43RD ANNUAL EDWARD L. PRATT LECTURE SERIES

Pediatric Resident Research Symposium

Keynote Speaker: Indi Trehan, MD, MPH, DTM&H

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Wednesday, May 15, 2024
noon – 4 pm

43rd Annual Edward L. Pratt Lectures

AGENDA | WEDNESDAY, MAY 15, 2024

noon–12:10 pm	**Introduction of Keynote Speaker** MICHELLE RECTO, MD | Pediatric Chief Resident 2023–2024
12:10–1 pm	**Keynote Address: The Unbearable Lightness of Being: Studies and Stories of Childhood Malnutrition** INDI TREHAN, MD, MPH, DTM&H Associate Professor of Pediatrics Adjunct Associate Professor of Global Health and Epidemiology University of Washington
1–1:15 pm	**Break**
1:15–1:30 pm	**Urine Olfactomedin-4 is Associated with Furosemide Responsiveness and Receipt of Kidney Replacement Therapy** IMOGEN CLOVER-BROWN, MD | CATEGORICAL PEDIATRICS, PGY-3
1:30–1:45 pm	**Neighborhood Air Pollution and PICU Length of Stay in Pediatric Acute Respiratory Illness** ZACHARY PITKOWSKY, MD | Categorical Pediatrics, PGY-2
1:45–2 pm	**Addressing Food Insecurity in the Pediatric Setting: Results of a Pilot Intervention to Address Post-Discharge Food Insecurity** MEGAN SMITH, MD | Categorical Pediatrics, PGY-3
2–2:15 pm	**A Retrospective Study of Trends in Testing and Treatment for Viral Lower Respiratory Tract Infection in Young Children Following the COVID-19 Pandemic** EMILY LABUDDE, MD | Categorical Pediatrics, PGY-3
2:15–2:45 pm	**Poster Session and Break**
2:45–3 pm	**Rates of Cerebral Palsy and Value of Risk Assessment Tools in Infants with Prenatal Opioid Exposure** NICOLE CONNOLLY, MD | Categorical Pediatrics, PGY-3
3–3:15 pm	**Assessment of Renal Angina Index for Prediction of Severe Acute Kidney Injury in Pediatric Patients Admitted to the Intensive Care Unit in the Dominican Republic** LAURA RANGEL RODRIGUEZ, MD | Categorical Pediatrics, PGY-3
3:15–3:30 pm	**2'-Fucosyllactose Directly Modulates Macrophages Responses in an in-vitro Model of Crohn's Disease** TAL MARSHANSKI, MD | Categorical Pediatrics, PGY-2
3:30–3:45 pm	**Early Identification of Patients at risk of Clinical Deterioration** OLIVIA POST, MD | Categorical Pediatrics, PGY-3

Poster Submissions: **prattlectures.com**

IN MEMORY OF

Edward L. Pratt, MD
1913 – 1988

Dr. Pratt fostered the spirit of intellectual curiosity, critical thinking, perseverance, and independent research in the minds of his students.

It is a pleasure to honor Dr. Edward L. Pratt with the 43rd annual Edward L. Pratt Lecture series.

Edward L. Pratt, MD, was professor and chairman of the Department of Pediatrics at University of Cincinnati College of Medicine from 1963 until his retirement in 1979; he continued as professor emeritus of pediatrics until his death in 1988.

Dr. Pratt graduated from Harvard Medical School in 1940, followed by pediatric residency and chief residency at Boston Children's Hospital and research training at Yale University and Cambridge University. He was associate professor of pediatrics at New York University College of Medicine from 1949-1954. In 1954, he was named chairman and professor of the Department of Pediatrics at University of Texas Southwestern Medical School, chief of staff at Children's Medical Center in Dallas, and chief of pediatric service at Parkland Memorial Hospital in Dallas. Dr. Pratt joined Cincinnati Children's Hospital Medical Center and the UC College of Medicine as the B.K. Rachford Professor of Pediatrics in 1963. At that time, he also was named director of the Children's Hospital Research Foundation and chief of staff of Cincinnati Children's.

Together with the Board of Trustees, Dr. Pratt led the effort to centralize child health care services in Cincinnati by bringing together the six health care programs that form Cincinnati Children's. He encouraged pediatric research and fostered the careers of many young investigators, both in the clinical and basic science arenas. Dr. Pratt taught that pediatric research is the best and most inexpensive way of combating childhood disorders. His own research in nutrition and fluid and electrolyte metabolism forms the basis of current knowledge and much of the current practice in these areas.

Established by their peers and teachers, the Pratt lectures allow pediatric residents to present results of their research in an open forum for critical analysis.

KEYNOTE SPEAKER

Indi Trehan, MD, MPH, DTM&H

The Unbearable Lightness of Being: Studies and Stories of Childhood Malnutrition

Indi Trehan, MD, MPH, DTM&H, is currently an Associate Professor of Pediatrics and Adjunct Associate Professor of Global Health and of Epidemiology at the University of Washington. He is board certified in Pediatrics, Pediatric Infectious Diseases, Pediatric Emergency Medicine, and Clinical Tropical Medicine.

I studied bioengineering at UC Berkeley, where I was a very average student but somehow made it off the waitlist for medical school at Northwestern University. Enchanted by the pharmacology professor teaching us antibiotics, I took two years off from medical school to work on β-lactamase inhibitor structure and function. Although I have not spent much time in a lab since then, I still have enormous gratitude to my mentor Brian Shoichet for teaching me how to ask the right scientific questions, design the right studies, and write for a scientific audience.

I then stumbled into Pediatrics training and three incredible years at Cincinnati Children's that gave me so much love for clinical medicine. Alongside the clinical work, I was lucky to meet Mary Staat, who taught me how to do clinical research. Possibly regretting the clerical error that led to my match, my extraordinary program director Javier Gonzalez was eager to get me out of the country and let me take five months of electives in Peru and Malawi.

Those were life-changing months which gave me a passion for (against?) childhood malnutrition that has shaped my life ever since. I completed a dual fellowship in Infectious Diseases and Emergency Medicine at Washington University in St. Louis so I could work with Mark Manary, who had a few years earlier revolutionized the care of malnourished children throughout Africa. Mark sent me to Malawi for three months, but I ended up staying for three years conducting several seminal field trials.

In early 2015, I worked for Partners In Health in the Port Loko Ebola treatment center in Sierra Leone. A year later, the late Paul Farmer convinced me to take an academic sabbatical and work for PIH in rural Liberia, helping rebuild the health system from years of civil war and Ebola. I later became the medical director of Lao Friends Hospital for Children, a teaching hospital caring for children from throughout rural northern Laos.

In 2020, I moved to the University of Washington to join the kindred spirits there studying childhood malnutrition. I remain active in clinical and translational research in Ethiopia, South Sudan, and Kenya, aimed at improving the care of malnourished children and work closely with WHO, UNICEF, and ACF on several projects aimed at improving clinical care and translating evidence into practice.

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EDWARD L. PRATT LECTURE

Urine Olfactomedin-4 is Associated with Furosemide Responsiveness and Receipt of Kidney Replacement Therapy

Imogen Clover-Brown, MD; Denise Hasson, MD; Kristalynn Kempton, MS; Adeleine Koterba; Kelli Krallman, RN, BSN, MS; Stephen Standage, MD; Stuart Goldstein, MD; Matthew Alder, MD, PhD

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Background: Anticipating need for kidney replacement therapy (KRT) is an opportunity for prognostic enrichment to facilitate early and appropriate KRT initiation. Furosemide stress test (FST) response can predict KRT receipt, but providers may avoid giving diuretics to unstable patients. Furosemide acts in the Loop of Henle (LOH), so a LOH-specific acute kidney injury (AKI) biomarker may predict furosemide response, without needing to give diuretics. Olfactomedin-4 (OLFM4) is a glycoprotein produced by injured LOH epithelial cells.

Objective: We hypothesize that urine OLFM4 (uOLFM4) may predict FST response and KRT receipt among patients at risk for severe AKI.

Methods: From 5/2022 to 11/2023, all patients in a single center pediatric intensive care unit (PICU) were screened with renal angina index (RAI) within 24 hours of admission. RAI $\geq$8 (RAI+) identifies patients at increased risk of KDIGO Stage 2/3 AKI. Urine was collected from lab residuals or bladder catheter waste daily. uOLFM4 levels were measured via enzyme-linked immunosorbent assay. AKI was staged using KDIGO creatinine criteria. To capture clinical FSTs, response was measured in any patient who received > 0.75 mg/kg furosemide. Urine output > 3 mL/kg/hr in the 4h after was considered responsive.

Results: 127 RAI+ patients provided 294 samples. 52 patients underwent 147 FSTs (median day 2; IQR 1-4), only 33% of FSTs were performed in the first 48h. 29 patients received KRT. uOLFM4 was increased in patients who failed FST on day of sampling ($p<0.01$, AUC 0.70, 95% CI 0.57 – 0.84) and 24h after sampling ($p<0.01$, AUC 0.72, 95% CI 0.57 – 0.85: Fig. 1). uOLFM4 603 ng/mL had 52% sensitivity, 78% specificity to predict FST 24h after sampling (Youden Index 0.32). uOLFM4 increased with AKI severity and KRT ($p <0.01$; Fig. 2) and had fair predictive performance for KRT (AUC 0.71; 95% CI 0.61 – 0.81). uOLFM4 of 603 ng/mL had 54% sensitivity, 78% specificity to predict KRT receipt (Youden Index 0.3).

Conclusions: Urine OLFM4 in the first 48h of PICU admission is associated with FST responsiveness and receipt of KRT among RAI+ patients. We suggest uOLFM4 may provide an earlier assessment of ultimate diuretic responsiveness and lead to earlier KRT initiation in the appropriate patient.

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EDWARD L. PRATT LECTURE

Neighborhood Air Pollution and PICU Length of Stay in Pediatric Acute Respiratory Illness

Zachary Pitkowsky MD, MPH; Andrew Beck MD, MPH; Cole Brokamp PhD; John Egbo; Carlie Myers MD, MS

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Background: Air pollution and neighborhood socioeconomic deprivation are associated with increased rates of hospitalization for child respiratory illness.

Objective: We hypothesized that greater exposure to neighborhood pollution and neighborhood deprivation would be associated with greater PICU length of stay (LOS) for pediatric acute respiratory illness.

Methods: This is a retrospective analysis of patients ≤18 years old admitted to a single center PICU with acute respiratory illness from 2015 to 2022. Acute respiratory illness was defined by ICD10 admission codes. Patient demographic data were extracted from the electronic medical record. Addresses were geocoded with DeGAUSS and appended to daily PM2.5 estimates using DeGAUSS PM 2.5 image. PM2.5 was summed for each patient for the 90 days leading up to admission. Childhood Opportunity Index (COI) was obtained from Diversity Data Kids utilizing census tracts from DeGAUSS. The outcome of interest was PICU LOS and predictors were PM2.5 and COI. Associations were tested in R using Poisson regression models.

Results: A total of 953 patients were included in the final analysis. The mean age was 2.44 years (SD: 4.32). Of included patients, 32.7% identified as African American or Black, 61.2% White, 0.3 % Asian, and 4.5% Hispanic. 64% of patients utilized public insurance. Mean PICU LOS was 2.24 days (SD: 2.13). Mean 90 day aggregate PM2.5 was 795 μg/m3 (SD: 120). In an unadjusted model, the PM2.5 coefficient was 0.0006766 ($p<0.01$; pseudo R^2 0.0096). In a model adjusted for COI, the PM2.5 coefficient was 0.0006526 ($p=0.02$; pseudo R^2 0.0123) and for COI and public insurance status the PM2.5 coefficient was 0.0006790 ($p=0.018$; pseudo R^2 0.01161). For each 100 μg/m3 aggregate increase in PM2.5, there were 0.06526 more PICU days for acute respiratory illness. Pseudo R^2 or ability to explain variation was highest in the model including COI and public insurance status.

Conclusions: This analysis confirms our hypothesis that there is an association between air pollution and acute respiratory illness in the PICU population. This analysis additionally highlights the interplay between neighborhood pollution and neighborhood deprivation in relation to respiratory illness-related PICU LOS.

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EDWARD L. PRATT LECTURE

Addressing Food Insecurity in the Pediatric Setting: Results of a Pilot Intervention to Address Post-Discharge Food Insecurity

Megan Smith, MD; Kerry Tepe; Hadley Sauers-Ford, MPH; Denise Atarama; Monique Gilliam; Ndidi Unaka, MD, MEd; Andrew Beck, MD, MPH; Anita Shah, MD, MPH; Amanda Schondelmeyer, MD; Katherine Auger, MD, MSc

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Background: There is growing interest in addressing food insecurity (FI) during pediatric hospitalization. While FI screening is welcomed by families, there is a need to understand the feasibility of interventions initiated during hospitalization and employed upon discharge.

Objective: We sought to evaluate the feasibility, acceptability, and appropriateness of food support interventions provided at discharge for families experiencing FI during hospitalization.

Methods: We performed a pilot study of discharge interventions for families experiencing FI at a large, freestanding children's hospital. Caregivers were considered food insecure if they indicated a positive response to any question on either the Six-item United States Department of Agriculture (USDA) survey or the HealthWatch Hunger Vital Sign (HVS) Screener when screened during hospitalization. The interventions included three options for food insecure caregivers to choose from at discharge: (1) grocery store gift cards, (2) grocery delivery/pick-up, and/or (3) frozen meals. Seven days after discharge, a clinical research coordinator contacted caregivers to ask about the interventions' acceptability, appropriateness, and feasibility, evaluated using an adaptation of a previously published tool. The tool assesses each dimension on a Likert Scale, ranging from "Completely disagree" (1) to "Completely agree" (5). We screened families for ongoing FI using the HVS. We summarized the median and proportion of "Completely agree" responses for Likert scales and compared in-hospital and post-discharge FI using McNemar's test.

Results: Of the 209 families who completed screening, 53 (25%) endorsed FI during hospitalization (Table 1). All 53 caregivers agreed to participate in the intervention, and 50 caregivers completed the post-discharge assessment. Every family selected the grocery gift card; none selected grocery delivery/pick-up. Additionally, 37 families (69.8%) received frozen meals. Seven days after discharge, caregivers rated gift cards and frozen meals acceptable (5, 90%), appropriate (5, 88%), and feasible (5, 76%) (Table 2). There was a significant decrease in the number of families who reported ongoing FI based on the HVS, from 80% during hospitalization to 44% seven days after discharge ($p < 0.001$).

