdevelopment of the lungs or pulmonary hypoplasia. To improve the survival of patients with CDH and protect their hypoplastic lungs, great care is taken to reduce exposure to mechanical ventilation and supplemental oxygen in the newborn period. Although these measures have improved the survival of patients with CDH, postnatal lung development remains abnormal. The cause of this failure of postnatal lung development remains unclear.

Hypothesis: Our hypothesis is that genetic mutations that cause abnormal diaphragm development in patients with CDH also play a direct role in the cellular and molecular mechanisms required for postnatal alveogenesis. Mutations in the PBX1 gene were recently reported in patients with CDH. In mice, Pbx1 is required for diaphragm formation and lung-specific deletion of Pbx1 causes failure of postnatal lung development. The cellular and molecular mechanisms responsible for these defects remain unclear.

Objective: To identify the molecular and cellular mechanisms responsible for defects in diaphragm formation and failure of alveogenesis in Pbx mutant mice.

Design/Methods: Using progenitor cell-specific, conditional gene deletion approaches, we inactivated the expression of Pbx1 in the developing diaphragm, the lung mesenchyme, and the myofibroblast progenitor cells of diaphragm and lung. We used a combination of histology and gene expression analysis to analyze the mutant phenotype.

Results: Deletion of Pbx1 in the developing diaphragm fibroblasts results in diaphragmatic hernia with a thin, membranous diaphragm and herniation of the liver and stomach into the thorax. Furthermore, deletion of Pbx1 in the lung mesenchyme resulted in failure of alveogenesis with decreased capillary and abnormal extracellular matrix. Deletion of Pbx1 in the alveolar myofibroblasts did not cause defects in alveogenesis.

Conclusion: Mutations in the PBX1 gene result in human CDH. Pbx1 deletion in diaphragm fibroblasts results in CDH in mice. Pbx1 is also required in the lung, independent of its role in the diaphragm, for postnatal alveogenesis, alveolar capillary development, and organization of the extracellular matrix. Pbx1 is not required in the alveolar myofibroblasts suggesting that a different population of mesenchymal precursor cells require Pbx1 expression to direct alveogenesis.

IMPACT OF FAMILY-CENTERED TAILORING OF PEDIATRIC T1D SELF-MANAGEMENT RESOURCES

Fiallo-Scharer R, Rajamanickam V, Chewning B, Palta M, Wetterneck T, Wysocki T, Cox E

Background: Experts recommend family-centered self-management approaches that address specific T1D self-management barriers for each child and family. However, no system-level method currently exists to identify and address these barriers.

Objective: To assess the impact on glycemic control and QoL for the child and parent of a family-centered approach to the delivery of diabetes self-management resources.

Design/Methods: Children 8-16 years old with T1D and their parent(s) were randomized to receive either tailored self-management resources (intervention) or usual care. Our intervention 1) identified families' self-management barriers with a validated survey, 2) tailored self-management resources to identified barriers, and 3) delivered these resources as group sessions coordinated with diabetes visits to optimize convenience, efficiency, and sustainability. Mixed effects models with repeated measures were used to examine the intervention's impact on A1c and parent and child QoL during the 9-month intervention period and for a year thereafter.

Results: Among 363 potentially eligible families, 267 (74%) consented to participate. Randomization allocated 1 families to usual care and 1 to the intervention. Participants were children (8-12 years, 44%) and teens (13-16 years, 56%). Mean diabetes duration was 5.4 years (sd 3.3) and 14% had an A1c <7.5%. Most families (69%) attended at least 3 of the 4 intervention sessions. No overall intervention effect on A1c or QoL for the child or parent was shown. However, at one site, mean A1c in the year post-intervention declined by 0.059% more per month for intervention group teens than for those receiving usual care ($p=0.02$). At this same site, mean parent QoL increased by 0.61 points per month more during the intervention for parents of intervention group children than parents of those receiving usual care ($p=0.03$).

Conclusion: Findings can inform healthcare organizations' decisions about ways to best deliver diabetes self-management resources.

COLORADO HIGH MEETS WISCONSIN JUMP AROUND

Fliegel J

Case Presentation: A 3 year old with congestion, tachypnea and retractions was admitted because of desaturations requiring oxygen. Medical history included intractable seizures, shunted hydrocephalus, hypotonia, developmental delay and dysphagia. 6 months earlier, the child was admitted for increased seizures and developed pneumonia that required intubation for a week. The patient's seizures of mixed type had been frequent and poorly controlled despite numerous anti-epileptic drugs. 2 months prior to admission, the family established Colorado residency to acquire cannabidiol (CBD) oil. After recommendation from a pediatric neurologist there, they purchased CBD oil. Using it, they reported a decrease in seizures from 30 per day to 1-2 per week. At the time of admission, Wisconsin did not allow dispensing CBD oil unless it was part of a clinical trial. With pharmacy and legal advice, we generated a "work around". We allowed passes so the parents could take their child off hospital grounds to administer CBD oil. The child had no seizures during a 2 day hospitalization and was discharged after hypoxemia resolved.

Discussion: Our clinical conundrum arose because this child became ill while travelling from a state that allowed medical marijuana, to a state where CBD oil cannot be legally dispensed. Currently, a majority of states allow either medical marijuana in general or limit use to CBD oil. These state laws are changing rapidly. More broadly, at the federal level marijuana remains a Schedule I drug, making it illegal to prescribe, dispense, use or transport. To complicate matters further, there is no clarity about how marijuana and its constituents will be defined by the US Department of Justice and the FDA. Another aspect of our conundrum was that although the patient's family was convinced that CBD oil worked, at that time there was no published evidence of efficacy. Basing our decision on their $n=1$ trial, we supported the family's treatment plan. It was not until after the admission that a first randomized controlled trial was published, showing CBD oil decreased seizure frequency in children (NEJM, 2017).

Conclusion: This conundrum exposes several different types of challenges. First, as we strive to apply up to date medical evidence, we confront the almost daily challenge that it is often limited or not yet available; the use of CBD oil has raced ahead of systematic studies to support its use in children. Second, this case emphasizes challenges arising from a different sphere, legal; laws regarding the use of marijuana and its constituents differ state by state, the implementation of federal law banning marijuana is evolving and all are changing rapidly. Hospitalists may need to design creative solutions in cases when they are balancing optimal evidence based treatment with parents' experience and preferences, all while staying within the constraints of hospital regulations and state and federal laws.

CONTENT VALIDITY OF THE PROMIS® PEDIATRIC FAMILY RELATIONSHIPS MEASURE FOR CHILDREN WITH CHRONIC ILLNESS

Flynn K, Kliems H, Saoji N, Svenson J, Cox E

Background: Families play a critical role in supporting the health and well-being of children with chronic illnesses, who face a lifetime of responsibility for self-management of their condition. Our goal was to investigate whether the novel Patient-Reported Outcomes Measurement Information System® (PROMIS®) Pediatric Family Relationships measure, developed primarily within the general pediatric population, reflects the experiences of family relationships for chronically ill children and their parents.

Design/Methods: We conducted semi-structured qualitative interviews with children (aged 8–17) with common chronic conditions: asthma (n=6), type 1 diabetes (n=5), or sickle cell disease (n=5), and separately with one of their parents (n=16). Interviews were recorded, and two team members independently coded the written transcripts facilitated by Nvivo 10. The systematic content analysis used a combination of: 1) pre-specified themes corresponding to the six facets of the domain identified during measure development and reflected in the content of the items (i.e., Sense of Family; Love and Caring; Value and Acceptance; Trust, Dependability, and Support; Communication; Enjoyment), as well as 2) open-coding, allowing participants to define important concepts (i.e., disease impact).

Results: Family relationships were conceptualized in a similar way to the general population, as evidenced by child and parent responses to open-ended questions about family relationships and to specific probes that corresponded with the item content in the Family Relationship 8-item short form. Children spontaneously discussed the impact of their disease on family relationships less often than parents did. Although participants described how living with a chronic illness positively and negatively impacted aspects of family relationships, nearly all participants believed their responses to the PROMIS® Family Relationships items would not change if they (or their child) did not have a chronic illness.

Conclusion: Among a sample of families of children with one of 3 chronic illnesses, participants described family relationships in a way that was consistent with the facets of the PROMIS® Family Relationship domain. This study adds to the content validity of the measure for children with chronic illness.

HUMAN MONOCYTES EDUCATED WITH EXOSOMES FROM TLR4 PRIMED MESENCHYMAL STEM CELLS TREAT ACUTE RADIATION SYNDROME BY PROMOTING HEMATOPOIETIC RECOVERY

Forsberg M, Kink J, Hematti P, and Capitini C

Background: Total body irradiation is often used as a conditioning regimen for bone marrow transplants but can cause life threatening damage to host tissues, especially the bone marrow. Developing a cellular therapy that can protect the bone marrow from acute radiation syndrome (ARS) and stimulate hematopoiesis is a priority for patients exposed to therapeutic or even accidental radiation injury.