Conclusions: This pilot study demonstrates the acceptability, appropriateness, and feasibility of providing gift cards and frozen meals to address FI as families transition home after hospital discharge.

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EDWARD L. PRATT LECTURE

A Retrospective Study of Trends in Testing and Treatment for Viral Lower Respiratory Tract Infection in Young Children Following the COVID-19 Pandemic

Emily Labudde, MD; Patrick Walsh, MD, MS; Matthew Lipshaw, MD, MS;
Benjamin Kerrey, MD, MS

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Background: In the last 20 years, rates of low-value care (ineffective, unnecessary, or wasteful practices) have steadily decreased for children with bronchiolitis. The effects of the COVID-19 pandemic and 2022 winter "tri-epidemic" on rates of low-value care, however, have not been studied.

Objective: We sought to determine whether rates of low-value care in young children with bronchiolitis increased nationally following the COVID-19 pandemic.

Methods: This was a retrospective study of the Pediatric Health Information Systems (PHIS) database including children < 2 years of age seen in a pediatric emergency department for bronchiolitis. We selected *a priori* September 1, 2018, to February 28, 2020 (pre-pandemic), March 1, 2020 to August 31, 2022 (pandemic), and September 1, 2022 to January 31, 2023 (post-pandemic) as the 3 study periods. Low-value care was the main study outcome and included viral testing, chest radiography, albuterol, and corticosteroids. We compared the percentage of patients with any and each low-value care element across the 3 time periods [main measure % difference and 95% confidence interval (CI)].

Results: We included 387,478 encounters: 173,478 (45%) pre-pandemic, 138,691 (36%) pandemic, and 75,309 (19%) post-pandemic. The percentage of patients with *any* low value care was 51%, 53%, and 50% across the 3 periods, respectively. There was little variation in the use of albuterol (28-30%), chest radiography (28-32%), and RSV testing (8%; 95% CI for nearly all differences inclusive of 0). Viral testing was performed for 39% pre-pandemic and 68% in both pandemic and post-pandemic periods (+29%, 95% CI 29-30%). Combination testing, including SARS-CoV-2 and at least one other virus, increased from 22% in the pandemic period to 34% in the post-pandemic period, while single virus testing for SARS-CoV-2 decreased from 33% to 20% respectively.

Conclusion: Despite increased volumes of patients with bronchiolitis during the fall and winter of 2022, there was no major increase in the use of low-value care. Due to SARS-CoV-2 testing, overall rates of viral testing increased dramatically over time; however, viral testing remained high even when COVID-19 incidence declined. Future bronchiolitis guidelines should consider updating viral testing recommendations to account for the rise in combination viral testing.

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EDWARD L. PRATT LECTURE

Rates of Cerebral Palsy and Value of Risk Assessment Tools in Infants with Prenatal Opioid Exposure

Nicole Connolly, MD; Stephanie Merhar, MD, MS; Liz Rick, MOT, OTR/L;
Angel Ehrenschwender, MPH; Jennifer McAllister, MD, IBCLC

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Background: Opioid use during pregnancy and the rate of neonatal opioid withdrawal syndrome (NOWS) have increased in recent years. The General Movements Assessment (GMA) and Hammersmith Infant Neurological Examination (HINE) are tools to identify infants at risk for cerebral palsy (CP) and neurologic abnormalities, however there is limited data on their use in the specific population of infants with prenatal opioid exposure. The average incidence of CP in the general population is estimated to be between 1.5 to 3 per 1,000 births (0.15% to 0.3%).

Objective: To determine CP rates in children with prenatal opioid exposure seen in NOWS clinic. To determine the utility of the GMA and HINE as tools to identify CP in the NOWS population.

Methods: Retrospective cohort study of 546 opioid-exposed infants born between 1/1/2020 and 10/1/2022 that were seen in NOWS Follow-Up Clinic. Our primary outcome was CP diagnosis. Our secondary outcome was rate of abnormal GMA and HINE between the CP and non-CP groups. Other factors examined include sex, mode of delivery, gestational age, APGARs, and type of opioid exposure. Infants with known CP risk factors (such as gestational age less than 32 weeks, hypoxic-ischemic encephalopathy, serious infection) were excluded. Descriptive statistics were used to compare the CP and non-CP groups. Bivariate associations were tested using simple logistic regression with Firth's bias reduced correction.

Results: Fourteen of the 546 opioid-exposed infants (2.6%) were diagnosed with CP at time of data analysis. Of the infants who had a scorable risk assessment tool completed, 60% of those later diagnosed with CP had an absent fidgety GMA ($p<0.001$) and 64% had HINE below the cutoff ($p=0.011$), whereas 5% of those without a CP diagnosis had an absent fidgety GMA and 23% had a HINE below the cutoff. The GMA and HINE had negative predictive values of nearly 99% and 94% respectively.

Conclusions: CP rates in opioid-exposed infants seen in NOWS clinic are significantly higher than in the general population. The GMA and HINE may be helpful tools to identify infants at high risk for CP in the NOWS population, as they are in other populations.

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Assessment of Renal Angina Index for Prediction of Severe Acute Kidney Injury in Pediatric Patients Admitted to the Intensive Care Unit in the Dominican Republic

Laura Rangel Rodriguez, MD; Stuart Goldstein, MD; Kelli Krallman, BSN, MS;
Laura Cuevas Lora, MD; Emma Almonte Baez, MD

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Background: Severe Acute Kidney Injury (AKI) affects 10-40% of pediatric intensive care patients and is associated with increased morbidity and mortality. While AKI management relies on supportive measures, the Renal Angina Index (RAI), a validated tool for early prediction in resource-abundant countries, can enable timely preventive strategies and informed decision-making. Given the scarcity of data in resource-limited settings, evaluating this screening tool becomes essential for effective implementation in these contexts.

Objective: Evaluate the RAI in the first 24 hours of ICU admission as a predictive tool for identifying severe AKI (sAKI) at days 2-4 at Robert Reid Cabral Pediatric Intensive Care Unit (PICU). Secondary outcomes include kidney replacement therapy (KRT) initiation time, fluid overload, mortality, therapy duration, and potential limitations related to insurance.

Methods: Retrospective chart review was conducted for pediatric patients admitted to the Robert Reid Cabral PICU who were started on KRT from February 2022 to June 2023. Primary outcomes were analyzed by Fisher Exact test and compared using Mann-Whitney U-tests $p < 0.05$.

Results: The study included 93 pediatric patients; 81 underwent KRT. 61.7% received peritoneal dialysis, 37% continuous renal replacement therapy, and 1.2% intermittent hemodialysis. RAI (RAI+ $\geq$8) had a sensitivity 0.71 (95% CI 0.56-0.83), specificity 0.57 (95% CI 0.34-0.78), positive predictive value (PPV) 0.79 (95% CI 0.69-0.86) and negative predictive value (NPV) 0.46 (95% CI 0.32-0.60) to predict day 2 to 4 sAKI (area under the receiver operating characteristic curve [AUC-ROC] 0.66 [95% CI 0.52–0.80]) and PPV 0.95 (95% CI 0.86-0.99) to predict KRT requirement during admission ($p<0.09$) ([AUC-ROC] 0.67 [95% CI 0.51–0.83]). Median fluid overload percentage (FO%) at KRT start was 21% with higher mortality with FO%>20% ($p=0.01$). Mortality of patients on KRT was 90.1%, including 9% awaiting KRT approval and 22% facing insurance delays.

Conclusions: The RAI shows promise to predict KRT requirement during ICU stay. The FO% at start of KRT plays a critical role in the high mortality rate observed. We suggest the RAI may provide guidance to start KRT earlier. Challenges like insurance delays underscore the need for nuanced strategies in resource-limited settings.

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EDWARD L. PRATT LECTURE

2'-Fucosyllactose Directly Modulates Macrophages Responses in an *in-vitro* Model of Crohn's Disease

Tal Marshanski, MD; Ingrid Jurickova, MD; Elizabeth Angerman; Erin Bonkowski; Lee Denson, MD

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Background: Crohn's disease (CD) patients present with inflammatory behavior, many develop fibrotic stricturing complications. Despite widespread use of anti-inflammatory and targeted biologic therapy, clinical relapse remains common. The interaction between the microbiome and the susceptible intestine has been previously described as one key driver of recurrence. The human milk oligosaccharide 2'-Fucosyllactose (2`-FL) was proposed as a modulator of the intestinal immune response. This molecule exerts prebiotic effects and directly acts on intestinal cells. An ongoing clinical trial in CD patients enlists it for its therapeutic potential. Direct effects of 2`-FL on macrophages (MΦ) were described. The potential to alter resident tissue MΦ programming, is particularly interesting due to the implication in the pathogenesis of CD.

Objective: Our aim is to study the immunologic basis of CD. Here we show proof of concept of a model to quantity the direct effects of 2`-FL on stimulated macrophages derived from CD patients.

Methods: A previously described a model system was used to differentiate MΦs from induced pluripotent stem cells derived from peripheral blood mononuclear cells obtained from a CD patient with an anti-TNF non-responder phenotype. First, hematopoietic progenitor cells were differentiated, subsequently MΦs were differentiated by re-suspending cells in media containing serum and growth factors. Macrophages were harvested and characterized by flow cytometry. These were incubated for 3 days with 2`-FL or media alone. The media was then refreshed, cells were exposed to either media alone, 2`-FL alone, Lipopolysaccharide (LPS) alone (as an inflammatory stimulator), or a mixture of 2`-FL and LPS. Cells were incubated for an additional 3 days, upon which cell marker and secreted content analyses were performed.

Results: Macrophages showed significant activation of an inflammatory program in response to LPS, represented by elevations of TNF-α, TL1A, IL-1β, OSM, CCL2, CCL7, CCXL5, SEMA3C, and IL-10. Exposing cells to pre-treatment with 2`-FL alone produced a nonsignificant trend in baseline cytokine profile. Pre-treating cells with 2`-FL with subsequent LPS stimulation produced a significant shift in the cell response, compared with LPS alone. Notably, the pro-inflammatory cytokines OSM and IL-1β were significantly attenuated, as well as CCXL5 and IL-10. Interestingly, levels of TNF-α were mildly increased in the treatment group.

Conclusions: In our in-vitro model of CD immune cells, treatment of stimulated MΦs with 2`-FL showed a significant shift in the immune cytokine milieu, towards attenuation of the inflammatory response. In addition, non-significant differences in signaling of SEMA3C and CCL7 may represent a possible effect on fibrotic mechanisms. Our data suggests that 2`-FL has a role in modulating the intestinal response, by directly influencing MΦ programming.

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EDWARD L. PRATT LECTURE

Early Identification of Patients at risk of Clinical Deterioration

Olivia Post, MD; Michelle Coleman, MSN, RN, CPN; Katy Bedinghaus, MSN, RN, CPN; Jenny Carmichael, RN; Katie Smith, MSN, RN, CPN, CNML; Brittany Frakes, BSN, RN, CCRN; Rae Becker, DNP, RN, CPN; Laura Hatcher, MSN, APRN, PPCNP-BC; Erin Molloy, MD; Laura Brower, MD, MSc

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Background: Pediatric patients who require emergency transfer (ET) to a critical care unit have worse outcomes, longer length of stay (LOS) post-transfer, and higher in-hospital mortality than matched controls. An ET is a floor to ICU transfer in which one of the following interventions occurs within one hour of transfer: intubation, receipt of inotropes, or at least three fluid boluses (60 mL/kg). Previous implementation of a situation awareness model that identifies and addresses risk factors for clinical deterioration reduced the rate of ETs. With a subsequent increase in the rate of ETs, our team focused on opportunities to allow earlier utilize the situation awareness model.

Objective (or hypothesis being tested): Increasing the percentage of acute care patients, hospital-wide, who are identified as watchers prior to activation of a medical response team (MRT) or code will decrease the rate of ETs.

Methods: Key drivers included appropriate assessment of the patient, early identification of patients at risk of deterioration, standardized clinical pathway for escalation of concern with usable tools, and psychological safety to escalate concerns and ask questions. Our primary process measure was the percentage of patients who were identified as watchers prior to MRT or code. Our secondary outcome measure was the number of ETs per 10,000 patient days.

Results: The percentage of patients identified as watchers prior to MRT or code increased from 41% to 51%. A run chart detailing the timing of implementation of various interventions, including unit-specific automatic watcher criteria, a critical care outreach team, and escalation pathway, is demonstrated in Figure 1. The number of ETs remained relatively stable at 3 events per 10,000 patient days compared to 3.5 in 2022.

Conclusions: We successfully increased the percentage of patients identified as watchers prior to MRT or code through implementation of various tools to allow earlier detection of clinical deterioration as well as a standardized escalation pathway.

Poster Abstracts

IN ALPHABETICAL ORDER BY RESIDENT AUTHOR(S)

The Relationship Between Ventilatory Anaerobic Threshold and Arrhythmia Onset in Patients with Catecholamingergic Polymorphic Ventricular Tachycardia
Elizabeth Aronoff, MD — Categorical Pediatrics, PGY-3

The Impact of Social Determinants of Health on Lapses in Outpatient Pediatric Cardiology Follow-Up
Katherine Boyer, MD — Categorical Pediatrics, PGY-3

Supporting Secure Firearm Storage in Under-Resourced Communities through Provision of Storage Devices during Routine Clinical Care
Margaret Carney, MD — Categorical Pediatrics, PGY-3
Kristen Humphrey, MD — Categorical Pediatrics, PGY-3

Comparison of Resting and Dynamic Measures of Cardiac Function in Youth with Syncope
Bradley Conant, MD, MATrg — Categorical Pediatrics, PGY-2

Genetic Feedback Circuits Employing the Endogenous Cellular Hypoxia Response Enhance the Performance of Synthetic Hypoxia Biosensors
Patrick Donahue, MD, PhD — Categorical Pediatrics, PGY-2

Profiling of Blood Transcriptome to Unravel Causal Pathways in Pediatric Septic Shock
Leland Dunwoodie, MD — Categorical Pediatrics, PGY-2

Impact of Telehealth Care on Patient and Family Experience for Non-Urgent Complaints
Abigail Gauthier, MD — Categorical Pediatrics, PGY-3

Characterization of Children with Hemophagocytic Lymphohistiocytosis (HLH)
Anisha Gopu-Gilboy, MD — Categorical Pediatrics, PGY-3

The Association of Emergency Severity Index Score and Patient and Family Experience in a Pediatric Emergency Department
Callie Krentz, MD — Categorical Pediatrics, PGY-3

Predictors of Celiac Disease in Patients with Type 1 Diabetes and Positive Tissue Transglutaminase IgA
Andrew Krueger, MD — Categorical Pediatrics, PGY-1

Epidemiology of Invasive Fungal Disease in Pediatric B- Cell Acute Lymphoblastic Leukemia Patients
Caroline Maguire, MD — Categorical Pediatrics, PGY-2

Recalibrating the Cardiac Renal Angina Index in Children Following Cardiac Surgery
Katherine Melink, MD — Categorical Pediatrics, PGY-3

Dysbiosis Alters Transcription Programs Within the Lung Mesenchyme after Streptococcus Pneumoniae Infection
Odemaris Narváez del Pilar, MD, PhD — Categorical Pediatrics, PGY-2

Mobile Learning for Pediatric Residents in Cardiology Utilizing App-Based Education
Jonathan Pacella, MD — Categorical Pediatrics, PGY-3

Needs-Based Assessment of Antimicrobial Stewardship Curriculums by Pediatric Infectious Diseases Fellowship Directors
Kristin Patrick, MD — Categorical Pediatrics, PGY-3

Innovative Acute Care Allergy Service (ACAS) Provides Timely Specialist Evaluation and Management for Children Experiencing Antibiotic-Associated Reactions
Scott Pfirrman, MD, MBA — Categorical Pediatrics, PGY-3

Fetal Echocardiogram Findings in Infants with in Utero Renal Dysfunction
Ghazal Rashidi, MD — Categorical Pediatrics, PGY-3

The Relationship of Handgrip to Body Composition and Cardiopulmonary Fitness in Children and Young Adults
Carter Richardson, MD — Categorical Pediatrics, PGY-2

Association Between Length of Stay and Changes in Home Support During Hospitalization Among Children with Medical Complexity
Jacob Smith, MD, MPH — Categorical Pediatrics, PGY-3

Early-Life Community Material Deprivation is Associated with Decreased School-Age IQ in the HOME (Health Outcomes and Measurements of the Environment) Study
Aimée Vester, MD, PhD — Categorical Pediatrics, PGY-3

Clinical Impact of Bronchoscopy in Pediatric and Young Adult Oncology Patients with Suspected Respiratory Infections
Daniel Whitehurst, MD — Categorical Pediatrics, PGY-3

Using Group Model Building to Create a Systems Map for Child & Youth Thriving in Structurally Disadvantaged Neighborhood in Cincinnati, OH
Rachel Zuellig, MD — Categorical Pediatrics, PGY-3

The Relationship Between Ventilatory Anaerobic Threshold and Arrhythmia Onset in Patients with Catecholamingergic Polymorphic Ventricular Tachycardia

Elizabeth Aronoff, MD; Shankar Baskar, MD; Richard Czosek, MD; Wayne Mays, MS, RCPT; David Spar, MD; Timothy Knilans, MD; Adam Powell, MD, MS

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Background: Catecholaminergic polymorphic ventricular tachycardia (CPVT) is a genetic disease associated with malignant ventricular arrhythmias at high catecholamine states, often necessitating exercise restriction. Cardiopulmonary exercise testing (CPET) is used in the management of patients with CPVT but can also be used to assess fitness. The ventilatory anaerobic threshold (VAT) is a common measure of fitness and reflects the point at which the body shifts from aerobic to anaerobic metabolism. The relationship between VAT and ectopy burden has not been evaluated in patients with CPVT. **Objective**: To assess if there is an association between VAT and development of arrhythmia during exercise in those with CPVT. Methods: This is a single-center retrospective study of all patients with CPVT completing CPET from July 2017 through September 2022. VAT was calculated utilizing the V-slope method. Simple ectopy was defined as a single, uniform premature ventricular complex and complex ectopy defined as polymorphic ectopy of greater than or equal to 3 beats of ventricular tachycardia. The heart rate at various time points was noted. To help determine the reproducibility of VAT on serial exercise test, a paired T test was performed. Data presented as median [IQR]. **Results**: There were 44 CPETs completed by 10 patients (19.8±10.4 years-old at first test; 50% male) with CPVT. Patients developed simple ectopy in 77% (34/44) and complex ectopy in 57% (25/44) of tests. No patients developed ectopy before VAT during any test. Average HR at VAT (101bpm), [75-152]) was below both the HR at which simple (122bpm, [102-173]) and complex (136bpm, [106-176]) ectopy developed. **Conclusion**: Patients with CPVT seem to reach VAT prior to the onset of ventricular ectopy. Anaerobic metabolism may play a role in the arrhythmogenicity of CPVT.

The Impact of Social Determinants of Health on Lapses in Outpatient Pediatric Cardiology Follow-Up

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Background: Disparities in clinical outcomes exist among pediatric patients with congenital heart disease (CHD) with social determinants of health (SDOH) as a significant contributor. Follow-up care plays an important role in long-term health and may be impacted by SDOHs. **Objective**: To better understand the impact of SDOHs, at both the individual and community level, on no-shows to scheduled appointments and lost to follow-up in outpatient cardiology care. **Methods**: A retrospective chart review was completed for children ages newborn to 18 years old and identified as a "no-show" or lost to follow-up to a Cincinnati Children's (CCHMC) general cardiology appointment. The Deprivation Index (DI), a community level marker of social disadvantage ranging from 0-1 with higher indices indicating more disadvantage, was calculated. Data collected was compared to the published demographic information on the CCHMC primary service area. **Results**: The no-show (n=1,473) and lost to follow-up (n=1,062) groups demonstrated multiple commonalties. Most identified as White, Non-Hispanic/Latino, reported English as their primary language, and utilized public insurance. Median age was comparable among both groups with a wide range of cardiac diagnoses represented. Both populations had a higher percentage of patients who identified as Hispanic/Latino, utilized public insurance, and resided in a community with higher social deprivation. However, only the no-show population was noted to have a higher proportion of patients identifying as Black/African American (30% no-show vs 13% service area). Finally, the proportion of patients who reported a non-English primary language in the no-show (6.6%), lost to follow-up (4.6%), and the primary service area (7.0%) populations were similar. Conclusion: SDOHs, both at the individual and community level, may impact follow-up in pediatric outpatient cardiology. Our research demonstrates that those who identify as a minority race/ethnicity, utilize public insurance, or live in an area with higher social deprivation may be at a higher risk for lapses in outpatient cardiology care. These differences in follow-up may contribute to disparities in outcomes among pediatric CHD patients. Future research needs to explore the relationship between SDOHs, follow-up, and long-term outcomes to better inform interventions aimed at improving retention, reducing barriers, and improving access to cardiology care.

Supporting Secure Firearm Storage in Under-Resourced Communities through Provision of Storage Devices during Routine Clinical Care

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Background: Firearm-related injury is the leading cause of death in American children. Data demonstrates firearm-related injuries and mortality disproportionately affect people of color and communities living in poverty. Locally, Avondale and South Fairmount have significantly higher firearm-related death rates compared to Cincinnati as a whole.[3] The AAP recommends pediatricians counsel caregivers on the dangers of firearms, screen for access to household firearms, and recommend secure storage. These strategies have been shown to be efficacious in enhancing secure storage practices in households. **Objective:** To 1) improve access to firearm storage devices for children who seek care at Pediatric Primary Care Center (PPCC) and Hopple Street Neighborhood Health Center (HSHC) and 2) explore family preference for type of firearm storage device. **Methods:** We conducted a QI study to increase device distribution with an embedded survey to assess patient family barriers to secure storage and preference for device type. Interested families were given a choice to receive either a lockbox or cable lock. Clinicians completed a survey documenting family preference, original firearm storage method, and patient-cited barriers to secure storage. Several PDSA cycles were implemented to remind clinicians to screen and distribute secure storage devices, including 1) sending weekly reminders on the availability off firearm safety device in clinic, 2) targeting all 2–3-year-old well-child checks, and 3) reviewing an instructional video with ancillary staff and clinicians. This study was IRB approved. **Results:** 51 devices were distributed in 5 months. The mean number of devices distributed per week increased to 3 after several PDSA cycles, but this increase did not establish a trend (Figure 1). Most families preferred lockboxes (62%), followed by unsure/no preference (34%), and cable locks (4%). **Conclusions:** Some barriers to secure firearm storage may be addressed through caregiver counseling and free distribution of firearm safety devices during routine clinical care; however, interventions such as clinician training on firearm safety counseling are likely needed to create a sustained change in safe firearm storage practices. Families indicated a preference for lockboxes to cable locks, an important finding as we consider scaling distribution of storage devices in other clinical settings.

Comparison of Resting and Dynamic Measures of Cardiac Function in Youth with Syncope

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Background: Neurocardiogenic syncope is a common concern in pediatric patients. Previous research has shown low left ventricular mass and stroke volume limitations on cardiac imaging as the primary etiology for symptoms. Minimal research has been performed on how measures of resting stroke volume relate to measures of dynamic cardiac performance and stroke volume in symptomatic patients with neurocardiogenic syncope. Additionally, there has been no research on how Innocor inert gas rebreathing relates to echocardiographic measures of stroke volume in pediatric patients with neurocardiogenic syncope. **Objective:** To evaluate the correlation between echocardiographic and Innocor-derived resting stroke volume, to assess relationships between resting and dynamic measures of cardiac performance, and to compare resting and dynamic cardiac function in youth with syncope after cardiopulmonary exercise testing. **Methods:** A retrospective chart review identified all patients <21 years old with a cardiopulmonary exercise test and echocardiogram performed on the same day from October 2017 to December 2023 for neurocardiogenic syncope (n=101, 15.2±2.3 years-old). Most patients also had body composition measured using bioimpedance analysis. Comparison between groups was performed with a student t-test, and correlations were performed using Pearson's correlation. $P<0.05$ was considered significant. **Results:** There were 22 patients (36% male; age 15.6±2.4) who had either syncope or a vasodepressor response to exercise compared to 79 patients (29% male; age 15.0±2.3) without symptoms. Height, weight, BMI, and body composition were not significantly different between groups. Patients with a positive syncope evaluation had lower Z-scores for left ventricular (LV) end-diastolic volume (-1.2±1.3 v. -0.4±1.3, $p=0.01$) and LV end-systolic volume (-1.0±1.4 v.-1.1±1.1, $p=0.001$) and lower percent predicted peak oxygen pulse (O_2pulse) (95.5±14.0% v. 104.6±18.5%, $p=0.04$) compared to those without symptoms during testing. Resting stroke volume measured by echocardiography was correlated with Innocor measurements of resting ($r=0.53$, $p<0.0007$) and peak ($r=0.32$, $p=0.009$) stroke volume, peak O_2pulse ($r=0.61$, $p<0.0001$), total body water ($r=0.67$, $p<0.0001$), and skeletal muscle mass ($r=0.67$, $p<0.0001$). **Conclusions:** Youth with symptoms following exercise testing have lower LV volumes and lower peak O_2pulse during cardiopulmonary exercise testing compared to those without symptoms. Resting stroke volume on echocardiogram is associated with Innocor-derived stroke volume, peak O_2pulse, total body water, and skeletal muscle mass.

Genetic Feedback Circuits Employing the Endogenous Cellular Hypoxia Response Enhance the Performance of Synthetic Hypoxia Biosensors

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Background: Tumor-targeted, cell-based therapies have successfully treated many hematologic malignancies; however, translating these successes to the treatment of solid tumors has been difficult for many reasons, including a lack of targetable tumor-specific antigens. One solution is to develop biosensors against features of the tumor environment common across many malignancies, for example hypoxia. Further, biosensors intended for these therapeutic purposes may provide utility beyond this original design, for instance, to study the development of hypoxia in a tumor longitudinally or in response to treatment via in vivo imaging. While several such biosensors exist, they rely on endogenous signaling pathways that are dysregulated in many cancers and therefore may not be robust to the choice of cell type and therefore not easily portable between different contexts. **Objective:** To characterize DNA-based hypoxia biosensors, determine opportunities for improvement, and test whether genetic circuits targeting these can enhance performance. **Methods:** DNA encoding hypoxia biosensors was integrated into safe harbor loci via the Landing Pad system, in both the HEK293FT chassis line and the B16F10 murine melanoma line. After culture in hypoxic conditions, by flow cytometry we studied the effects of minimal promoter choice, responses to varying degrees of hypoxia, and the timing of the response. **Results:** Reliance on endogenous regulators of the hypoxic response limits the hypoxia-induced signal maximum. Genetic circuits that either relieve this limitation through positive feedback or avoid it by employing synthetic transcription factors increased hypoxia-induced signaling, without substantially increasing signal in the absence of hypoxia. **Conclusions:** Harnessing native signaling pathways for cell engineering can be limited by the availability of endogenous cellular resources. However, careful study of these limitations can identify opportunities for overcoming them. In this work, multiple genetic circuits functioned as high performing hypoxia biosensors that could be used for discovery, diagnostics, and therapeutics.