Design/Methods: In this study, exosomes derived from mesenchymal stem cells (MSCs) stimulated with the TLR4 agonist lipopolysaccharide (LPS) were used to alternatively activate human monocytes, termed LPS EEMos, as a potential novel radioprotective cellular therapy.

Results: LPS EEMos expressed higher levels of PD-L1 (p<0.0001), and lower levels of CD16 (p<0.01), CD86 (p<0.01), and CD206 (p<0.0001) by flow cytometry compared to monocytes educated with exosomes from unstimulated MSCs (EEMos). Using qPCR, increased gene expression in LPS EEMos of IL-10 (p<0.05), IDO (p<0.001), FGF2 (p<0.05), IL-15 (p<0.05), and IL-6 (p<0.0001) were detected compared to EEMos. Using a xenogeneic radiation injury model, infusion of human LPS EEMos 4 hours after lethal radiation led to reduced clinical scores and an increased survival at 40 days postinfusion, as compared to infusions of PBS, EEMos, and monocytes alone, all of which led to worse clinical scores and 0% survival with uniform death by 20 days (p<0.05). Complete blood cell counts in LPS EEMo recipients showed leukocyte, erythrocyte and platelet counts equivalent to non-irradiated mice, demonstrating complete restoration of hematopoiesis.

Conclusion: Infusion of LPS EEMos may be a useful strategy to protect the bone marrow from acute radiation syndrome by expression of anti-inflammatory molecules and cytokines that promote hematopoiesis/engraftment.

YOUTH APPEAL IN RECREATIONAL MARIJUANA PROMOTIONS ACROSS THREE SOCIAL MEDIA PLATFORMS

Jenkins M, Kerr B, Scheck J, Gower A, Moreno M

Background: Since recreational marijuana use was legalized in Washington State in 2012, marijuana businesses have used social media as a main form of advertising. There are concerns that this social media presence may lead to significant exposure and influence on underage viewers. The social media content posted by marijuana business remains underexplored.

Objective: To evaluate content on three social media platforms towards understanding the presence of content appealing to youth.

Design/Methods: This study evaluated 3 marijuana businesses in Washington State on the social media sites Facebook, Twitter, and Instagram (9 total public pages). For each business, we coded every post over one month. Our evaluation focused on: 1) whether the page had age restrictions to limit underage viewers, 2) user engagement, including likes and comments, and 3) measures of youth appeal. We applied coding based on a pilot study to evaluate content appealing to youth, including images appealing to youth such as cartoons, sweets and images of youth. Analysis included descriptive statistics and t-tests to test differences in user engagement and presence of youth appeal across platforms.

Results: Our sample included 128 total posts. For age restrictions, only 3 of the 9 business pages had these restrictions, one from each business. No age restrictions were found on Twitter pages. Regarding user engagement, the median number of likes on posts across all platforms was 4; Instagram had the highest median number of likes at 22. Posts with age restrictions were found to have significantly more likes than those without, $p=.021$. The median number of comments on all platforms was 0. The highest average number of comments was on Twitter at 4.5(SD=21.6). Posts with age restrictions did not differ significantly in number of comments from posts without age restrictions, $p=.242$. Youth appeal posts were present on 6.3% (n=8) of posts across all platforms: 2 posts (1.6%) referenced sweets, 2 posts (1.6%) were categorized as images of youth. Out of the 3 businesses evaluated, 2 had content categorized into at least one youth appeal category on each page, while the third business had none. Posts categorized as sweets were only present on Instagram, while posts categorized as images appealing to youth or images of youth were only present on Facebook and Twitter. An example of an image categorized as appealing to youth included a post in meme format captioned "When you high af & a song with police sirens come on" with a picture of Kermit the Frog.

Conclusion: In this study of marijuana business presence on 3 social media platforms, few pages had age

restrictions. Age restrictions were positively associated with likes and had no effect on comments, showing that user engagement does not suffer as a result of meeting regulations. We found that content appealing to youth was rare, but present in marijuana promotions on all social media platforms, including pages without age restrictions. These findings emphasize the need for greater enforcement of marijuana advertising policy as a means of prevention for youth.

PERINATAL CHARACTERISTICS ARE ASSOCIATED WITH FREE THYROXINE LEVELS OF PRETERM INFANTS ON DAY OF LIFE THIRTY

Kaluarachchi D, Lasarev M, Colaizy T

Background: Hypothyroxinemia is a common form thyroid hormone dysfunction among preterm infants. Data on free thyroxine (FT4) levels beyond first two weeks of life is limited.

Objective: The objective of the current study is to determine the association between perinatal characteristics and day of life 30 FT4 levels.

Design/Methods: Retrospective analysis of serum thyroid function screening at day of life 30 in preterm infants <30 weeks gestation, admitted to University of Iowa NICU between 07/01/2012 to 06/30/2015. Bivariate analysis and multivariable regression was used to determine whether free thyroxine (FT4, ng/dL) at 30 days of life was associated with demographic/perinatal characteristics of the infant, maternal characteristics, or clinical status/treatment of the infant.

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

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

INSTAGRAM & BODY POSITIVITY AMONG FEMALE ADOLESCENTS & YOUNG ADULTS

Kelly L, Daneshjoo S, & Moreno M

Background: Recent data from the Pew Research Center indicates 71% of adolescents and young adults (AYAs) between the ages of 18-24 use Instagram. Previous research has shown that viewing images of thin bodies on Instagram is associated with negative perceptions of body image and low levels of self-esteem in female AYAs. However, social media sites like Instagram can provide a positive outlet of expression for young female activists, reframing perceptions of body image in a more positive way. More research is needed to determine how social media platforms can be used for social good and inspire young women to feel good about themselves and their bodies. In recent years, the Body Positive Movement has emerged on Instagram, but much is still unknown.

Objective: The aim of this study was to explore the Body Positive Movement on Instagram.

Design/Methods: We conducted a content analysis of the top 100 Instagram posts featuring #bodypositive, as Instagram allows users to search by hashtags. Eligible public profiles were written in English and of individuals' ages 18-25 years. A codebook was developed using an iterative process to capture common content categories associated with the movement. Profile owner variables included location and vocation. Posts were analyzed by text, image, and hashtags and evaluated for overall tone. Variables of interest included: inspiration, body size/image, identity, love, mental health, physical health, and feminism. Interrater agreement was conducted for all variables on a 10% sub-sample.

Results: The 100 posts represented 100 unique profile owners. Over one third of profile owners (38%) were from the United States, with 18 different countries represented in total. Profile owners were most likely to be working as a model (28%) or writer/blogger (22%) and many represented themselves as advocates for body positivity and mental health. The majority of posts were positive in tone (63%) and inspirational (52%) (ex. "Hang in there ladies and I'm here to help you if you need it")! Frequency of key variables across posts included: body size/image (78%), identity (76%), love (49%), mental health (30%), physical health (29%), and feminism (29%). Hashtags were often used to connote a sense of identity and feminism (ex. #blackgirlyoga and #empowering women).

Conclusion: Findings indicate that Instagram can provide a positive outlet of self-expression for female AYAs through participation in the Body Positive Movement. Instagram content for the #bodypositive community was most often positive and inspirational, with a majority of posts promoting body size/image and love. Online communities may serve as sources of social support for young women to discuss mental health concerns and promote physical health, along with a sense of identity and female empowerment.

****PAS Poster Presentation**

RISK OF ADOLESCENT AND YOUNG ADULT PROBLEMATIC INTERNET USE BASED ON COMMUNICATION MEDIUM USED WITH PARENTS

Kerr B, D'Angelo J, Moreno M

Background: Affecting up to 22% of adolescents and young adults (AYAs), Problematic Internet Use (PIU) is associated with mental health concerns such as depression. Few studies have explored the influence of parent-adolescent digital communication on AYAs' PIU risk. This study aimed to understand the relationship between parent-child digital communication frequency—via phone call, text, and Facebook—and PIU among AYAs.

Design/Methods: Incoming first year students were randomly selected from registrar lists of a Midwestern and Northwestern university for a five-year longitudinal study. After the third year of college, participants completed phone interviews. Variables included participants' daily Facebook visits, participants' communication frequency with parents via phone call and text, as well as 3 measures of Facebook connection: 1) parent-child Facebook friendship status, 2) child blocking personal Facebook content from parent, and 3) Facebook communication frequency. PIU risk was assessed using the Problematic and Risky Internet Use Screening Scale. Analysis was conducted on participants who reported visiting Facebook at least once per day. Multiple Linear Regression was used, followed by a post-hoc mediation with Hayes Process Macro to further investigate causal relationships among significant variables. Participants included 265 students (81% response rate), of whom 57% were female, 75% were Caucasian, and 59% were from the Midwestern University.

Result: The 151 participants analyzed reported mean Facebook visits per day of 4.28 (SD = 3.34). The Multiple Linear Regression indicated that there was a collective significant effect between participant daily Facebook visits, participant-parent phone calls, texts, and all 3 Facebook connection variables ($F(6, 144) = 2.60, p = .02, R^2 = .10$). However, only two individual items were significant PIU predictors: participant daily Facebook visits was positively associated with increased PIU risk ($b = .04, p = .006$) and being friends with a parent on Facebook was negatively associated with PIU Risk ($b = -.66, p = .008$).

Conclusion: Participant daily Facebook visits was not a significant mediator of the relationship between participant-parent Facebook friendship and PIU risk ($b = -.04, BCa CI [-.1098, .0348]$). Parent-AYA Facebook friendships predicted lower PIU risk for college students. Facebook friendships with AYAs may allow parents to model healthy internet use.

COMPARING USING PROTOTYPE WILLINGNESS MODEL AND THEORY OF REASONED ACTION FOR RECREATIONAL MARIJUANA USE

Lai T, Kerr B, Moreno M

Background: Daily recreational marijuana use among young adults has been increasing, and problematic marijuana use can lead to negative health consequences. Previous studies have focused on the Theory of Reasoned Action (TRA) to understand deliberate marijuana use. However, marijuana use may be unplanned. The Prototype Willingness Model (PWM) suggests that behavioral willingness, prototype favorability (positive or negative views of a risky image), and prototype similarity (identification with the risky image) predict unplanned behaviors. While predictive values of PWM have been established for multiple health-risk behaviors, little is known about PWM for recreational marijuana use.

Objective: The purpose of this study was to examine the predictive validity of PWM for young adults' recreational marijuana use compared to TRA.

Design/Methods: This secondary analysis of a longitudinal phone interview study included incoming college students randomly selected from registrar lists of two universities in the Northwest and Midwest in 2011. Participants were included in this study if they completed a phone interview in 2015. PWM variables included prototype favorability, prototype similarity and behavioral willingness. TRA variables included, attitude, intention, and subjective norm. Marijuana use in the past 28 days was also assessed. Analysis included descriptive statistics and regression analysis for PWM and TRA conceptual models.

Result: Among the 261 participants, 56.7% were female, 75.5% were Caucasian, and 59.8% were students from the Midwestern university. In the PWM regression analysis, willingness towards marijuana predicted increased likelihood of marijuana use (OR=7.23, 95% CI: 3.2, 16.18). In the TRA model, intention positively predicted increased likelihood of marijuana use (OR=2.44, 95% CI: 1.75, 3.40). Prototype favorability (PF) and prototype similarity (PS) were predictors of willingness (PF OR=1.005, 95% CI: 1.003, 1.008; PS OR=1.06, 95% CI: 1.02, 1.10). Attitudes and subjective norm toward marijuana were associated with an increased likelihood of intention to use marijuana (OR=2.13, 95% CI: 1.86, 2.42; OR=1.01, 95% CI: 1.00, 1.02).

Conclusion: The results indicated that both TRA and PWM played a critical role in young adults' marijuana use. Results provide implications for future prevention and intervention targeting at addressing how marijuana risk images are viewed and identified with by young adults.

****PAS Platform Presentation**

CORD BLOOD-DERIVED EXOSOMAL CONTACTIN-2: A BIOMARKER FOR BRAIN HEALTH OF NEONATES AT RISK FOR IRON DEFICIENCY?

Marell P, Blohowiak S, Georgieff M, Kling P, Tran P

Background: Exosomes are small extracellular vesicles carrying proteins and RNAs. These vesicles are important in intercellular communication. A neural-specific glycoprotein, Contactin-2, can be used to isolate neural-specific exosomes in the cord blood circulation. In the developing brain, Contactin-2 plays important roles in neuronal migration, neuronal differentiation, and axonal elongation and myelination. While we have tools to assess blood circulating iron status, none exist for brain iron. It is of high interest to determine whether Contactin-2 positive exosome can be used to index neonatal brain health.

Objective: Establish a relationship between cord blood-derived Contactin-2 exosomes and neonates at risk for iron deficiency (ID).

Design/Methods: Cord blood samples were obtained at C-section deliveries. Prematurity (<36 wks gestational age [GA]) and pregnancy with complication (e.g. infections) were excluded. Maternal anemia or diabetes during pregnancy were assessed. Cord blood Ferritin was quantified by ELISA. Cord blood exosomes were isolated and validated by Western blot for CD81 and Contactin-2. Exosomal Contactin-2 levels were quantified by ELISA. Correlation analysis was performed using Pearson.

Results: Exosomal Contactin-2 from cord blood of 25 female and 34 male newborns (Ave. GA 39.5 [female] and 39.1 [male] wks) were distributed into two clusters (Panel A, 0.0033 ± 0.0015 and 0.0160 ± 0.0040 , Means \pm SDs). Maternal anemia showed 1.9x chance to have low cord blood exosomal Contactin-2 (Panel B, OR=0.53). Cord blood Ferritin and Contactin-2 were directly covaried in male, but not female, neonates (Panel C-D). Male neonates from diabetic mothers showed lower level of Contactin-2 compared to those from non-diabetic mothers (Panel E).

Conclusion: The correlation between cord blood Ferritin, which indexes peripheral iron status, and the neural-derived exosomal Contactin-2 provides a potential biomarker reflecting synaptic and axonal impairments associated with neonatal ID. The lower exosomal Contactin-2 levels in male infants of diabetic mothers, whom are at risk of neonatal brain ID, further supports this hypothesis. The correlation is specific to male neonates, but not female, indicating a sex-specific effect. Additional analyses of cord blood Contactin-2 positive exosomes will potentially identify additional markers that can be readily translated into clinical tools for assessing developing neonatal brain health.

****PAS Poster Presentation**

PARENT'S KNOWLEDGE AND BELIEFS OF MINDFULNESS

Mathur M, Babal J, Neuman M, Kerr B, Eickhoff J, Moreno M

Background: Studies in adult literature suggest that mindfulness practices can positively affect physiologic and psychologic health as well as overall well-being. Few studies have assessed parents' perceptions of mindfulness and their attitudes toward learning more about this within the primary care medical home.

Objective: This study aims to address this gap by assessing the knowledge and beliefs of parents regarding mindfulness for themselves and their children.

Design/Methods: We conducted a national cross-sectional survey of parents with children 0-18 years of age in October 2018. The survey explored parents' knowledge and beliefs of mindfulness as well as their attitudes toward learning about mindfulness from their health care provider to benefit themselves as an individual and as a parent. The survey results were analyzed by age, race, gender, and level of education using a nonparametric Wilcoxon rank sum test. All reported P-values are two-sided.

Results: A total of 3,000 parents completed the survey, 87% were female. Among respondents, 82.5% were Caucasian and 60% had children under age 12. Overall, 65.9% believed that mindfulness contributes to a healthy lifestyle, 50.4% were interested in learning about mindfulness and 40.8% wanted their healthcare provider to teach them about mindfulness. Males (M=4.0, SD=1.0) and college educated parents (M=4.0, SD=0.8) were more likely to believe mindfulness could be beneficial for parenting compared to females (M=3.9, SD=0.9) and parents without a college degree (M=3.8, SD 0.9), ($p < 0.01$ and < 0.0001 , respectively). Males wanted to learn about mindfulness from a health care provider (M=3.3, SD 1.4) more than females (M=2.8, SD= 1.2, $p < 0.0001$).

Conclusion: Over half of parents were interested in learning about how mindfulness could benefit themselves and their ability to parent. Parents interested in learning more about mindfulness from their health care provider were more likely to be males and college educated parents. Willingness to learn about mindfulness within the pediatric medical home provides an opportunity for health care providers to share mindfulness techniques as a way to enhance patient well-being.

****PAS Poster Presentation**

DEVELOPING A SHARED PLAN OF CARE FOR YOUTH WITH ADHD

Mathur M, Neuman M, Babal J

Background: Shared plans of care (SPoC) generated by the parent and healthcare provider can be shared with schools and other care team members and have been recommended by AAP. However, little is known about parent and provider views about SPoC and their potential impact for ADHD patients.

Objective: In this quality improvement project, we addressed this gap by developing and piloting a SPoC for youth with ADHD.

Design/Methods: We developed the SPoC for Youth with ADHD through surveys and through a taskforce that included primary care pediatricians, nurses, clinic administration, and community partners. We surveyed families with children who have ADHD, pediatricians and school nurses about what information would be most useful to include on a SPoC. Five pediatricians at two clinics within one academic center then developed and piloted the use of this SPoC for youth ages 6-18 years old with ADHD over a six-month period. Afterward, surveys were sent to assess feedback from parents and from pediatricians.

Results: The surveys responses included 37 families, 30 primary care pediatricians and 21 school nurses. The majority of families (83%), school nurses (100%) and pediatricians (87%) indicated that a SPoC would be useful for a child with ADHD to be successful at school. Overall, 97% of pediatricians and 64% of families indicated it would be helpful to have ADHD medications listed on the shared plan of care, while only 77% of pediatricians and 42% of families indicate it would be important to have non ADHD medications listed on the SPoC. In the four follow up family surveys that were returned, only one family had shared it with their school. In qualitative feedback, families expressed needing better coordination with medical and psychological care for their children with ADHD and more support from the school staff. Follow up surveys of pediatricians indicate that it was difficult to complete the SPoC within some office visits due to time constraints.