Profiling of Blood Transcriptome to Unravel Causal Pathways in Pediatric Septic Shock

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Background: Sepsis is a heterogenous disease which causes significant morbidity and mortality. In the U.S. alone, 7,000 lives are lost to pediatric sepsis annually. However, therapies other than antibiotics and intensive organ support have not proven to be efficacious. The Pediatric Sepsis Biomarker Risk Model (PERSEVERE)-II has been prospectively validated to identify children at high risk for mortality from sepsis. However, biological features distinguishing children at high risk for mortality from those at low risk remain unknown. A comprehensive assessment of this biology may inform development of targeted therapeutic interventions among at-risk patients. **Objective**: To determine differences in the blood transcriptome of children with septic shock stratified as high- or low-risk for 28-day mortality based on PERSEVERE-II biomarkers. **Methods**: We utilized day-1 blood samples from a multi-center prospective observational cohort of children with septic shock biobanked at CCHMC. Patients were assigned PERSEVERE-II mortality probability and stratified as having either a high or low risk for 28-day mortality. Bulk mRNA sequencing was performed and genes were mapped to the human reference genome. Differential expression of genes was determined using R package DESeq2 and a Benjamini-Hochberg adjusted p-value of < 0.001. We conducted cellular decomposition analysis using CIBERSORTx and biological pathway analysis using clusterProfiler. **Results**: 20,030 genes were identified for analysis from 81 samples; 23 samples were from patients with a high mortality-risk. We identified that 517 genes were overexpressed and 278 were under-expressed among high-risk patients (Figure 1). Biological pathway analyses revealed that high-risk patients were characterized by up-regulation of cell cycle-related genes and repression of genes involved in adaptive immune response activation (Figure 2). Cellular decomposition analyses revealed a lower percentage of mature neutrophils among high-risk patients relative to low-risk patients (35% vs. 46%), $p=0.006$ using a heteroscedastic two-tailed t-test. **Conclusions**: Patients with a high mortality risk based on PERSEVERE-II biomarkers are characterized by activation of the innate immune response, as represented by high cell turnover and a lower proportion of mature neutrophils, as well as by repression of the adaptive immune response. Multi-omic analyses are currently being utilized to unravel key molecular drivers of disease progression among high-risk patients.

Impact of Telehealth Care on Patient and Family Experience for Non-Urgent Complaints

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Background: Families seek medical care in pediatric emergency departments (EDs) and urgent cares (UCs) for a variety of non-urgent or emergent reasons. At the start of the COVID-19 pandemic, healthcare organizations rapidly increased access to care via digital solutions for non-acute complaints. Offering telehealth as a care alternative may impact patent and family experience (PFE) for individual patients and families who are seen in the virtual setting. **Objective:** To identify any associations between management location (virtual urgent care [VUC], UC, or ED) for non-emergent complaints and PFE. **Methods:** Retrospective cohort study of discharge encounters of patients with specific ICD-10 diagnoses (Appendix A) from VUC, five UCs and two EDs between July 1st, 2021, and June 30, 2022, in which a post-visit PFE survey was completed. Descriptive statistics of patient demographics and clinical parameters were generated. Univariate analysis of association between these factors and our key performance indicator (KPI) on the PFE post-visit survey was performed. Multivariable analysis was used to identify independent predictors of KPI. **Results:** 13299 patient encounters with relevant ICD-10 diagnoses occurred during the study period, 828 (6.2%) of which had post-visit PFE surveys and were included in the study (Table 1). In univariate analysis, VUC location, Hispanic ethnicity, no revisit within 72 hours, and shorter time to provider or encounter duration were associated with higher mean KPI scores (Table 2). In multivariant analysis Hispanic ethnicity, shorter encounter duration, and no revisit within 72 hours were independently associated with KPI score (Table 3). Patients presenting to VUC had less odds of revisit within 72 hrs. **Conclusions**: While location is not independently associated with PFE, experience in VUC is likely driven by the convenience of shorter encounter duration. Optimizing use of virtual visits may not only improve PFE, but could help reduce waiting room crowding in the ED and UC for low-risk patients without contributing to repeat visits.

Characterization of Children with Hemophagocytic Lymphohistiocytosis (HLH)

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Background: Hemophagocytic lymphohistiocytosis (HLH) is an immune dysregulation disorder that presents with nonspecific features of severe inflammation often seen in viral illness, rheumatologic diseases, and severe sepsis. Diagnostic criteria are based on enrollment criteria established for the HLH-2004 clinical trial despite their unknown sensitivity or specificity. **Objective**: This is a preliminary descriptive study to characterize patients with known HLH during their initial presentation to improve earlier provider recognition, limit misdiagnosis and therefore unnecessary exposure to toxic chemotherapy. **Methods**: Patients with genetically validated HLH were identified from a maintained central database of patients at Cincinnati Children's Hospital Medical Center. Initial, peak and nadir values of diagnostic measures and other commonly deranged variables in HLH patients were obtained by retrospective chart review within 14 days of presentation. Central tendency markers for these measures, and time to peak/nadir values from initial presentation were measured as relevant. **Results**: A total of 67 patients treated for confirmed HLH formed our patient cohort, 81% (54/67) of whom have genetic mutations known to cause HLH. The remaining 19% had indeterminate/ambiguous genetic mutations suspected to be associated with HLH. Average age at presentation was 3.9 years. The study population had a 25% (17/67) survival rate overall. Ferritin, triglyceride, soluble IL2 receptor (sIL2R), and fibrinogen followed right-skewed F-distributions at initial presentation, with medians of 2924 mcg/L, 233 mg/dL, 14487 units/mL, and 159 mg/dL, as compared to peak/nadir values of 7458 mcg/L, 301 mg/dL, 14440 units/mL, and 108 mg/dL respectively. Patients reached peak/nadir values for absolute neutrophil count, hemoglobin, platelet count, ferritin, fibrinogen, triglyceride and sIL2R between 3.54 and 4.45 days. 83% (33/40) of the patients with measured NK function had decreased or absent function, and 68% (41/60) of the patients with bone marrow aspirations during the admission had hemophagocytosis. 85% (51/60) of patients evaluated had documented splenomegaly during the admission. **Conclusions**: Diagnosis of HLH is often delayed due to variability in clinical presentation and similarity to other hyperinflammatory states. Future studies will compare this data to a large control group to better define specificity and sensitivity of current and novel criteria using receiver operating curves to optimize diagnostic thresholds.

The Association of Emergency Severity Index Score and Patient and Family Experience in a Pediatric Emergency Department

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Background: When a patient arrives at the Pediatric Emergency Department (PED), they are triaged using the Emergency Severity Index (ESI) system, which is a validated 5-level triage scale that applies a clinical assessment to the patient and assigns a triage level 1 to 5. Patient Family Experience (PFE) surveys are frequently given after PED visits asking families to rate their experience. PFE scores have been shown to be inversely related to wait times and door-to-room times. Given the connection between ESI and wait times, ESI scores may be correlated with PFE survey results. **Objective**: The study aim was to determine the relationship between a patient's ESI score and their or their family's response to the key performance indicator (KPI) question on the post-visit PFE survey. **Methods**: This is a retrospective cohort study of patient encounters resulting in discharge from two PEDs between July 1, 2021, and June 30, 2022, in which a PFE survey was completed after the visit. Data collected included: demographics, encounter specific information, and responses to the following prompts: How would you rate our facility (KPI)? How likely would you be to recommend our emergency department to friends or family? I/my child was seen in a timely manner. We also extracted whether a prescription was written at discharge, if any lab work was ordered, if any imaging studies were ordered, or if a procedure had been performed. Univariate analysis was performed on all candidate variables, and multivariable logistic regression determined independent associations with KPI. **Results**: 8136 patients were included in the study (Table 1). While ESI was associated with KPI in univariate analysis (Table 2), there was no independent association. However, we did find that clinical factors including abbreviated time to provider, shorter length of stay, and any procedure performance were independently associated with a more positive experience (Table 3). **Conclusions**: Although ESI triage score is not an independent predictor of experience, it is associated with variation in wait time and can be used as a proxy for these measures to design interventions aimed at improving the experience of patients and their families presenting to the PED.

Predictors of Celiac Disease in Patients with Type 1 Diabetes and Positive Tissue Transglutaminase IgA

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Background: The prevalence of celiac disease (CeD) is known to be higher among patients with Type I Diabetes Mellitus (T1DM) as compared to the general population. CeD is often diagnosed with initial serologic testing (tissue transglutaminase immunoglobulin A (TTG IgA) and endomysial antibody (EMA) tests) followed by a diagnostic endoscopic biopsy. In patients with T1DM, false positive abnormal TTG IgA results are not uncommon, and while EMA is highly specific for CeD in general, there is limited data in patients with T1DM. **Objective**: To identify clinical features and serological values that can more accurately predict biopsy-proven CeD diagnosis in children with T1DM. Specifically, this study focused on the predictive values of TTG IgA elevation and positive EMA dilution in predicting CeD diagnosis. **Methods**: We retrospectively reviewed pediatric patients with T1DM who underwent endoscopic evaluation for CeD between 2016 and 2022 at a single pediatric institution. We evaluated reported symptoms, demographic, anthropometric, and serologic data, and endoscopy findings, and compared those diagnosed with CeD to those who were not diagnosed with CeD. **Results**: Our retrospective study included 123 pediatric subjects with T1DM who underwent esophagogastroduodenoscopy, of which 74 (60%) were diagnosed with CeD. Univariate logistic regression analysis revealed the only factors associated with diagnosis of CeD were degree of TTG IgA elevation, EMA positivity, and degree of EMA dilution. For a 10-fold increase in TTG IgA, there was a 4.7x increased risk of CeD. TTG IgA value ≥10 times the upper limit of normal (ULN) provided a positive predictive value (PPV) of 85% in all subjects and 91% in asymptomatic subjects. Of 66 subjects with EMA data, 41 (62%) were positive and 32 had CeD (PPV = 0.78). Of 12 asymptomatic subjects with positive EMA, eight had CeD (PPV = 0.67). For subjects with EMA ≥ 1:80, all were diagnosed with CeD, and all had TTG IgA ≥ 10 times the ULN. **Conclusions**: In pediatric patients with T1DM, the degree of TTG IgA elevation and EMA dilution were predictive of CeD diagnosis, whereas presenting symptoms, anthropometric data, and additional labs were not found to be predictive.

Epidemiology of Invasive Fungal Disease in Pediatric B- Cell Acute Lymphoblastic Leukemia Patients

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Background: Pediatric patients with B-cell acute lymphoblastic leukemia (B-ALL) have increased risk of infections. Invasive fungal disease (IFD) is an important cause of morbidity and mortality in B-ALL patients. Data regarding the epidemiology of IFD in pediatric B-ALL patients is needed to inform prophylaxis strategies and empirical treatment decisions. **Objective**: Describe the epidemiology of IFD in children and young adults with de novo B-ALL treated at Cincinnati Children's Hospital Medical Center (CCHMC) from 1/1/2012-12/31/2022. **Methods**: Chart review was performed to identify children with IFD based on consensus definitions. Patients contributed data until they completed therapy, suffered relapse, or underwent stem cell transplantation. Cases were categorized as proven or probable IFD per the EORTC definition. Causative organisms and diagnostic information were collected in a REDCap database. Additional data collected included prophylaxis strategy, treatment, and outcomes for each episode. **Results**: A total of 8/250 (3.2%) developed 9 episodes of IFD during B-ALL treatment at CCHMC. There were no differences in age, sex, or overall outcomes between those with and without IFD. Four invasive mold infections occurred during induction (n=3) and consolidation (n=1). There were two infections involving yeasts that occurred during a blinotumomab block and the IB course of Interfant-06. Three cases of proven/probable *Pneumocystis jiroveci* pneumonia occurred during maintenance or continuation therapy. There were no IFD cases in interim maintenance or delayed intensification. The IFD incidence-rate was higher in induction therapy (0.37 cases/1000 patient-days) than consolidation (0.11/1000 patient-days) or maintenance chemotherapy (0.02/1000 patient-days). Of those with IFD, 5/9 (55.6%) were on antifungal prophylaxis at the onset of infection, and the infecting fungus was resistant to prophylaxis in 4/9 (44.4%) cases. All patients received treatment, and 1/12 (8.3%) died from their IFD. **Conclusions**: Invasive fungal disease was uncommon in this single-center cohort of pediatric ALL patients, but it occurred most often in patients receiving intensive chemotherapy courses such as induction or consolidation. In those courses, patients should receive mold-active prophylaxis, while prophylaxis against *Pneumocystis jiroveci* pneumonia should be considered for those receiving less-intensive cycles of therapy.

Recalibrating the Cardiac Renal Angina Index in Children Following Cardiac Surgery

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Background: Acute kidney injury (AKI) among critically ill children after cardiac surgery is associated with poor outcomes and remains challenging to predict. The cardiac renal angina index (cRAI) is a bedside predictive tool calculated early in the post-operative period. The cRAI on subsequent studies has performed poorly, necessitating need for recalibration. **Objectives**: We aimed to redefine renal angina using a proximal composite outcome following cardiac surgery, recalibrate the cRAI for prediction of the composite outcome, and evaluate cRAI performance after addition of urinary AKI biomarker – neutrophil gelatinase-associated lipocalin (NGAL). **Methods**: Two-center prospective observational study of children 0-18 years admitted to the Cardiac Intensive Care Unit (CICU) with NGAL measured 8-12 hours after surgery. The primary outcome was a composite of: Day 2-4 serum creatinine-defined AKI or mechanical ventilation (MV) ≥3 days. The cRAI was recalibrated (**Figure 1**) using significant variables on univariate analysis that are known to be associated with AKI. cRAI and NGAL predictive performances were compared. The NGAL cutoff of 125ng/mL was used based on the FDA-approved value. **Results**: Among 476 patients, 129 (27%) suffered the composite outcome. These patients were younger with higher surgical complexity, longer CICU stays, and higher mortality (**Table 1**). Of those who suffered the composite outcome, 44 (34%) experienced Day 2-4 AKI and 101 (78%) MV ≥3 days. The optimal cRAI cutoff was ≥6 (Youden's Index 0.35), with 341 patients (72%) being cRAI+. The cRAI predicted the composite outcome with an AUROC 0.74 (95%CI 0.69-0.78), sensitivity 0.97, specificity 0.38, PPV 0.37, and NPV 0.97. NGAL alone outperformed the cRAI in predicting the composite outcome (AUROC 0.81, 95%CI 0.76-0.85) p=0.012) (**Figure 2**). The addition of NGAL ≥125ng/mL to cRAI+ improved composite outcome prediction specificity to 0.89 (0.85-0.92) and PPV to 0.65 (0.56-0.74) with a mild decrease in NPV to 0.84 (0.80-0.88). **Conclusions**: The recalibrated cRAI has modest predictive performance for AKI and/or MV ≥3 days in children after cardiac surgery. The addition of NGAL ≥125ng/mL to cRAI+ improved specificity and PPV. Targeted NGAL evaluation in cRAI+ patients should be considered and tested to determine if it aids in clinical decision support.