Conclusion: Although there is strong support by families, pediatricians, and school nurses for creating a SPoC for youth with ADHD, there are challenges to implementing this in the ambulatory setting, primarily lack of time during the office visit. While parents express the need for better coordination with schools, some families prefer limiting information that is shared with the school. Additional work is needed to optimize workflows for developing SPoCs in the clinic setting to facilitate better care coordination with schools.

IN VIVO GENE MANIPULATION TO STUDY DISEASE MECHANISMS

Pattnaik A, Shahi P, Pattnaik B

Background: After demonstrating that Kir7.1 protein is primarily expressed in RPE cells, we sought to determine whether the RPE Kir7.1 channel contributes to the ERG.

Design/Methods: We delivered a specific shRNA lentiviral particle to the mouse vitreous chamber by microinjection to inhibit Kcnj13 gene expression.

Results: Seven days after shRNA injection, eyes were harvested and RPE cells isolated. PCR amplification of Kcnj13 in RPE cells did not reveal a product from the shRNA injected mouse eye, whereas, in the contralateral eye that received a saline injection, a 653 bp band corresponding to the Kcnj13 transcript was present. Housekeeping gene β -actin transcript was detected as a 248 bp band in both samples. We did not detect either Kir7.1 or actin in negative control experiments.

Conclusion: Kir7.1 shRNA inhibition was able to reduce Kcnj13 mRNA expression by an average of $73.62 \pm 14.47\%$

STANDARDIZATION OF PATENT DUCTUS ARTERIOSUS (PDA) MANAGEMENT USING A CLINICAL AND ECHOCARDIOGRAPHIC SCORING SYSTEM DECREASED PDA LIGATION RATES

Peebles P, Meinen R, Kaluarachchi D

Background: Routine treatment of the PDA has not been shown to improve long term outcomes. There is a trend toward more conservative management of the PDA.

Objective: To evaluate differences in rates of PDA treatment and ligation, before and after the initiation of a standardized PDA guideline in extremely preterm infants.

Design/Methods: This is a single center before and after study. A PDA management guideline incorporating a clinical and echocardiographic scoring system to guide PDA treatment was introduced. The aims of the guideline are to introduce a more conservative standardized approach to PDA management and decrease PDA treatment rates. Rates of PDA treatment and PDA ligation were compared for infants born between 23-27 weeks gestation in the pre and post intervention periods.

Results: A total of 43 infants were included. PDA treatment occurred in 15/28 (54%) in the pre-intervention period and 12/15 (80%) in the post-intervention period (OR 1.48 (0.97-2.29), $p=0.17$). PDA ligations occurred in 9/28 (32%) in the pre-intervention period and 2/15 (13%) in the post-intervention period (OR 0.41 (0.10-1.67), $p=0.32$). On multivariate logistic regression analysis when correcting for gestational age, birth weight, and gender, there was no difference in the odds of PDA treatment (OR 2.32 (0.45-14.3, $p=0.32$); However, the odds of PDA ligation were significantly lower in the post-intervention period (OR 0.09 (0.006-0.72), $p=0.04$). The rate of BPD/death didn't differ between two periods.

Conclusion: Following the implementation of a standardized PDA guideline, the PDA ligation rate decreased in extremely preterm infants without a significant change in the rate of BPD/death.

**PAS Poster Presentation

ASTHMA ACTION PLANS SIGNIFICANTLY IMPROVED ASTHMA CONTROL TEST FOR PEDIATRIC PATIENTS WITH INITIAL POOR ASTHMA CONTROL

Pletta K, Eickhoff J, Allen G, Jain , Kerr B, Moreno M

Background: Asthma Action Plans (AAPs) are recommended for pediatric patients however evidence varies for impact on improved asthma outcomes. It is not clear if AAPs may have differing effects for patients who have initial poor vs adequate asthma control.

Objective: The purpose of this study was to evaluate pediatric asthma control scores before and after AAPs and compare outcomes by level of initial asthma control.

Design/Methods: A chart review was conducted using the electronic health record (EHR) to identify pediatric patients with AAPs from our asthma registry over a 3 year period. Measures included level of asthma control (Asthma Control Test, ACT) and demographic, insurance and healthcare utilization variables. Poor asthma control was defined as ACT < 19 and adequate asthma control as > 19. We examined ACTs closest to pre/post AAP implementation. All outcome measures were summarized in terms of percentages, mean +/- standard deviations or medians. The evaluation of ACT scores pre/post AAP was conducted using a paired Wilcoxon signed rank test.

Results: We identified 1674 patients with asthma who were median age of 12 years, 41% female and 6% had Medicare/Medicaid insurance. Of these, 230 patients initially had poor asthma control (ACT < 19) and 1441 patients had adequate asthma control (ACT > 19).

Patients with poor initial asthma control were more likely to be on Medicare/Medicaid (14% vs 4.5%, $p<0.001$), have a history of steroid use (median 2 vs 1, $p<0.0136$), have acute visits for asthma > 0 (75.2% vs 69.2%, $p=0.064$) and have well checks (median 2 of 3 years vs median 1 of 3 years, $p<0.001$). There were not differences for age or language.

For the total group there was a small increase in mean ACT pre/post AAP implementation (22.7 +/-3.4 to 22.9 +/-3.2 (0.15, $p=0.010$).

Patients with initial poor asthma control had a significant increase in the ACT score from 16+/-3.0 to 18 +/-3.8 ($d=2.0+/-3.5$, $p<0.001$). Of these patients, 26% improved to adequate control after AAP implementation. For subjects with initial adequate asthma control, no significant change in ACT score was observed.

Conclusion: Asthma action plans significantly improved asthma control test for pediatric patients with initial poor asthma control with 26% of patients improving from poor to adequate asthma control after receiving AAP. Continued work to increase pediatric asthma action plans may lead to improved outcomes for these high risk patients.

****PAS Poster Presentation**

PARENTS PERCEIVE PEDIATRIC ASTHMA ACTION PLANS TO BE HIGHLY VALUABLE

Pletta K, Kerr B, Eichkoff J, Allen G, Jain S, Moreno M

Background: Asthma Action Plans are recommended for pediatric patients to help improve asthma control. Studies have not shown clear improvement to decrease asthma hospitalization and ER rates but there may be impact on other daily lifestyle factors such as missed school or parent work days or caregiver management that are valuable for patients and families.

Objective: The purpose of this study was to understand the association between pediatric Asthma Action Plans and parent self-efficacy as well as parent perception of daily lifestyle factors related to their child's asthma.

Design/Methods: A national cross-sectional online survey was completed by parents of children with asthma in October 2018. Survey questions included presence or absence of pediatric Asthma Action Plan (AAP), Bursch Parental Self Efficacy for Asthma and parental perceptions of helpfulness of AAP with regard to daily lifestyle factors ranked on a 5 point Likert scale. Survey responses were summarized in terms of percentages or means +/- standard deviations. A two-sample t-test was used to compare self efficacy for asthma and parental perception for helpfulness scores between groups. All reported p-values are two-sided.

Results: A total of 704 parents with a child 0-17 years old with asthma completed the survey. Parents had a mean age of 37.5 +/-10.9, 82% were female and 77% were Caucasian. Most (80%) of parents had an AAP for their child (65% written, 47% online, 84% available at school). Bursch Self-Efficacy Scale was significantly higher for parents with AAP (Mean = 57.7 SD 8.6) vs no AAP (55.1 SD 9.9) (p 0.0021). Parents agreed/strongly agreed that AAP was helpful for daily lifestyle factors including managing asthma (80%), decreased parental missed work days (68%), decreased child missed school days (73%), when at school (78%), when with other caregivers (80%), child doing normal activities (78%) and child leading a normal life (81%).

Conclusion: Parents from across the country perceive that pediatric asthma action plans improve their child's asthma control and are helpful for asthma management for home, school and when with other caregivers. Findings support continued work for medical providers to give pediatric AAPs and to develop sharable electronic AAPs for children.

CHARACTERIZATION OF PROTEIN EXPRESSION AND RETINAL STRUCTURE UPON GABA RECEPTOR DEFICIENCY

Ramachandran N; Shahi P, Ebbinghaus B, Hoon M, Pattnaik B

Background: It has long been known that schizophrenia is a severe chronic psychiatric disorder that is approximately present in 1% of the world population and that about 62% of adults with this disorder experience damages to vision. Recent studies have furthermore found that vision damage occurs due to a change in the retinal architecture. However, the exact root cause of the change in retinal architecture is not clearly defined. I sought to determine what the root cause of these vision problems is and first sought to study whether this disease affects the integrity or the apical processes of the retinal pigmented epithelium cell layer because this layer is responsible for mediating photoreceptor function. Specifically looking at whether the disease has any effect on the integrity or apical processes of the RPE cells, in which a potassium channel Kir 7.1 and a structural membrane protein Ezrin are expressed. Additionally, I sought to determine if there was any impact on the overall retinal structure due to the disease.

Design/Methods: To determine the effect of GABAergic receptor deficiency on the RPE cell integrity, I will perform immunohistochemistry on wild type and mutant transgenic mice (GABAergic receptor deficient) eye tissue sections. Then, I will analyze histological staining to compare the retinal structures of wild type mice and knockout mice. Specifically, for this purpose, I will image Hematoxylin and Eosin stained retinal sections of wild type and knockout mice, perform nuclear counts within the outer and inner nuclear layers, and also measure the thickness of the inner and outer plexiform layers in both samples. Finally, statistical analysis will be performed to find any significant difference between them.

Hypothesis: I believe that transgenic mouse with GABAergic receptor deficiency will alter the integrity/apical processes of the retinal pigmented epithelium layer as can be seen by a change in the protein expression of Kir 7.1 and Ezrin. Additionally, the overall retinal structure will be impacted in that there will be a change in the nuclear counts of the outer and inner nuclear layer, and there will be a change in the thickness of the outer and inner plexiform layers.

Results: There was no qualitative difference in the colocalization of both Kir 7.1 and Ezrin between the control mice and GABA receptor deficient mice, indicating that GABA receptor deficiency likely does not have an effect on the apical processes of the RPE cells. Since the H&E-stained retinal sections of the GABA receptor deficient mice received were too poor to do a data analysis, a comparison of retinal structures between the control mice and GABA receptor deficient mice was not performed. Which is why, no conclusion about the effects of GABA receptor deficiency on retinal structure could be made.

PARENTAL INTEREST IN MEDICAL GROUP VISITS FOR OVERWEIGHT CHILDREN

Raman P

Background: There is a growing body of evidence that group medical visits might be effective for managing chronic medical conditions in adults. There is not much information available about group visits in children. The primary goal of this survey was to evaluate the interest that parents might have in group medical visits for overweight children.

Design/Methods: We conducted a National cross sectional survey of parents with at least one child between ages 1 and 18. Parents were recruited from Qualtrics panels in October 2018. This survey assessed interest for a group medical visit for overweight children 10 years and older and included preferred times, number of sessions, and frequency of visits. Key factors to attend or barriers to prevent attendance were also evaluated. Descriptive statistics were used to assess willingness to attend group medical visits, preferred times, and barriers.

Results: Of 1653 parents surveyed, 86.6% were female and mean age was 40.9 years. Most participants were Caucasian (86.6%) followed by African American (9.7%). Among these, 853 were interested in a group medical visit (51.6%). Most participants were interested in biweekly (44.5%) or monthly (41.4%) visits with total number of sessions they were willing to attend varying between 1-3 sessions (37.3%) or 4-7 sessions (29.9%). For visit timing, 46.7% preferred weekdays and 52.6% preferred weekends. Over half (51.7%) would be interested in enrolling multiple children and 47.9% of the potential kids would be between ages 10 and 13. The most common barrier to attending group visits was time (18.3%), followed by price (6.8%), location (4.3%) and transport (3.8%). The most common factors to attend were time (6%), need (5.2%), location (5%), and price (2.9%). Other factors were effectiveness of treatment, recommendation by a doctor and information provided.

Conclusion: Parents expressed interest in group medical visits for overweight children. Timing of the visit and time constraints as well as cost, location, and need for the visit appear to be the most likely factors in influencing the decision to enroll in group visits.

SPIROMETRY AND IMPULSE OSCILLOMETRY TRAJECTORIES IN AN INNER-CITY LONGITUDINAL BIRTH COHORT AT HIGH RISK FOR ASTHMA.

Ramratnam S, Lockhart A, Calatroni A, Bacharier L, Jackson D, Wood R, Kattan M, O'Connor G, Visness C, Gergen P, Gern J

Background: Assessment of lung function is an essential component for understanding lung development. We sought to determine trajectories of lung function in a high-risk, urban longitudinal birth cohort.

Design/Methods: The Urban Environment and Childhood Asthma (URECA) birth cohort study had spirometry and impulse oscillometry (IOS) measures taken at repeated intervals between ages 3-10 years in urban-residing (n=434). Latent class mixed models identified age-related trajectories of the FEV1/FVC ratio and the area of reactance (XA). The differences among these trajectories were examined using analysis of variance.

Results: We identified 3 age-related trajectories for FEV1/FVC, with the largest group (n=305, 70%) consistently having high values (age 3 [mean±SD] 0.94±0.05; age 10, 0.86±0.04), a second group (n=62, 14%) with consistently lower values (age 3, 0.82±0.10; age 10, 0.86±0.04) and a third group (n=67, 15%) that had comparatively high values at age 3 but subsequently developed airways obstruction (age 3, 0.95±0.04; age 10, 0.76±0.05). We also identified high, intermediate, and low trajectory patterns for XA with each exhibiting parallel age-related reductions over time. Mean (SD) Xa values at age 10 for the groups were 2.61±1.10, (n=187); 1.70±0.52 (n=138); and 1.11±0.47 (n=114).

Conclusion: Our results demonstrate that children in an urban birth cohort at high risk for asthma, have 3 different trajectories of lung function. Notably, there is one group with a high initial FEV1/FVC but develops airways obstruction over time. Additional analyses are required to determine whether there are specific early life exposures or other factors that are associated with progressive airway obstruction.

IMMUNE EFFECTS OF RUXOLITINIB ON GAMMA DELTA T CELLS IN VITRO

Rinella S, Capitini C, Ott M

Background: Gamma delta T cells are a rare subset of T cells with extraordinary properties including the capacity for tumor cell killing and are an attractive cell type for novel immunotherapy approaches. Ruxolitinib is a selective JAK inhibitor that is currently being used for some hematologic malignancies and being investigated in clinical trials for others in patients with poor outcomes.

Objective: Our goal was to investigate the immune effects of ruxolitinib on gamma delta T cells for the potential implications for combined novel immunotherapies.

Design/Methods: First, we examined levels of intracellular IFN γ and pSTAT3 to examine ruxolitinib's effect (1.25 μ M, 2.5 μ M, 5 μ M, and 10 μ M) on activated gamma delta T cells. IFN γ decreased compared to untreated control once 2.5 μ M or higher dose was reached after 48 hr. As expected, pSTAT3 decreased compared to untreated control, however, this decrease could be seen even at the lowest dose of 1.25 μ M. Next, we wanted to examine ruxolitinib's effects (2.5 μ M) on gamma delta T cells' ability to kill leukemia cell lines, K562 and Jurkat.

Results: There was no difference observed in cytotoxicity measured by LDH release in K562 and Jurkat with or without ruxolitinib at the following target effector ratios: 20:1, 10:1, and 5:1 using previously expanded and cryopreserved gamma delta T cells. Finally, we were interested in examining whether zoledronate alone could be used to expand gamma delta T cells as we were inhibiting JAK/STAT signaling of IL-2 with the addition of ruxolitinib (2.5 μ M).

Conclusion: Ruxolitinib completely blocked gamma delta T cell expansion (14 days) and in post expansion analysis showed toxicity to PBMCs exposed to ruxolitinib after the 14 day expansion period.

THE PEDIATRIC ASTHMA RISK SCORE (PARS) PREDICTS ATOPIC AND NON-ATOPIC ASTHMA BETTER THAN THE ASTHMA PREDICTIVE INDEX

Schauburger E, Biagini Myers J, Martin L, Kroner J, Ryan P, Bernstein D, Lockey J, LeMasters G, Arshad S, Kurukulaaratchy R, Khurana Hershey G

Background: Despite the continued advancement of our understanding of asthma, identifying at-risk children continues to be difficult. We previously reported the results of a new scoring system called the Pediatric Asthma Risk Score (PARS).

Objective: Here we compare the performance of the PARS vs the Asthma Predictive Index (API) to predict allergic vs non-allergic asthma and then replicate the results in a second population.

Design/Methods: The PARS was constructed using multivariate analysis of demographic and clinical data from participants in CCAAPS (Cincinnati Childhood Allergy and Air Pollution Study) with asthma diagnosis at age 7yrs (n=589). Allergic asthma and non-allergic asthma were defined as asthma ever with or without a positive skin-prick test (SPT) ever, respectively. The results were compared to the API and replicated in the Isle of Wight birth cohort (IOW, n=981; atopy and asthma defined at ages 4 and 10yrs, respectively). Area under the curve (AUC) was compared using DeLong's test.

Results: The PARS predicted atopic asthma significantly better than the API in both CCAAPS (AUC=0.82 vs 0.71, p=0.004) and the IOW (0.87 vs 0.74, p=7E-5). PARS also predicted non-atopic asthma as well as the API in CCAAPS (0.71 vs 0.63, p=0.32) but significantly better in the IOW (0.74 vs 0.64, p=0.04).

Conclusion: The PARS outperformed the API in predicting the development of allergic asthma in the CCAAPS and both allergic and non-allergic asthma in the IOW. In conclusion, the PARS was shown to be a robust model that better predicts atopic and non-atopic asthma.

****PAS Poster Presentation**

**PERCEPTION OF QUALITY IMPROVEMENT METRICS:
IMPACT ON PEDIATRICIAN WELLNESS**

Shadman K, Babal J, Moreno M, Webber S

Background: Pediatricians are increasingly asked to improve patient care through quality initiatives that rely on metrics to benchmark practice, often in a context of financial pressures.