Dysbiosis Alters Transcription Programs Within the Lung Mesenchyme after *Streptococcus Pneumoniae* Infection

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Background: The mouse lung mesenchyme is divided into three proximal-distal axes that are associated with the endothelium, epithelium and interstitium, respectively. From proximal to distal: the vascular axis includes vascular smooth muscle cells and pericytes; the epithelial axis includes airway smooth muscle cells and two populations of myofibroblasts – ductal myofibroblasts, surrounding alveolar ducts, and alveolar myofibroblasts, surrounding alveoli; the interstitial axis residing between the epithelial and vascular trees includes fibroblasts in the bronchovascular bundle and the alveolar region. We previously showed that lung resistance and resilience pathways are remodeled by commensal microbiota during the critical neonatal period, contributing to chronic respiratory disease beyond infancy. Nevertheless, a unifying framework explaining how early-life dysbiosis remodels the developmental program in lung mesenchymal cells and rewires the mesenchymal cell-immune cell communication remains unresolved. **Objective**: To study the effect of dysbiosis on the transcriptional program of the lung mesenchyme after challenge with *Streptococcus pneumoniae,* a common respiratory pathogen in infants. **Methods**: C57/BL6 WT pregnant dams were exposed at E15 to antibiotics vancomycin, gentamycin, and ampicillin. Litter mice were infected at P7 with bacteria *Streptococcus pneumoniae* and harvested at P14. Whole lungs were digested and sorted for single-cell RNA sequencing (scRNA-seq). Cellranger output data from scRNA-seq was analyzed using the three axes paradigm with bioinformatics, trajectory analysis and differential gene expression with R studio. **Results**: scRNAseq and trajectory analysis revealed distal interstitial cells (DIC) of infected and antibiotic-exposed mice were similar to DIC in controls: uninfected/unexposed and uninfected/antibiotic exposed. When compared to infected and antibiotic unexposed littermate, distal interstitial cells in infected and antibiotic-exposed mice downregulated innate immune response genes (*C2, C4b, C1ra, C3*) and upregulated smooth muscle cell genes (*Acta2, Myh11, Myh10*), commonly seen in myofibroblasts. **Conclusions**: These findings suggest that dysbiosis alters transcriptional programs within the lung mesenchyme after *Streptococcus pneumoniae* infection. Our preliminary data that suggests dysbiosis disrupts mesenchymal-cell mediated inflammatory response and promotes formation of myofibroblasts. Future directions of this research consist in visualizing these cells *in vivo*, spatial cellular characterization and genetic labeling of these DIC to evaluate their fate after dysbiosis.

Mobile Learning for Pediatric Residents in Cardiology Utilizing App-Based Education

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Background: Historically, traditional instructional methods in congenital heart disease (CHD) education (i.e. lectures, handouts) have demonstrated variable acquisition and mastery of knowledge. Congenital heart disease topics are a core area pediatric residents must develop facility with during their training. Mobile learning applications have emerged as a new modality in medical education that may enhance learning. **Objective:** We performed a feasibility and acceptability study using a mobile educational app, Heartpedia™ (HP), to assess its utility in improving CHD education. **Methods:** A cohort of first-year pediatrics residents were recruited at the beginning of their four-week cardiology rotation between July 2023 and February 2024. A pre-test and survey were administered along with a Heartpedia™ application tutorial in week 1 and a post-test and survey were administered at the conclusion of their rotation. These instruments and the lesion test rubric were developed and reviewed by two independent educational experts. Lesion tests were compared by the percentage change in score from pre to post testing. **Results:** A total of 36 residents completed pre-rotation instruments and 27 completed both. At baseline, 89 % of residents reported mobile applications use for their own or patient and family CHD education with 22% of residents having used the HP app for personal learning. Following the rotation, 63% of residents reported some (minutes to hours) use of the app with most using different features for 0-15 minutes. App use correlated with percentage change in lesion test score for the complex congenital lesion but not the simple lesion. Residents highlighted the 3-dimensional (3D) lesion images, 3D repair images and lesion description features as most useful with 63%, 52% and 41% respectively identifying these features. More than 80% of learners described the app as an acceptable resource for learners and families. **Conclusions:** The Heartpedia™ application was used by the majority of residents during their rotation. Commonly used features included: 3-dimensional lesion and repair images and lesion descriptions. Learners found the HP app was a feasible and acceptable educational resource during their rotation. Further study is warranted to compare the use of mobile learning applications to traditional methods for CHD education.

Needs-Based Assessment of Antimicrobial Stewardship Curriculums by Pediatric Infectious Diseases Fellowship Directors

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Background: Antimicrobial stewardship is a crucial aspect of a pediatric infectious diseases fellow's training in order to address the public health crisis of antimicrobial resistance. Given requirements and standards for antimicrobial stewardship programs, it is important to have proper pediatric infectious diseases physician leadership and direction within this area. While adult infectious diseases programs have noted an educational gap, there is minimal information known related to the status of antimicrobial stewardship fellowship education as a whole within pediatric infectious diseases. **Objective**: Our central hypothesis is that we will identify varying levels of education between programs, with an overall consensus for the need to develop a core antimicrobial stewardship curriculum. Our goal being to create a curriculum that will be tailored based on the results of this survey. **Methods**: A cross-sectional survey was created to address the current state of training and identity the current strengths and weakness in pediatric antimicrobial stewardship education. Overall, the survey assesses the presence of a curriculum, satisfaction with current training, current learning objectives and methods of implementation, and barriers. **Results**: 27 of 65 programs responded to the survey, with 63% of those that responded having a formal antimicrobial stewardship curriculum and all programs stating a standardized curriculum would be useful. There was a divergence of satisfaction of fellows' training and perceived fellows' ability to assume a leadership role in antimicrobial stewardship post training. Some notable gaps in education included psychosocial factors that influence prescribing, strategies for drug shortages, antibiotic timeouts, and antibiotic allergy assessments. The most common barrier programs identified was insufficient time from an educator standpoint. **Conclusions**: To address the educational gap, aspiring fellows in antimicrobial stewardship should allocate dedicated time for both practical experience and scholarly pursuits. Our results identified areas to improve, which will aid in our goal to create a curriculum that builds a foundation throughout fellowship and establishes the necessary career skills to become a successful antimicrobial steward. Future steps being collaboration between multiple programs to aid in the creation of a standardized antimicrobial stewardship curriculum.

Innovative Acute Care Allergy Service (ACAS) Provides Timely Specialist Evaluation and Management for Children Experiencing Antibiotic-Associated Reactions

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Background: Antibiotic-associated reactions (AARs) are a poorly understood constellation of cutaneous and systemic "allergic" symptoms that bring substantial concern to patients and families (Figure 1). AARs contribute to over 25% of emergency department/urgent care (ED/UC) adverse drug events with high rates of acute care reutilization -- up to 40% of infants will reutilize acute care a second or third time. Although experts in treating allergic reactions, allergists have historically not evaluated patients at the time of AARs. Early allergy specialist engagement could improve outcomes through consistent messaging and longitudinal management of the dynamic and concerning AAR symptoms over time. The creation of a first-in-kind allergy subspecialist service providing acute care for AARs could reduce ED/UC reutilization while also enhancing antibiotic allergy testing and delabeling. **Objective**: Review the AAR Acute Care Allergy Service (ACAS) quality by focusing on presenting symptoms, timely access, post-acute care utilization, and subsequent testing. **Methods**: Patients utilizing ACAS (Figure 2) were identified through an EMR antibiotic allergy flowsheet. Clinical data was collected at acute care appointments. For quality assessment, additional data was collected retrospectively via chart review. Primary outcomes included care utilization, treatment, and completion of allergy testing. **Results**: Seventy-six children (median 3.4 years; 54% female, Table 1) utilized ACAS for AARs from January 2020 through May 2023. Primary symptom was rash in 75 patients, with systemic symptoms in 59 patients (78%, Table 2). 26 patients (34%) initially utilized ED/UC care, with pre-ACAS treatment comprised of first-generation antihistamines (51, 67%), second-generation antihistamines (35, 46%), and systemic steroids (13, 17%). ACAS appointments occurred within two days (median) of AAR onset and under three hours (median) of referral. ACAS providers prescribed primarily second-generation H1 (71, 93%) and H2 (37, 49%) antihistamines. Only two patients (3%) reutilized ED/UC services. Other post-ACAS care included ACAS on-call (17, 22%) and primary care (5, 7%). Nearly half (35, 46%) have completed antibiotic testing. **Conclusions**: ACAS offers patients experiencing AARs rapid access to allergy subspecialty care, on-call follow up, and future antibiotic allergy testing. ACAS also provided uniform recommendations of non-sedating antihistamines, and children experienced low rates of ED/UC re-utilization.

Fetal Echocardiogram Findings in Infants with in Utero Renal Dysfunction

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Background: Severe forms of congenital anomalies of the kidney and urinary tract (CAKUT) are associated with significant morbidity and mortality, including pulmonary hypoplasia and renal dysfunction/failure. Children and adults with chronic kidney disease have a higher burden of cardiovascular disease related to the effects of cardiorenal syndrome (CRS). Little is known about the cardiovascular effects of renal dysfunction in utero and CRS in infants with CAKUT.
Objective: To describe the major fetal echocardiographic findings in CAKUT to facilitate prediction of cardiovascular instability in neonates. **Methods**: Retrospective cohort study of mother/infant dyads with prenatal diagnosis of isolated CAKUT evaluated in the Cincinnati Fetal Center (January 2010-June 2021). Data collected via chart review included fetal echocardiographic data, demographics, fetal interventions, and NICU course. **Results**: 102 infants (74% male) with CAKUT and at least one fetal echocardiogram were identified. Malformations included obstructive uropathies (49%), primary renal dysplasia (32%), and bilateral renal agenesis (20%). There was a mean gestational age (GA) of 33.9±3.9 weeks at birth and birth weight of 2.3±0.8 kg. 74% underwent fetal intervention: serial amnioinfusions (47%), bladder aspiration (24%), and vesicoamniotic shunt (15%) were most common. 45% survived beyond 7 days and 34% survived to NICU discharge or transfer, with median length of stay of 89 days (range 7-262) amongst survivors. Mechanical ventilation was common (59%), as was dialysis (27%). Cardiovascular instability occurred frequently; 33% required vasopressors and 32% required nitric oxide for pulmonary hypertension. Initial fetal echocardiogram was performed at average GA of 22.7±3.4 weeks. Major echocardiographic findings included right ventricular hypertrophy (38%), left ventricular hypertrophy (37%), tricuspid regurgitation (30%), pericardial effusion (12%), and abnormal ductus venosus flow pattern (10%). Mean cardiothoracic area ratio was normal at 0.37±0.06 and average umbilical artery pulsatility index was normal. The next steps are to compare echocardiographic findings amongst CAKUT types and correlate these findings to predict neonatal course. **Conclusions**: Infants with CAKUT require complex neonatal care, including pulmonary and cardiac support, potentially related to CRS. Fetal echocardiograms in CAKUT commonly exhibit findings of biventricular hypertrophy, tricuspid regurgitation, and pericardial effusion. Further studies are warranted to elucidate the effects of CRS in this population.

The Relationship of Handgrip to Body Composition and Cardiopulmonary Fitness in Children and Young Adults

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Background: Handgrip strength (HGS) is a quantitative measure of muscle function. It is non-invasive, inexpensive, and fast to obtain making it suitable to use at the bedside in routine clinical practice. The comparison between HGS and body composition via bioelectrical impedance (BIA) and cardiopulmonary fitness via cardiopulmonary exercise testing (CPET) has not been studied in children and young adults. **Objective:** The primary aims of our study are: i) to describe the HGS values in a large cohort of youth and young adults with normal cardiac anatomy; ii) to assess the relationship of HGS with markers of fitness on CPET and body composition assessed by BIA; and iii) to describe differences in HGS by sex.
Methods: A total of 2871 patients referred to our center's exercise laboratory for clinical CPET between January 2020 and June 2023 were reviewed. Following application of our inclusion/exclusion criteria there were 317 patients with complete data and presumably normal hearts that were included in the analysis. Each patient underwent HGS testing using a hydraulic hand dynamometer, BIA using InBody, and CPET using a cycle ergometer 10-minute ramp protocol.
Results: 317 patients with no diagnosed heart disease (age 15.1±2.4 years-old; 37% male) were included in our analysis. Dominant peak HGS was 28.3±9.2 kg. In comparing HGS with CPET and BIA, peak dominant HGS was correlated with skeletal muscle mass (SMM) ($r=0.77$, $p<0.0001$), right arm SMM ($r=0.76$, $p<0.0001$), peak oxygen consumption (VO2peak; ml/min) ($r= 0.67$, $p<0.0001$), and peak work rate ($r= 0.67$, $p<0.0001$). Peak dominant handgrip strength had a negative relationship with body fat percentage ($R= -0.19$, $p=0.008$) and was not related to body fat mass ($R=0.063$, $p<0.3$). At young ages, the HGS was similar between the sexes but diverged in the teenage years; however, when comparing the relationship between SMM and sex, there was no difference in HGS between male and female patients with similar SMM. **Conclusions:** Handgrip strength is associated with skeletal muscle mass, total work, and absolute measured VO_2peak, but not measures of adiposity. Sex based differences in HGS values occur in mid-teenage years, likely secondary to expectant pubertal changes.

Association Between Length of Stay and Changes in Home Support During Hospitalization Among Children with Medical Complexity

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Background: Hospitalization in children with medical complexity (CMC) can result in escalation of care needs requiring changes in home support. Obtaining home support resources to ensure safe discharge often takes time and may prolong length of stay (LOS), however this relationship remains unknown. **Objective:** To evaluate the association between changes in home support and prolonged LOS in CMC. **Methods:** This retrospective single center case-control study included children 0-21 years old with ≥2 chronic diseases identified using ICD-10 complex chronic conditions (CCC) classification discharged from hospital medicine between 2016-2022. We excluded children in foster care and those who died or required neonatal intensive care during hospitalization. The eligible cohort was categorized into cases (prolonged LOS: 90th-97.5th percentile of LOS or 14.08-40.96 days) and controls (shorter LOS: 25th-75th percentile of LOS or 1.86-6.91 days). They were matched on age, number of CCC, and admission timing. Primary exposure was change in home support (new or change in long term care facility, primary caregiver, or home nursing). We conducted logistic regression accounting for ICU admission during hospitalization, change in medical technology, and a measure of neighborhood socioeconomic deprivation (SDI). **Results:** Preliminary analysis included 200 encounters, with 67 cases and 133 controls. Odds of prolonged LOS was greater among those with ICU admission compared to no ICU admission (OR=7.4, $p<0.001$) and change in medical technology compared to no change (OR=3.3, $p<0.01$), while SDI did not significantly differ (0.33 vs. 0.32, $p=0.60$). Children with change in home support had 10.9 times the odds ($p=0.049$) of prolonged LOS compared to those without change in home support controlling for PICU admission, change in medical technology, and SDI. **Conclusions:** Preliminary analysis suggests change in home support level is associated with prolonged LOS among CMC while accounting for age, complexity, admission year, ICU, change in medical technology, and SDI. Our findings indicate that changes in support during hospitalization may prolong LOS, which increases healthcare costs, places additional financial and social stress on families, and may increase exposure to iatrogenic illness. If these findings hold in analysis of the full cohort, they suggest a need to optimize processes surrounding obtainment of home support resources for CMC.