Objective: Characterize faculty perceptions of the impact of quality metrics on physician well-being.

Design/Methods: Trained facilitators conducted semi-structured focus groups of pediatric faculty physicians in June 2018. Questions explored perceptions of factors influencing physician wellness. Focus groups were audio recorded, transcribed and de-identified. Three researchers manually analyzed transcripts and came to consensus via the constant comparative method.

Results: Faculty (n=40) participated in seven focus groups that identified metrics as a factor influencing wellness. Participants were 60% female, and represented 40% subspecialty, 32.5% general outpatient and 27.5% inpatient practice. Half were mid-career faculty (6-20 years in practice.) Three themes emerged. First, ability to meet quality goals may be perceived as judgment of individual ability to deliver care, rather than measurement of appropriate care delivery to individual patients. "It almost kinda makes you feel like maybe I'm not good enough because I'm measuring up less well than people expect." "I feel I'm doing poorly because my number is not meeting their goal, but I don't have any means to do that besides working late and finishing my project so I can meet their quota for the numbers." Second, measurement of patient access and volume is perceived as superseding other work-related responsibilities. "It just limits you I think in scheduling...You might be able to bring people together [to meet] or what have you...feeling like I should be in there seein' my patients' cause my RVUs are going down""healthcare is a business instead of as an educational institution and I do feel like the focus is on seeing more patients, making more money." Third, physicians identify quality related electronic medical record data collection as time-consuming and unsupported. "We're are tracking asthma, obesity, and tracking ADHD stuff. We're being evaluated on how we're doing for our quality of our patients, but they don't provide the staff for us to do all those things"

Conclusion: Faculty may perceived quality metrics a judgement of individual physician's patient care, negatively impacting other work-related responsibilities, time consuming, and poorly supported. Future quality initiatives may include balancing measurements of physician well-being.

A GENE MUTATION GONE NONSENSE

Srinivas A, Beverley K, Shahi P, Pattnaik

Background: A nonsense mutation in the KCNJ13 gene at aa position W53x results in the truncated Kir7.1 protein product. This results in the disease LCA16, causing blindness. Our laboratory found that read-through drugs can suppress the premature stop codon through insertion of near-cognate amino acids.

Objective: In this specific study, my objective was to determine which near-cognate amino acids will produce a full length Kir7.1 protein product when inserted at the mutation site.

Design/Methods: We performed site-directed mutagenesis to generate near-cognate amino acids Tyr (TAC), Ser (TCG), Glu (GAG), and Gln (CAG) at position 53 in GFP-fused Kir7.1 carrying the TAG mutation. We cultured human HEK293T cells in 35mm dishes in complete growth medium. When cells reached confluency, we transfected at 2µg / ml. After 2-3 days of transfection, protein localization was determined by Western blot.

Results: Our results determined that Kir7.1 protein is expressed through insertion of Tyr amino acid.

Conclusion: Further research is necessary to determine efficiency of other near-cognate amino acids in producing full-length Kir7.1 protein.

CALLING ALL EDUCATORS: INTRODUCING A COMPREHENSIVE GUIDE TO GLOBAL HEALTH EDUCATION

St Clair N and Butteris S, on behalf of the Program Director's Guide to Global Health Education Author Group

Background: The American Board of Pediatrics (ABP) Global Health Task Force (GHTF) Trainee Workgroup recently published a Program Director's Guide to Global Health (GH) Education—a comprehensive, practical, freely available resource for incorporating GH education into pediatric training programs. While the guide was created for pediatrics, it was intentionally designed to be easily adapted for other specialties and trainee levels.

Design/Methods: In 2013, the ABP convened a GHTF to advise its Board of Directors (BOD) and staff in developing a GH agenda around its core values. The ABP and American Academy of Pediatrics (AAP) co-sponsored a conference with leadership from 12 stakeholder organizations in 2015, after which the ABP GHTF convened workgroups. The Trainee Workgroup's goal was to create "Global Health in Pediatric Education: An Implementation Guide for Program Directors." The author group was comprised of 15 GH educators from 10 institutions, with administrative support from the ABP Foundation. Writing commenced in September 2016. It underwent a total of eight comprehensive reviews and modifications by leadership from the Association of Pediatric Program Directors (APPD) Global Health Learning Community, AAP Section on International Child Health, ABP GHTF, ABP Education and Training Committee, ABP BOD, ABP Foundation, and 18 educators from low-resource settings. The guide is housed on the ABP website.

Results: The guide covers: (1) core considerations for GH training; (2) implementation strategies for GH education; (3) competency-based GH objectives; (4) local/global health; (5) program considerations for GH electives; (6) trainee preparation for GH electives; (7) evaluation, assessment, and certification; (8) GH fellowships; (9) post-graduate GH opportunities; and (10) partnerships and bidirectional exchanges. It is comprised of 145 pages, including 25 resource-packed appendices. Dissemination plans include communication with educators, conference presentations, and publication of a descriptive manuscript.

Conclusion: The Program Director's Guide to GH Education is the first comprehensive set of resources for integrating GH into residency education, and was created through a three-year collaborative effort with several national stakeholder organizations and educators from low-resource settings. It can be easily modified for other target audiences, across trainee levels and specialties, and is a useful, free tool for all educators.

KNOWLEDGE AND ATTITUDES REGARDING LTBI TREATMENT AMONG THE TIBETAN MONASTIC POPULATION LIVING IN INDIA: RECOMMENDATIONS FOR THE ZERO TB CAMPAIGN

Starke S, Borchardt N, Topgyal S, Dorjee K, Paster Z, Conway J

Background: In an effort to eradicate tuberculosis (TB) in the Tibetan refugee population living in India, the Zero TB program conducts institutional screening and treatment of Latent TB infection (LTBI) in high incidence settings such as boarding schools, Buddhist monasteries and nunneries. Attaining widespread acceptance of Rifampin Preventative Therapy (RPT) in the monastic population has proven challenging. This project assessed knowledge and perceptions of LTBI in latently infected monks and nuns, exploring factors affecting their decisions to accept or refuse RPT.

Design/Methods: Cross-sectional survey and semi-structured, in-depth group interviews of LTBI+ residents from seven Tibetan monastic institutions near Dharamsala, India. Participants: Monks, nuns, and staff previously diagnosed with LTBI during institutional screening. Surveys were administered to all LTBI residents (n=238) in five sites. Representative members from six sites were recruited for group interviews.

Analysis: Knowledge of LTBI was assessed with a six-question tool and attitudes towards RPT using belief statements. Survey responses were analyzed in SAS. Qualitative data from interviews was compiled and analyzed to generate codes, themes, and quotations.

Ethics Approvals and Consent: This project was exempt from IRB review by designation as program evaluation. A project description and aims were explained during participant recruitment and verbal consent was obtained before each interview. As a voluntary survey, consent was implied on completion.

Results: 161 surveys were completed, and 18 monks/nuns participated in 6 group interviews. Knowledge regarding LTBI was low (mean knowledge score: 2.59 out of 6, SD: 1.81). Factors associated with RPT acceptance included perceived individual and community benefit. Factors associated with refusal included side effects, low perceived likelihood of developing active disease, and comorbid conditions. Interestingly, higher knowledge scores were associated with RPT refusal. Recurrent themes influencing individual decision-making included peer discussion and institutional leadership.

Conclusion: Gaps in LTBI knowledge in the monastic population may be addressed through education, but utilizing peer-to-peer education and institutional opinion leaders may be more effective strategies for encouraging RPT acceptance within these settings. This program assessment highlights possible limitations of educational interventions, suggesting that the source of guidance is important in such communities. The scope and generalizability of this survey is limited as a pilot project.

****PAS Poster Presentation**

TEST DATE AND CLERKSHIP TIMING IMPACT ON USMLE STEP 1 PERFORMANCE

Stillwell C, Tatar R, Cowan E, Nackers K, McIntosh G, Chheda S, Seibert C

Background: In 2016, the University of Wisconsin School of Medicine and Public Health began a curriculum transformation. To prepare for higher volumes of students completing clinical clerkships during a 6-month overlap, the final cohort of M3 students in the former curriculum were given the option to start clerkships sooner and delay their USMLE Step 1 exam.

Objective: To analyze how Step 1 scores are associated with exam timing.

Design/Methods: Students in the final M3 cohort chose their Step 1 test date from three timeslots: May-June, July-August, and January-March, regardless of previous performance. After scores were reported, we examined differences in academic performance and demographic variables between groups. We used predictor variables (M2 grades and MCAT scores) to predict Step 1 scores and examined the relationship between actual and predicted Step 1 scores based on the test dates.

Results: From a class of 177, 81 students opted for May-June, 45 for July-August, and 51 for Jan-March. There were no differences in demographics between groups ($p>0.05$). Students in the May-June and July-August groups had similar M2 and MCAT performances and were grouped together for analysis (May-August group). Students who self-selected to the January-March group had lower mean M2 grades and MCATs, predicting lower Step 1 performance than students in the May-August group and their actual scores were not statistically significantly different than their predicted scores ($p>0.05$). Therefore, there was no difference between actual and predicted Step 1 performance for all groups ($p>0.05$), regardless of test time.

Conclusion: Students self-selected into testing groups and analyses found that there was no consistent effect of Step 1 scores and test timing. Students who had poorer performance in M2 grades and MCATs chose to take Step 1 later, however, this delay was not associated with scores. In conclusion, Step 1 scores are not associated with timing of the Step 1 exam.

****PAS Platform Presentation**

A GENETIC MODEL OF DIAPHRAGMATIC HERNIA, LUNG HYPOPLASIA, AND PULMONARY HYPERTENSION

Stokes G, Giangela M, Genthe W, Brix M, Wynn J, Shen Y, Chung W, McCulley D

Background: Congenital diaphragmatic hernia (CDH) is a common and severe congenital malformation, affecting 1 in 3500 live births with a mortality rate of 20-50%. The high mortality is due to failure of normal lung and pulmonary vascular development causing a frequently lethal combination of lung hypoplasia and pulmonary hypertension. The severity of these defects is highly variable between patients and their developmental origins are unclear.

Hypothesis: Our hypothesis is that a core group of genes is required for both diaphragm formation and development of the lungs and pulmonary vasculature. Mutations in these genes or disruption of their downstream signals may be responsible for lung hypoplasia and pulmonary hypertension. Using genome sequencing, mutations in the SIN3A gene have recently been identified in patients with CDH; however the role that SIN3A plays in diaphragm, lung, or pulmonary vascular development is not clear.

Objective: To determine the role of Sin3a in the developing diaphragm and lung mesenchyme and identify the developmental mechanisms responsible for lung hypoplasia pulmonary hypertension due to Sin3a loss of function.

Design/Methods: 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: Deletion of Sin3a in the developing diaphragm mesothelium or skeletal muscle resulted in failure of diaphragm formation and CDH in mice. Furthermore, deletion of Sin3a in the lung mesenchyme alone resulted in lung hypoplasia and pulmonary hypertension in the absence of CDH, due to defects in cellular proliferation and differentiation caused by the loss of Sin3a function.

Conclusion: Mutations in the SIN3A gene result in human CDH. Tissue-specific deletion of Sin3a results in a mouse model of CDH with lung hypoplasia and pulmonary hypertension. Sin3a is required for normal cell proliferation, survival, and differentiation during lung and pulmonary vascular development. These data support the model that genetic defects in patients with CDH can cause abnormal development of the lung and pulmonary vasculature independent of the associated diaphragm defect.

IN VIVO VACCINE AGAINST NEUROBLASTOMA IS SAFE AND EFFECTIVE AFTER BONE MARROW TRANSPLANT

Tippins K, Bates P, Capitini C, Walker K

Objective: 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 a bone marrow transplant model in conjunction with neuroblastoma cells (AgN2a) modified to express immune costimulatory molecules CD54, CD80, CD86, and CD137L.

Design/Methods: 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. We also aimed to investigate the possible role of different immunization schedules and the impact of utilizing an allogeneic versus a syngeneic bone marrow transplant donor on tumor growth and clinical outcomes using AgN2a as prophylactic treatment for neuroblastoma. 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 short-term activation of NK cells in the presence of AgN2a.

Results: The data from these experiments showed that NK cells are minimally activated when co-cultured for 24 hours with AgN2a in vitro. 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. We also found that an additional round of AgN2a inoculation prior to tumor challenge greatly delays tumor growth in both allogeneic and syngeneic models.

Conclusion: 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

CXCR4 BLOCKADE OF T CELL ACUTE LYMPHOBLASTIC LEUKEMIA CAUSES SYSTEMIC DISEASE IN AN NSG MODEL ALLOWING RUXOLITINIB AND VENETOCLAX TO SYNERGISTICALLY TREAT CANCER BURDEN

Walker K, Kabakov S, Zhu F, Olson S, Rui L, Capitini C

Background: T-cell acute lymphoblastic leukemia (T-ALL) is a hematologic malignancy that accounts for 25% of adult and 15% of pediatric acute lymphoblastic leukemia (ALL) cases. Relapsed or refractory T-ALL is difficult to salvage with chemotherapy, which causes long-term toxicity, and is often fatal. The JAK/STAT and BCL-2 pathways are upregulated in T-ALL and promote increased T-ALL proliferation and survival. Currently, targeted therapies of the JAK/STAT and BCL-2 pathways have not been investigated in combination. I propose that dual inhibition of the JAK/STAT and BCL-2 pathways, with ruxolitinib and venetoclax respectively, will lead to maximal T-ALL cell death.

Design/Methods: Jurkat cells were treated with single doses of ruxolitinib (0.156 μ M - 5 μ M) or venetoclax (1.56nM - 50nM) in vitro, and analyzed by trypan blue exclusion, MTT and flow cytometry at 24, 48 and 72h post-treatment.

Results: Results demonstrate decreased proliferation by MTT, decreased viability by trypan blue exclusion, and increased apoptosis by flow cytometry for the three highest doses of ruxolitinib (1.25 μ M, 2.5 μ M and 5 μ M) and venetoclax (12.5nM, 25nM and 50nM). A synergistic effect was achieved for all three assays at 48 and 72h when cells were treated with a combination dose of ruxolitinib (1.25 μ M) and venetoclax (25nM; CI<1). This optimal in vitro combined dose significantly decreased proliferation (p<0.0001) and viability (p<0.0001) of Jurkat cells compared to vehicle and single drug treatment groups. Jurkat-GFP cells were injected intravenously into NSG mice to mimic a systemic in vivo xenograft model of T-ALL, and followed for clinical scores and survival. End organs were analyzed for GFP+CD45+ cells by flow cytometry and GFP+ cells by immunohistochemistry (IHC). Compared to single treatments of ruxolitinib and venetoclax, all mice treated with ruxolitinib and/or venetoclax combination therapy developed hind-limb paralysis and died of CNS disease in the spinal cord and brain as shown by IHC.

Conclusion: This suggests for the first time that ruxolitinib or venetoclax cannot penetrate the blood brain barrier (BBB). LC-MS-MS studies were performed to confirm that ruxolitinib and venetoclax cannot penetrate the BBB. Previously published data suggests that T-ALL exploits the CXCR4-CXCL12 chemokine pathway to relapse into the CNS. Jurkat cells were analyzed by flow cytometry and showed high expression of the CXCR4 surface receptor while NSG brain tissue showed presence of CXCL12 mRNA and protein by in situ hybridization (ISH) and western blot analysis. Antibody blockade of CXCR4 in vivo prevented the migration of Jurkat cells into the CNS and suggests that disruption of the CXCR4-CXCL12 pathway will result in a systemic model of T-ALL that could allow for ruxolitinib and venetoclax to eliminate T-ALL at primary sites of disease.

SEX DIFFERENCES IN SENESCENCE-RELATED GENE EXPRESSION IN A RAT MODEL OF BRONCHOPULMONARY DYSPLASIA

Wanek S, Braun R, Eldridge M

Rationale: Bronchopulmonary dysplasia (BPD) is the most common complication of preterm birth. It is induced by hyperoxia exposure during the vulnerable sacular or early alveolar stage of lung development resulting in an arrest of alveolarization. Oxidative stress in the immature lung induced by this oxygen supplementation causes oxidative modifications leading to the initiation of senescence in damaged cells. A hallmark feature of senescence is persistent cell-cycle arrest that is unresponsive to extrinsic or environmental growth factor induction. The senescence arrest is stringent; it is established and maintained by at least 2 major tumor suppressor pathways: the proteins p53/p21 and the p16Ink4a/retinoblastoma protein (pRb). We hypothesized that senescence is induced by hyperoxia exposure and has long term impacts in aged rats.

Design/Methods: Newborn Sprague Dawley rats were exposed to hyperoxia (HYP, 85%, n=13) or normoxia (NORM, 21%, n=9) for 14 days and then normoxic conditions until one year of age. Pulmonary function was tested at day 14 and at age 1 year. Also, at age 1 year, the left lung was inflated and fixed (4% formaldehyde), the right lobes were flash frozen. Pulmonary tissue was kept at -80°C until analyzed for mRNA expression of proteins p16, p21, p53, and interleukin IL-6 via qPCR. Differences in expression were calculated by the ddCt method using the reference gene GAPDH. Collagen levels were assessed in normoxia and hyperoxia rats using a colorimetric assay. Masson's trichrome staining was utilized to visualize collagen in histology lung slides. Two-way ANOVA was utilized for comparison of ddCt values between sexes in HYP and NORM rats for each target gene.