Early-Life Community Material Deprivation is Associated with Decreased School-Age IQ in the HOME (Health Outcomes and Measurements of the Environment) Study

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Background: Optimizing a child's cognitive potential can positively influence long-term health outcomes. There are diverse environmental factors associated with a child's IQ, ranging from individual exposures to community-level effects. Prior work illustrates the role of socioeconomic status in mediating child IQ. However, few studies have examined the role of community disadvantage early in life in later cognition. Here, we investigate the association between a multi-variable measure of community material deprivation and child IQ. **Objective:** Examine the relationship between community deprivation index (CDI) at age 12 months and child full-scale intelligence quotient (FSIQ) at ages 5-12 years and explore modification of this association by socioeconomic factors. **Methods:** This study included 233 mother-child dyads from Greater Cincinnati enrolled in a longitudinal cohort from 2003-2006. CDI was calculated utilizing 2015 American Community Survey census-tract level variables characterizing community-level material deprivation, resulting in a score between 0 and 1. Higher CDI score indicates increased census tract deprivation. We modeled CDI as the exposure of interest and FSIQ as the outcome, using multivariable linear regression. Models were adjusted for sex, household income, maternal education, maternal prenatal vitamin use, mean gestational serum cotinine, and child blood lead concentration at 12 months. Mean serum cotinine represents levels at 16- and 26-weeks gestation. **Results:** Higher CDI score is significantly associated with decreased FSIQ. For every 0.1-unit increase in CDI score, there is an estimated loss of 1.8 FSIQ points (95% Confidence Interval: -3.3, -0.16) after adjusting for sex, household income, maternal education, maternal prenatal vitamin use, gestational serum cotinine, and child lead at age 12 months. There is significant effect modification by household income on the association of CDI with FSIQ (interaction p-value = 0.019). Additionally, maternal education modifies the effect of CDI on FSIQ. **Conclusions:** CDI in early childhood is negatively associated with IQ several years later, suggesting that there is a relationship between community-level characteristics and cognition even after adjusting for other individual- and household-level covariates associated with IQ. Further studies to investigate the effects of community-level factors on cognitive potential are necessary to better understand these outcomes and target public health efforts.

Clinical Impact of Bronchoscopy in Pediatric and Young Adult Oncology Patients with Suspected Respiratory Infections

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Background: Respiratory infections are a significant cause of morbidity and mortality in pediatric and young adult patients with malignancy. Bronchoscopy with bronchoalveolar lavage (BAL) is frequently utilized as part of the diagnostic process, but its clinical impact is not well defined. **Objective**: Determine the clinical impact of bronchoscopy for the evaluation of a suspected respiratory infection in pediatric and young adult patients with malignancy. **Methods**: A retrospective study at Cincinnati Children's Hospital Medical Center from 2013-2022 examined patients with active malignancy who underwent bronchoscopy, reporting clinical characteristics, bronchoscopy yield, adverse events, and clinical impact. Positive clinical impact was defined as a bronchoscopy that changed management or led to a new diagnosis explaining respiratory symptoms/imaging findings. Negative clinical impact occurred if bronchoscopy led to an adverse event, missed diagnosis, or unnecessary antimicrobial treatment. Repeat bronchoscopies within 28 days were excluded. Mixed-effects logistic regression was performed to identify factors associated with positive and negative clinical impact. **Results**: 145 bronchoscopies met inclusion criteria from 131 patients. The median patient age was 12 years (IQR 5-17) and the median duration of antibiotic treatment prior to bronchoscopy was 7.6 days (IQR 3.4-15.5). Hematologic malignancy (78.6%) was the most common underlying diagnosis in each episode. Respiratory symptoms occurred in 41.4% of episodes, while 44.1% had fever ≥ 38 C. 30.3% of bronchoscopies had a positive clinical impact with 17.2% leading to a new diagnosis, most commonly Pneumocystis jirovecii pneumonia (PJP) (7.6%) and aspergillosis (3.4%). Comparatively, 18.6% had a negative clinical impact, most commonly from a procedural complication (13.1%). Trimethoprim-sulfamethoxazole use (aOR 9.76, 95% CI 1.50-63.60) and respiratory symptoms (aOR 3.05, 95% CI 1.02-9.10) were associated with positive clinical impact. ICU-level care (aOR 19.9, 95% CI 3.84-103.14) and nasal cannula use (aOR 20.57, 5.17-81.88) were associated with negative clinical impact. **Conclusions**: Pediatric and young adult oncology patients with potential respiratory infections who have respiratory symptoms or are deemed high risk for PJP (and thus started on trimethoprim-sulfamethoxazole) are the most likely to benefit from bronchoscopy with BAL while care must be taken to weigh the potential risks of bronchoscopy in patients in the ICU on nasal cannula.

Using Group Model Building to Create a Systems Map for Child & Youth Thriving in Structurally Disadvantaged Neighborhood in Cincinnati, OH

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Background and Objective: The well-being of children and youth is influenced by a myriad of factors and the interactions among them over time. To inform efforts to improve the collective well-being of children and youth, we used the participatory method of group model building to elucidate and visualize the complex, dynamic system of factors that influences child and youth well-being in our city. **Methods.** We convened 12 adults with varied viewpoints, roles, and lived experiences with children and youth to create a causal loop diagram of the system that produces child and youth well-being. Through a series of facilitated activities, participants identified the factors that foster and/or undermine the well-being of children and youth living in one structurally disadvantaged neighborhood in our city. Participants then mapped the relationships among these factors and subsequently identified potential leverage points for actionable focus to improve child and youth well-being. **Results.** The group identified 43 factors from which they generated a causal loop diagram that demonstrates complex dynamics in the education system, environmental conditions, family factors, health and social care policy, interpersonal skills, physical and mental health, self-awareness, and social connectedness. The group then identified 10 potential leverage points from which they selected three key leverage points to prioritize for action. **Discussion.** Community-based group model building allowed a diverse set of perspectives to engage in systems thinking, generate a shared understanding of the system of factors that influence child and youth well-being, and identify leverage points for action to improve collective well-being. The resultant map provides a foundation for the generation of systemic action to improve the well-being of children and youth.

Additional Submitted Abstracts

IN ALPHABETICAL ORDER BY RESIDENT AUTHOR(S)

Association Between HLA Typing and Celiac Disease Prevalence in Patients with Turner Syndrome
Rosario Alarcon, MD — Categorical Pediatrics, PGY-2

The Contribution of Dietary Composition Over 25 Years to Cardiovascular Risk Factors in Childhood and Adulthood: The Princeton Lipid Research Study
Leah Beck, MD — Categorical Pediatrics, PGY-1

Association Between Genetic Variants of Peroxisome Proliferator-Activated Receptors and Clinical Outcomes in Pediatric Septic Shock
Valentina Bonnefil, DO — Categorical Pediatrics, PGY-2

Patterns in Follow Up After an Elevated PHQ-9 Among Patients Enrolled in HealthVine
Samuel Eggers, MD — Pediatrics/Triple Board, PGY-2

Shining a TORCH on a Case of Blueberry Muffin Rash in a Newborn Infant
Anisha Gopu-Gilboy, MD — Categorical Pediatrics, PGY-3

Post-Transplant EBV+ Smooth Muscle Tumors in Children, Adolescents and Young Adults- a Multi-Institution Experience
Meghan Haney, MD, PhD — Categorical Pediatrics, PGY-2

Incidence and Impact of Vitamin D Insufficiency in Patients With HLH
Jennifer Jess, MD — Categorical Pediatrics, PGY-2

Assessment of Current Practices to Determine Ventricular Septal Defect Size and Proposal of Standardized Sizes to Guide Management
Sara Kennedy, MD, MS — Categorical Pediatrics, PGY-2

Clinical Presentation and Factors Associated with Gluten Exposure in Children with Celiac Disease
Andrew Krueger, MD — Categorical Pediatrics, PGY-1

Mechanical Chest Compression Devices in Pediatric Patients — Prehospital Use and Implications
Emily Labudde, MD — Categorical Pediatrics, PGY-3

Perinatal Antibiotics Compromise Lung Epithelial Rpair Following Viral Injury
Kristin Lambert, MD, PhD — Categorical Pediatrics, PGY-3

Sustaining Hope in the Chaos: A Scoping Review of Interventions Targeting Compassion Fatigue in U.S. Physicians
Tracy Li, MD, MPH, MA — Categorical Pediatrics, PGY-1

Single-HLA Expressing Cell Line Screened Virus Specific T-cells (SAL-VSTs) Demonstrate Clinical Efficacy Against Viremia and Invasive Disease, Despite Low HLA Concordance
Daniel Lichtenstein, MD — Medicine/Pediatrics, PGY-3

Resident Communication Practices during Interpreter-Mediated Family-Centered Rounds
Liezelle Lopez, MD, MPH — Categorical Pediatrics, PGY-3

Retrospective Review of Catheter Fibrin Sheath Development in Patients with Intrathecal Baclofen Pumps
Joseph Quinlan, DO —Pediatrics/PM&R, PGY-3

Outcomes Related to Continuous Glucose Monitor Start at Diabetes Diagnosis
Sarah Rachal, MD, MPH — Categorical Pediatrics, PGY-3

Systems Analysis of Influenza Vaccine Response in Chronic Dialysis Patients
Carol Rowley, MD, PhD — Categorical Pediatrics, PGY-2

A Framework for Identifying and Addressing Health Disparities in the Use of Immunotherapy for Relapsed/Refractory B-cell Acute Lymphoblastic Leukemia
Aron Stark, MD, MA — Categorical Pediatrics, PGY-3

Prediction of Cardiac Surgery Associated Acute Kidney Injury Using Response to Loop Diuretic and Urine Neutrophil Gelatinase Associated Lipocalin
Emily Sullivan, MD — Categorical Pediatrics, PGY-3

Association Between HLA Typing and Celiac Disease Prevalence in Patients with Turner Syndrome

Rosario Alarcon, MD; Iris Gutmark-Little, MD

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Background: Patients with Turner Syndrome (TS) are at higher risk for various comorbid diseases, such as celiac disease (CD). Patients with TS are 2-5 times higher risk to develop CD compared to the general population, with the risk increasing with age in childhood. Current recommendations for children with TS include screening for CD starting at 2-3 years of age, and then every 2 years until adulthood. However, there is limited evidence regarding celiac disease onset, natural history, and risk factors in patients with Turner syndrome. HLA typing has been previously utilized as an accurate first-line screen for CD in high-risk groups. While positive HLA typing does not confirm diagnosis of CD, those who are HLA-DQ2 or HLA-DQ8 negative are highly unlikely to develop CD. The most recent 2020 ESPGHAN guidelines no longer recommend universal testing for HLA typing in at-risk groups, but instead, that further studies need to be done which assess for the utility of HLA typing in specific groups that are considered high risk. The utility of HLA typing has not been previously studied in pediatric patients with Turner syndrome in the United States, and the association and predictive value of HLA typing and CD in pediatric patients with Turner syndrome is not well-established. **Objective:** To determine the association between HLA typing and CD in patients with TS in the existing IRB-approved Turner syndrome database. We will determine the percentage of participants with each of the HLA risk alleles among TS Patients with and without celiac disease, and determine the prevalence of risk factors among patients with and without celiac disease. Will also evaluate for celiac disease onset in the TS population. **Methods:** Retrospective cross-sectional pilot study using existing data from the IRB-approved Turner syndrome database. Will analyze data from patients with TS who have been diagnosed with CD and have had prior HLA testing. Chart review will include TTG levels, endoscopy results, clinical gastroenterology and endocrine documentation. Data will be analyzed for statistically significant differences in percentages of HLA types and risk factors in patients with and without CD. This will be evaluated using non-parametric testing (Wilcoxon Rank Sum test for continuous variables and Fishers Exact test for categorical variables) as we expect small samples sizes. **Results:** Currently undergoing data analysis of existing data from TS database. Also performing chart review to assess for celiac disease, endoscopy results, other autoimmune diagnoses, or new HLA typing results. **Conclusions:** Awaiting preliminary results to analyze association between HLA typing and risk of developing celiac disease in Turner syndrome population. Will also use these results to inform age range and follow up of patients for larger cohort study.

The Contribution of Dietary Composition Over 25 Years to Cardiovascular Risk Factors in Childhood and Adulthood: The Princeton Lipid Research Study

Leah Beck, MD; Jessica Woo, MHSA, PhD

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Background: Diet is a contributing factor to cardiovascular disease risk and is the basis for dietary guidelines such as the Dietary Approaches to Stop Hypertension (DASH) eating plan. However, little is known about how childhood dietary habits are maintained into adulthood or how longitudinal changes in diet may influence disease risk. **Objective:** Our goal was to examine the relationship between diet quality, cardiovascular disease risk, and changes in diet quality over time. We hypothesized that diets lacking in nutrients for ideal cardiovascular health would be conserved from childhood to adulthood. This would be reflected as increased rates of diabetes, hypertension, dyslipidemia, and obesity. **Methods:** Diet data was analyzed from the Princeton Lipid Research study (24-hour recall in the 70's; Block Food Frequency Questionnaire in 1998). Diet quality at each visit was assessed as a ranking of 12 key macro/micronutrients and by a modified DASH index based on 9 nutrient targets and adapted for children. Outcomes in both childhood and adulthood included: diabetes, hypertension, hyperlipidemia, and obesity. Linear and logistic regression models were performed with adjustment for age, race, sex, and BMI. **Results:** Analysis included 221 individuals in Generation 1 (parents at initial visit; 39% male, mean age 38.9 ± 6.5 followed up at 66.6 ± 6.6 years) and 606 individuals in Generation 2 (45% male, mean age 11.9 ± 3.2 at initial visit and 38.5 ± 3.6 years at follow up). Parents increased in total DASH score from Baseline to Follow-up (1.4 ± 1.0 → 2.1 ± 1.3) while offspring remained consistent (1.6 ± 0.9 → 1.6 ± 1.1). Overall, DASH score was not significantly associated with baseline or follow up outcomes in childhood or adulthood. Of the micronutrients examined, saturated fat and total fat intake were associated with increased rates of diabetes in the parental generation at follow-up, while iron intake was inversely associated with HTN in offspring at follow-up. **Conclusions:** Overall diet quality was poor in both generations and changed little over time. No relationship was detected between DASH diet accordance and disease outcomes, however certain nutrients are associated with and may contribute to higher cardiovascular disease risk.

Association Between Genetic Variants of Peroxisome Proliferator-Activated Receptors and Clinical Outcomes in Pediatric Septic Shock

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Background: Pediatric septic shock remains a major public health challenge associated with high morbidity and mortality. Yet, therapeutic interventions remain limited to antibiotics and intensive care. Despite over 120 clinical trials, no new therapies have been proven to be efficacious among patients. An incomplete understanding of disease pathobiology coupled with heterogeneity among patients continue to impede scientific progress. Peroxisome-proliferator activated receptors (PPAR) are nuclear receptors with key roles in linking inflammation, metabolic state, and cellular fate. Thus, targeted modulation of PPAR pathway signaling may hold potential to improve sepsis outcomes. **Objective**: We hypothesized that missense genetic variants in PPARs would be independently associated with increased risk of complicated course among children with septic shock. **Methods**: Biobanked DNA from a multi-center prospective observational cohort of pediatric septic shock were used. We performed TaqMan qualitative genotyping of two single nucleotide polymorphisms (SNPs) of PPARα (rs4253778 and rs1800206) and PPARγ (rs10865710 and rs1801282) each with a minor allelic frequency >5% and determined that SNPs were in Hardy Weinberg equilibrium. We performed logistic regression analyses to test whether SNPs were associated with complicated course, defined as death by or presence of ≥ 2 organ dysfunctions on day 7 of septic shock, upon adjusting for age, co-morbidity, and illness severity at illness onset. **Results**: Among 127 patients (median age of 4.6 years) genotyped in the pilot phase of the study 25 patients (19.7%) had a complicated course. The adjusted odds of complicated course among patients carrying a single mutant of PPARγ SNP rs10865710 was 3.42 (1.2, 10.2), p=0.027, relative to the wildtype. Those that carried two mutants had an adjOR of 15.5 (1.2, 208.3), p=0.039 relative to the wildtype. None of the SNPs of PPARα met statistical significance in these preliminary analyses. **Conclusions**: Our data indicate the independent influence of PPARγ SNP (rs10865710) on increased risk of patient outcomes in pediatric septic shock. Pending mechanistic validation, targeted use of commercially available PPAR γ agonists, i.e. thiazolidinediones, among at-risk patients based on genotype may hold potential to improve pediatric septic shock outcomes.

Patterns in Follow Up After an Elevated PHQ-9 Among Patients Enrolled in HealthVine

Samuel Eggers, MD, MPH; Landon Krantz, MD; William Brinkman, MD, Med,, MSc

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Background: The Patient Health Questionnaire (PHQ-9) is a validated depression screening tool for adolescents. Cincinnati Children's primary care is working to improve 30-day follow-up for adolescents after elevated PHQ-9's as recommended in national guidelines. To enhance these efforts, it is important to identify patient-level factors associated with follow up patterns. **Objective**: Describe demographic and clinical differences between adolescents who follow up as recommended within 30 days of an elevated PHQ-9 score compared to those who do not. **Methods**: We performed a retrospective cohort study using visit data from six primary care clinics between July 2021 and December 2023 where a PHQ-9 was administered and elevated (≥ 10) or a patient answered "yes" to question #9 regarding suicidality. We included patients enrolled in HealthVine with claims data available in the electronic health record so both internal and external follow up could be ascertained. We calculated descriptive statistics and used independent samples two-tailed t-test and chi-squared analyses to compare the follow up and no follow up groups. **Results**: 455 unique patients had an elevated PHQ-9 at a total of 550 encounters. Overall, patients were 14.3 ± 1.7 years old, 76.5% Black, and 68.7% female. 234 encounters (42.5%) had a documented follow-up within 30 days. 50 of these encounters (21.4%) were with an external behavioral health agency. The groups differed significantly in racial composition, with a higher proportion of Black patients in the no follow up group (80.6%) compared to the follow up group (71%, p=0.03). The groups did not differ significantly in patient age (p=0.68) or gender (p=0.34). The mean PHQ-9 score was significantly higher in the follow up group (13.7 ± 4.8) compared to the no follow up group (12.6 ± 4.6, p=0.01). The groups did not differ on suicidality (follow up = 56.8%, no follow-up = 52.2%, p=0.28). **Conclusions**: Adolescents who completed recommended follow up were more likely to report higher depressive symptom burden on the PHQ-9. Black adolescents were overrepresented in the no follow up group. These findings highlight important areas for further investigation, collaboration and intervention as efforts continue to improve mental health care for adolescents.

Shining a TORCH on a Case of Blueberry Muffin Rash in a Newborn Infant

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Introduction: Blueberry muffin rash in the neonatal period has a broad differential including infection, blood dyscrasias, and malignancy. Neonatal leukemia is an uncommon presentation of blueberry muffin rash and accounts for less than 1% of all childhood leukemias. *KMT2A*r is the most common genetic abnormality seen in infants with leukemia, occurring in 75% of infants with ALL and 50% of those with AML, and is considered a high-risk lesion. Hyperleukocytosis (WBC >100 x 10^3/mcL) is the most consistent hematologic feature associated with neonatal leukemia and can cause respiratory distress, hypoxia, acidosis, cardiac and renal failure. Congenital myeloid leukemia has a poor prognosis, with 5-year overall survival rates around 50%. Treatment of neonatal and infantile AML consists of intensive anthracycline and cytarabine-based chemotherapy regimens. **Case Description**: This is a case describing a full-term female infant born via Cesarian section who presented with hepatosplenomegaly and diffuse rash resembling a blueberry muffin rash. Infant's laboratory evaluation on admission was significant for pancytopenia, severe neutropenia, unconjugated hyperbilirubinemia. Infectious testing was unrevealing and negative. Diagnosis of congenital AML was made by skin biopsy of a nodule showing evidence of leukemia cutis and *KMT2A*- rearrangement (*KMT2Ar*; 11q23.3) on FISH. Notably, this patient had pancytopenia which is atypical from the more common presentation of hyperleukocytosis seen in AML. Unfortunately, she developed rapidly progressive AML and passed away at 3 months of age due to central nervous system involvement of leukemia. **Discussion**: Blueberry muffin rash does not always indicate a TORCH infection. It is important to consider a broad differential diagnosis, including malignant conditions such as congenital leukemia. Prompt biopsy of the skin lesions may be required to make a diagnosis. The most common genetic mutation seen in infant AML is *KMT2A*r, which is typically associated with hyperleukocytosis and extramedullary involvement, especially skin and CNS. As is seen with older children, pancytopenia may be the initial presentation of leukemia in infants as well. **Conclusion**: This case highlights a unique presentation of a rare diagnosis with high infant mortality associated with blueberry muffin rash requiring early recognition for prompt treatment and appropriate prognostic counseling for families.

Post-Transplant EBV+ Smooth Muscle Tumors in Children, Adolescents and Young Adults- a Multi-Institution Experience

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Background: Epstein-Barr Virus (EBV) positive smooth muscle tumors (SMTs) are an extremely rare group of tumors found in immunocompromised or post-transplant patients. These tumors can occur in patients after transplantation of either solid organs (SOT) or hematopoietic stem cells (HSCT). In most cases, EBV remains in a latent phase in the body. However, in some immunocompromised patients, the virus can trigger uncontrolled proliferation of smooth muscle cells, resulting in EBV-SMTs. With the rare incidence of EBV-SMTs, there is no clear consensus around how they should be treated. Instead, patients are treated on a case-by-case basis and only a few small case-report studies exist on treatment of EBV-SMTs. Current treatment regimens include: anti-retroviral treatment, reduction in immunosuppression, surgical resection, chemo and/or radiation, or viral-specific T-cells (VSTs). The use of VSTs engineered to eradicate EBV infected cells has seen increasing use at our institution and a few other academic institutions. **Objective**: The objective of our study is to evaluate experiences across multiple centers with the risk factors, screening measures, diagnoses, treatment, and outcomes of children and AYA with EBV-SMTs. **Methods**: Subjects 0-41 years of age who received a SOT or HSCT with the subsequent diagnosis of EBV-SMT and were evaluated at any of the participating sites will be included in the data collection and analysis. This study is a retrospective chart review looking at patient characteristics, treatment modality, toxicities and clinical outcomes. **Results**: At this time data is still being collected from the multiple sites involved in the study. Preliminary data from 3 of the 5 sites being studied with n=7 total patients shows that the majority of patients treated for EBV-SMTs were cardiac transplant patients with EBV positive donor organs in EBV negative recipients. The average time to diagnosis was 37 months after transplantation. **Conclusions**: From our preliminary data, we can conclude that EBV SMTs are rare complications of SOT and HSCT and still need further characterization and analysis of treatment response. We are awaiting further data collection and submission from 2 additional sites at this time before comparing treatment regimens and drawing further conclusions.

Incidence and Impact of Vitamin D Insufficiency in Patients With HLH

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Background: Vitamin D insufficiency in patients undergoing hematopoietic stem cell transplant (HSCT) is associated with worse outcomes. Patients with hemophagocytic lymphohistiocytosis (HLH) appear to have more severe Vitamin D insufficiency than other pre-HSCT populations. **Objective**: We aim to characterize the incidence and impact of Vitamin D insufficiency in patients with HLH. Additionally, we'll explore the impact of high dose (Stoss dosing) versus maintenance repletion therapy on ability to maintain adequate vitamin D levels post-HSCT and assess effects of each method on complications and outcomes. **Methods**: A database of patients treated for HLH at CCHMC will be compiled via the BMI Data Services team and manual chart review. Patients with a diagnosis of HLH evaluated at CCHMC from 2010 to 2021 will be included. Type of HLH therapies received, including cumulative corticosteroid exposure, multiple lab parameters including inflammatory markers, calcium levels, vitamin D and vitamin A levels at pre-determined time points, and post-transplant outcomes will be recorded. Vitamin D supplementation received before and after transplant, dosing regimen (Stoss and/or maintenance), and length of exposure to supplementation will be assessed. Comparative data will be collected for non-HLH patients undergoing HSCT at CCHMC during this period. **Results**: We have identified 296 potential patients with and without HLH who underwent HSCT at CCHMC Although initial data analysis is pending, we hypothesize that those with a diagnosis of HLH will have higher rates of vitamin D insufficiency compared to those undergoing HSCT for other causes, and that within the HLH cohort, higher cumulative steroid exposure may correlate with worse vitamin D insufficiency. We further hypothesize that patients receiving high-dose vitamin D therapy (Stoss dosing) will maintain adequate levels of vitamin D longer than those on standard maintenance therapy after HSCT, potentially leading to a lower incidence of HSCT-complications and improved survival rates. **Conclusions**: HLH patients almost invariably develop vitamin D deficiency, likely exacerbated by steroid exposure. Inadequate repletion potentially contributes to poorer outcomes. Focused research specifically on HLH patients is expected to yield insights that will alter clinical practices and enhance outcomes for this specific population.

Assessment of Current Practices to Determine Ventricular Septal Defect Size and Proposal of Standardized Sizes to Guide Management

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Background: Ventricular septal defects (VSDs) are the most common congenital heart lesion and have a prevalence of 4 in 1000 live births. Despite their frequency, there is variation in practice in classification and management. For example, there are no standardized measurement guidelines for classifying VSD size as small, moderate, or large. Management of a VSD may be medical or surgical based on its size and hemodynamic impact. **Objective:** To evaluate variation in practice in VSD classification by creating a library of echocardiogram images from select Cincinnati Children's Hospital patients with a diagnosed VSD. This library of images and studies will be reviewed by pediatric cardiologists at various institutions and each VSD will be sized. Variability in classification across reviewers will be assessed. Additionally, best practices in classifying VSD size by defining cutoff values for VSD measurements that require observation only, medical management or surgical closure will be determined. **Methods**: A library of echocardiogram images from approximately 10 CCHMC patients with an isolated VSD will be created. This library of 8-10 images per case will be created by embedding de-identified AVI echo clips into a PowerPoint. This will then be distributed to pediatric cardiology imaging faculty and pediatric cardiology fellows at various institutions who will review the images and provide their VSD classification. Variability in VSD measurements will then be assessed using intraclass correlation coefficients and Kendall's rank order correlation. The second component of the study, to establish VSD size cutoff values that correlate with management options (observation only versus medical management only versus surgical management), will be done by retrospective chart review. **Results and Conclusions**: Pending echocardiogram image library finalization, distribution to pediatric cardiology imaging faculty and fellow, and data analysis.