Results: Lung compliance at day 14 was strongly reduced in HYP rats compared to NORM rats. At one year, compliance was reduced in female HYP compared to female NORM rats. In contrast, HYP males showed increased compliance compared to NORM males. Day 14 HYP rats showed a higher increase in p16, and a smaller increase in p21 and IL-6 mRNA expression compared to NORM rats. At one year, male HYP males showed an increased p16 expression compared to NORM males, whereas HYP females showed increased p21 expression compared to NORM females. p53 expression did neither display a gender difference nor a change over time. The expression of p16 was significantly greater and the expression of p21 was significantly smaller in HYP males compared to HYP females ($p < 0.01$). Total lung collagen levels were significantly higher in 1 year-old HYP females compared to NORM females with clear histologic interstitial collagen deposition. One year-old HYP males

did not show a difference in total collagen between the two exposure groups.

Conclusion: At day 14 of neonatal rat hyperoxia exposure there is a similar upregulation of senescence markers in the lung between males and females. However, at one year, sex difference is presented with elevated p21 expression in female rats associated with reduced lung compliance and elevated lung collagen. p16 expression in HYP males is high at day 14 and remains highly expressed at 1 year. These data suggest that lung aging is accelerated in HYP rats. Moreover, there are sex differences in the mechanisms of the accelerated lung aging.

****PAS Poster Presentation**

SPILLAGE, CAREGIVING AND EROSION: AN EXPLORATION OF PEDIATRIC FACULTY PERSPECTIVES OF THE INTERSECTION OF WELLNESS AND WORK-LIFE CONFLICT

Webber S, Babal J, Moreno M, Shadman K

Background: Pediatrician satisfaction with work-life conflict declined from 60% to 40% in recent years. Poor perceived work-life balance is associated with female gender, less sleep, and working > 50 hours/wk. Understanding critical factors intersecting wellness and work-life is needed to inform meaningful changes.

Objective: Evaluate pediatric faculty perceptions of physician wellness related to work-life conflict.

Design/Methods: A trained facilitator conducted semi-structured focus groups with pediatric faculty physicians in June 2018. Questions explored faculty perceptions of factors in physician wellness. Focus groups were audio recorded, transcribed, and de-identified. Qualitative analysis included the constant comparative method.

Results: 54 faculty participated in 9 focus groups. 52% female; 41% subspecialty, 26% general outpatient, 31% inpatient and 2% not reported. Every group reported issues related to work-life conflict. Three themes related to work-life conflict were present in our data. (1) Spillage: encroachment of work into non-work life due to work load. "I have multiple meetings in a week that are gonna keep me here past 5:00. That adds up and eats away at personal time." Spillage also related to the ability to maintain personal health and well-being, "The fact that charts take so much time definitely affects my ability to take care of myself, and my time with my family, which is really mentally helpful and important." (2) Caregiving: The role of faculty members as caregivers in non-work life. "When [NAME]'s husband was dying, I couldn't get there very often." (3) Erosion: The blurring of boundaries and constant availability due to technology; "My work never ends because I could either be charting at home or emails or some research project... Maybe this is just how it is in general now because of electronics. My parents came home from work, and then they were done. That was work."

Conclusion: Pediatric physicians perceive issues of work-life conflict as important factors in physician wellness. As leaders look to improve physician wellness, meaningful impact could come from consideration of strategies to minimize spillage, prevent erosion, and support physicians as caregivers.

****PAS Poster Presentation**

PERCEIVED CONSEQUENCES OF WORK-RELATED TECHNOLOGY

Webber S, Babal J, Moreno M, Shadman K

Background: Technology is ubiquitous in medicine. The electronic health record (EHR) is commonly cited as negatively impacting physician well-being; less is known about other technological interfaces.

Objective: Characterize the role of technology in faculty physician well-being.

Design/Methods: Trained facilitators prompted academic pediatric faculty physicians participating in nine semi-structured focus groups to discuss factors associated with physician well-being. Focus groups were audio recorded, transcribed and de-identified. All content related to technology was extracted and analyzed using the constant comparative method.

Results: Among the 54 pediatric faculty participants, 52% identified as female, 31% inpatient, 41% subspecialty, 26% general outpatient. Participants discussed three types of technology: email (7/9 groups), "I reflect on how much time we spend with email. It's a huge time sink, but... there is not a deep value we get out of that"; EHR (8/9 groups), "When we're not in clinic, we're constantly just living on our computers, so just constantly charting"; and texting (1/9 groups), "It's the continual erosion, I think, of your privacy that occurs because of the constant availability". Perceptions of technology were generally negative, except for two positive comments about the EHR. Faculty discussed drivers and consequences of technology related to well-being (Figure 1). Consequences were grouped into five themes: (1) Hindered meaningful work, "Lack of high-value work. I classify the majority of my emails for that"; (2) Increased perceived stress, "Email stresses me out. It's like this never-ending list of things"; (3) Prevented disconnection from work, "I find that very difficult 'cause there's not an off/on switch. Even if you're out of town, people still track you down or send you e-mails"; (4) Impeded maintenance of physical and mental health "In order to be a happy person and enjoy my job and do a good... and all the other things I wanna be, I have to get adequate sleep and... exercise my body, and I pretty much always sacrifice those things so I can get my notes done"; and (5) Interfered with non-work relationships, "[Keeping up with charts] really cuts into your chance to be with your family after work".

Conclusion: Pediatric physicians largely perceive work-related technology as negatively impacting well-being, eroding privacy and hindering meaningful work. Further understanding of the negative consequences of technology will help identify changes that can improve physician well-being.

MRI MARKERS OF OUTCOME AFTER SEVERE PEDIATRIC TBI

Yeske B, Kirk G, Guerrero J, Alexander A, Ferrazzano P

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.

Design/Methods: Clinical MRI scans acquired ≤ 30 days post-injury were collected from subjects with severe traumatic brain injury enrolled in the Approaches and Decisions after Pediatric TBI (ADAPT) study ($n=356$, 24 sites). Forty MRI scans were randomly selected for IRR assessment, by age, sex and site strata observed in the overall cohort. Each MRI scan was reviewed in a blinded fashion by 2 board-certified neuroradiologists and imaging findings were coded to the NIH Common Data Elements for neuroimaging (CDE). Inter-rater reliability (IRR) was determined for CDE lesion presence (Kappa) and lesion quantification (weighted Kappa) in each brain region. Twenty five subjects ≥ 9 years old were recruited for follow-up MRI scanning 1-2 years post-injury. Subjects underwent outcome assessments approximately 1 year post-injury, including the Wechsler Abbreviated Scale of Intelligence (IQ) and the Pediatric Glasgow Outcome Scale-Extended (GOS-E Peds). A typically developing control cohort underwent scanning at the University of Wisconsin. Brain image segmentation was performed on T1-weighted images using Freesurfer. Brain and CSF volumes were used to compute a Ventricle-to-Brain Ratio (VBR) for each subject, and the Corpus Callosum (CC) 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: Overall, 59% of children admitted to participating sites with severe TBI during the study period underwent MRI scanning during the first 30 days post-injury, and no differences in injury severity or presenting GCS were found between imaged and non-imaged TBI patients. Children who had an MRI were younger (5.7 vs. 8.18 years, $p=0.03$) and had longer ICU stays (22.13 vs. 11.41 days, $p<0.001$) compared to the non-imaged TBI cohort. Median time from injury to MRI scanning was 5.71 days, and at the time of MRI scanning many children were still receiving intensive therapies and monitoring, including mechanical ventilation (94%) and vasoactive infusions (39%). IRR for presence/absence of lesions was moderate to excellent across brain regions and lesion types: Diffuse Axonal Injury (DAI, $k=0.55-0.94$ across regions), Hemorrhage/Contusion

($k=0.68-0.80$), Ischemia ($k=0.55-0.60$), Intraventricular Hemorrhage ($k=0.77$), Midline Shift ($k=0.93$), and Cisternal Compression ($k=0.78$). Similar reliability was found when quantifications of DAI lesion count ($k=0.60-0.80$) and Hemorrhage/contusion volume ($k=0.56-0.69$) were assessed. On follow-up MRI, the TBI group demonstrated higher VBR and lower CC area compared to the control cohort. After adjusting for age and sex, VBR correlated significantly with GOS-E Peds score in the TBI group ($n=24$, $p<0.01$). After adjusting for age, sex, intracranial volume and brain volume, CC cross-sectional area correlated significantly with IQ score in the TBI group ($n=18$, $p<0.02$). No association was found between VBR and IQ or between CC and GOS-E Peds.

Conclusion: MRI is frequently performed in children with severe TBI, often within days of injury. We found acceptable inter-rater reliability of most CDEs in clinical MRI scans acquired early after injury in children with severe TBI. Analysis of the entire cohort of clinical scans is now underway to identify MRI predictors of neurocognitive outcome after TBI. At 1-2 years post-injury, the MRI volumetric measures of ventricle-to-brain ratio and corpus callosum cross sectional area are markers of global cognitive function in children recovering from severe TBI. Ongoing analyses will determine regional brain volumes, and MRI measures of structural and functional brain network connectivity, to identify markers of specific neurocognitive dysfunction after TBI.

MICROGLIAL RESPONSES TO TRAUMATIC INJURY IN THE DEVELOPING BRAIN

Zafer D, Ozaydin B, Kemanli P, Novak B, Benedict C, Kintner D, Cengiz P, Ferrazzano P

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.

Design/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, amoeboid 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 regions 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.