Clinical Presentation and Factors Associated with Gluten Exposure in Children with Celiac Disease

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Background: While the prevalence of celiac disease (CeD) is increasing, it remains underdiagnosed, likely due to variability in patient presentation. Diagnostic criteria are evolving, and strict gluten-free diet adherence is challenging for many. **Objective**: Utilizing a large cohort of pediatric patients, we attempted to 1) characterize the clinical presentation (including demographic and anthropometric data, presenting symptoms, comorbid conditions, and serologic findings) of CeD and 2) identify patient factors associated with adherence to a gluten-free diet. **Methods**: This retrospective study included pediatric patients with CeD aged 0-18 from eleven United States medical centers. Electronic health records were reviewed in a standardized manner by trained reviewers, and parents completed surveys regarding their child's adherence to a gluten-free diet. We characterized the clinical presentation of CeD utilizing descriptive statistics while logistic regression analyses were performed to identify risk factors associated with gluten exposure. **Results**: 460 children with a median age of 6.4 years (range 1-16.2) were included in the study. The median BMI z-score was -0.1 with a normal distribution. Abdominal pain was the most reported symptom (57%), but other symptoms were common, including weight loss/poor weight gain (30%) and constipation (30%). Parental surveys regarding gluten-free diet adherence were completed for 455 participants, of which 65 (14%) were classified as high-risk for gluten exposure given reported weekly or daily gluten exposure or intentional gluten ingestion within the last year. Participants less than five years old had a lower risk of gluten exposure while participants without repeat serology eighteen months after diagnosis (serving as a proxy for follow-up) were at higher risk of gluten exposure. The method of diagnosis (specifically, whether a diagnostic biopsy was utilized), history of visiting a dietician, and the presence or absence of symptoms at diagnosis were not significant predictors of gluten exposure risk. **Conclusions**: In a large, multicenter cohort of CeD patients, clinical presentation is highly variable, necessitating a high index of suspicion to make a diagnosis. Parent surveys indicate 14% of patients are at high risk of gluten exposure, and patient age and indicators suggesting lack of follow-up are predictive of gluten-free adherence.

Mechanical Chest Compression Devices in Pediatric Patients – Prehospital Use and Implications

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Background: Mechanical chest compression (MCC) devices are commonly used to facilitate chest compressions in adults with out-of-hospital cardiac arrest (OHCA). The advantages of MCC device use include freeing emergency medical services (EMS) clinicians and other responders from the "compressor" role to perform other critical tasks and decreasing risk of infectious exposure during manual chest compressions. There are few studies on the use of MCC devices in children, namely case reports and simulation-based studies with limited generalizability. Manufacturer guidelines for MCC devices do not provide pediatric-specific recommendations or settings, i.e. compression-to-ventilation ratios or compression depth. Despite this, MCC devices are being used in pediatric-aged patients, especially if the patient appears "adult-sized." **Objectives**: The aims of this study are to describe the use of MCC devices in children with OHCA using a national cardiac arrest database and to assess impacts on pediatric patient outcomes. **Methods**: We will perform a retrospective cohort study of children (1-18 years) with OHCA using the ESO database. The main study outcome will be use of MCC devices in children with OHCA. Secondary outcomes will be return of spontaneous circulation (ROSC) and patient survival, including neurologically favorable survival. We will perform descriptive analyses of MCC use over time and compare cardiopulmonary resuscitation and patient outcomes for MCC versus manual compressions. We will tabulate summaries and test the association between MCC device use and factors of interest. **Results/Conclusion**: Pending at time of submission.

Perinatal Antibiotics Compromise Lung Epithelial Rpair Following Viral Injury

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Background: Infants with early life exposures to antibiotics have greater susceptibility to respiratory infections. A significant proportion of infants are exposed to antibiotics as a routine part of the birthing process. However, the exact biologic costs and consequences of fetal dysbiosis from antibiotics are not yet understood. Our group has previously demonstrated that perinatal antibiotics interrupt the maturation of intestinal commensal bacteria and, as a consequence, perturb the pulmonary immune system in infant mice. Infant mice exposed to antibiotics experience non-resolving lung inflammation and dysfunctional repair of the alveolar-capillary barrier after viral infection. Alveolar type 2 (AT2) cells are critical players in lung homeostasis and enable regeneration after injury by proliferating and differentiating into new alveolar type 1 (AT1) cells . We hypothesized that early life antibiotics disrupt repair of the lung epithelium after viral insult due to delays in transition between alveolar type 2 (AT2) to alveolar type 1 (AT1) cells. **Objective**: Determine mechanisms by which AT2 differentiation is altered following influenza-induced lung injury in individuals exposed to early life antibiotics. **Methods**: Pregnant mouse dams were treated with ampicillin, the most commonly used antibiotic in pregnant women and human newborns, beginning 5 days before delivery and discontinued upon birth. Antibiotic exposed or control infant mice were then challenged postnatally (day of life 14) with a sublethal dose of murine-adapted influenza A H1N1 strain-PR8. To investigate our hypothesis that delayed airway repair and regeneration after IAV is a result of stalled AT2-to-AT1 differentiation, we utilized ABX-exposed or ABX-free $Sftpc^{CreERT2}R26^{YFP}$ animals to track AT2 cell differentiation. Populations of AT1 and AT2 cells were quantified via spectral flow cytometry. AT2 cells were also tracked and visualized with immunofluorescence. **Results**: The frequency of AT2-derived AT1 cells was significantly decreased in ABX-exposed infant mice as quantified by flow cytometry. Data and statistical analysis is ongoing. **Conclusions**: Antibiotic exposure mimicking current clinical practices disrupts AT2-AT1 transition, resulting in impaired regeneration and delayed recovery from influenza A. Insult during infancy to the developing gut microbiota- lung axis from antibiotic exposure permanently alters pulmonary health beyond infancy.

Sustaining Hope in the Chaos: A Scoping Review of Interventions Targeting Compassion Fatigue in U.S. Physicians

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Background: Compassion fatigue, an often-misused term, is the emotional/physical exhaustion from strenuous work conditions and traumatic experiences. Burnout is due to organizational demands, while secondary traumatic stress results from working with trauma. This study concurs with compassion fatigue as encompassing burnout and secondary traumatic stress, which captures the stressors physicians face from administrative burdens and challenging patient encounters. Post pandemic studies in physicians have shown increasing levels of compassion fatigue, burnout rates up to 60%, and suicide rates up to 130% higher than the general population. The U.S. healthcare system has unique pressures; this is the first review to compile compassion fatigue interventions focusing on U.S. physicians. **Objective**: Conduct a scoping review of compassion fatigue intervention research in U.S. physicians. Guide implementation of compassion fatigue interventions and areas for research. **Methods**: We used Arksey and O'Malley's framework and created search terms in Pubmed to extract compassion fatigue interventions that were published after 2011, conducted in the U.S., and primarily studied physicians. After title/abstract and full text screening, the articles were sorted into categories and put into a table that outlined the findings and limitations. **Results**: The initial search yielded 2376 articles, which were reduced to 23. Of the articles that recorded demographics, the majority were white females practicing internal medicine. Even though we searched for compassion fatigue, many articles were burnout interventions, showing the lack of construct validity. Only 2 articles focused on compassion fatigue interventions. The most effective interventions were in mindfulness (k=4), coaching and mentorship (k=3), organizational load changes (k=2), education/skills workshops (k=3), self-care (k=1), and mixed methods (k=1). The study limitations were the small number of studies, lack of control groups, and limited long-term follow-up. **Conclusions**: This study characterizes the existing compassion fatigue interventions in U.S. physicians. This review shows the lack of construct validity around compassion fatigue/burnout/secondary trauma which harms our ability to create effective interventions. There is need to improve the methodological rigor of these studies and to study a greater diversity of physician demographics. This study highlights the types and structures of interventions we can implement and the eed to invest in the wellbeing of our physicians and patients.

Single-HLA Expressing Cell Line Screened Virus Specific T-cells (SAL-VSTs) Demonstrate Clinical Efficacy Against Viremia and Invasive Disease, Despite Low HLA Concordance

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Background: Viral infections cause significant morbidity and mortality in immunocompromised populations. Virus specific T-cells (VSTs) effectively treat CMV/EBV/BK/ADV infections following hematopoietic stem cell transplant (HSCT). Early studies suggested a high degree of HLA-concordance was essential to third party (TP)-VST efficacy. However, recent studies demonstrated similar outcomes between donor derived- (DD-) and TP-VSTs despite disparate HLA concordance. Degree of HLA-match often guides TP-VST selection; however, this does not directly assess response to viral antigens, and thus may be a suboptimal approach. Single HLA-expressing cell lines (SALs) loaded with viral peptide can be co-cultured with VSTs to objectively measure HLA restriction. **Objective**: To assess if using SAL screening of VSTs (SAL-VSTs) to inform product selection improves clinical outcomes compared to historical controls at CCHMC. **Methods**: All HSCT recipients who received SAL-VSTs at CCHMC were analyzed. Clinical response was determined as previously described for viremia, and as recorded by clinician assessment per study protocol (ClinicalTrials.gov NCT02532452) for invasive disease (ID). **Results**: Twenty infusions for 9 patients were analyzed. Two subjects had multiple infusions with the same product. Median age was 10 years (range 1-70). Patients were infused for: viremia (n=4), ID (n=2), both viremia and ID (n=3). Of 7 patients infused for viremia, 6 had objective response (OR) (86%). Of 5 patients infused for ID, 5 responded (100%). 9/9 patients had overall clinical response (OCR) to either viremia or ID (100%). HLA typing was reviewed for all patients, and median number of HLA matches was 2/10 (range 2-8). **Conclusions**: Patients infused with SAL-VSTs have robust clinical response rates. SAL-VST ID response and viremia OR was comparable to historical TP-VSTs at CCHMC.1 Additionally, SAL-VST OCR rate was comparable to OCR from historical institutional data (range: 56-70.3% across viruses), and to TP-VST OCR from other groups. Though limited by sample size, the robust response of SAL-VSTs indicate these products are efficacious, and preliminary data suggests possibly more efficacious for ID than historical products. Their ability to induce response despite low total number of HLA matches suggests that product selection based on presumed HLA restriction is crucial.

Resident Communication Practices during Interpreter-Mediated Family-Centered Rounds

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Background: In pediatric hospital medicine (PHM), family-centered rounds (FCR) have become the standard of care for engaging with families and promoting shared decision-making. Given the importance of communication between providers, patients, and families, the Accreditation Council for Graduate Medical Education (ACGME) and American Board of Pediatrics (ABP) require trainees to adopt practices that reduce health disparities and demonstrate communication skills that meet all patient and family needs. With a growing population of linguistically diverse patients and families, trainees must consider and incorporate best practices in working with interpreters to maintain effective communication during FCR for families with languages other than English (LOE). Despite the emphasis on inclusive and equitable practices, standard resident education to develop these skills is variable and tools to assess competency are minimal. **Objective**: To conduct an observational study examining the communication practices of pediatric residents during interpreter-mediated family-centered rounds using an adapted faculty observer rating scale (FORS). **Methods:** An expert team consisting of PHM attendings, fellows, residents, and medical interpreters adapted an existing assessment tool using a think aloud protocol. The adapted tool (aFORS, attached) was amended to include items assessing general principles of family-centered rounds and components of interpreter-mediated communication. Observations using the aFORS were conducted by two trained independent raters on patients admitted to hospital medicine, age 0-18 years, that self-identified as having an interpreter need. Observations noted patient language, interpreter modality, and year in training of the resident leading FCR. Appropriate descriptive statistics will be used for categorical variables on the aFORS and chi-square testing will be used to compare global ratings on FCR communication by language (Spanish vs other) and interpreter modality (in person vs remote). **Results:** A goal of 30 observations will be collected over 2-3 months, with statistical analysis to be completed by May 2025. **Conclusions**: The results of this study will serve as a needs assessment for current communication practices during interpreter-mediated FCR to guide curriculum development for residents. Next steps include a feasibility study using the aFORS to better assess competency during FCR and provide resident feedback.

Retrospective Review of Catheter Fibrin Sheath Development in Patients with Intrathecal Baclofen Pumps

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Background: Intrathecal baclofen pump (ITBP) therapy is an effective treatment for many individuals with refractory hypertonia related to cerebral palsy or other central nervous system disorders. Intrathecal baclofen therapy has a wide variety of goals based on each unique patient, including pain relief, easing caregiver burden, and preventing secondary problems from uncontrolled spasticity. Complications associated with ITBP therapy include catheter related issues (migration, fracture, or obstruction), pump issues (stall or incorrect programming), and surgical complications (wound dehiscence, infection, or CSF leak.) A review of current literature about ITBP therapy shows that catheter complications are relatively common, with the incidence ranging from 8.3% to 56%. These studies vary in specificity of reporting subtypes of catheter complications. Some studies mention catheter malfunction due to obstruction but there is no specific mention or identification of fibrin sheaths. Upon review of the literature, there have been no published descriptions of intrathecal catheter obstructions due to fibrin sheath. **Objective**: To describe the phenomenon of catheter fibrin sheath in patients with intrathecal baclofen pumps and to explore common features and potential risk factors for patients with intrathecal baclofen pumps who develop this complication. **Methods**: Subjects identified based on a registry and electronic health records (Epic). The study includes subjects aged 0-25 years old seen between January 1, 2009 until March 30, 2023. Electronic health records will be reviewed to identify patient characteristics, risk factors, and treatments. Descriptive statistics will be calculated if a sufficient number of patients are identified by the end of data review. **Results**: Data collection and analysis is currently ongoing. **Conclusions**: Project is on-going, but we plan to complete a retrospective chart review of patients with intrathecal baclofen pumps at CCHMC who have had a complication of fibrin sheath formation. We further aim to describe affected patient's presenting symptoms, diagnostic work-up, and treatment in these cases and identify risk factors associated with fibrin sheath formation.

Outcomes Related to Continuous Glucose Monitor Start at Diabetes Diagnosis

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Background: Continuous glucose monitors (CGMs) have improved the management of Type 1 and Type 2 diabetes. Typically, CGMs are started several weeks to months after diabetes diagnosis; however, several studies indicate that initiating CGM use earlier leads to improved long term diabetes outcomes. In October 2023, our institution began offering CGM initiation at the time of diabetes diagnosis. **Objective:** To determine the impact of CGM initiation at time of diabetes diagnosis on short term measures of diabetes management, with a primary outcome of hemoglobin A1c (HbA1c) at 3 months from diagnosis. **Methods**: Starting in October 2023, new onset diabetes patients admitted to our institution were offered a CGM upon admission or during diabetes day hospital as part of their initial diabetes education. Families received education about CGM use from certified diabetes educators prior to discharge. This prospective cohort was compared to all patients admitted with new onset diabetes between September 2018 and August 2023 who were not started on a CGM at diabetes diagnosis. HbA1c was documented at clinic follow up 3 months after diagnosis. Degree of change in the HbA1c in those who were started on CGMs will be compared to the degree of change in HbA1c 3 months after diagnosis for those previously followed by endocrinology who did not start a CGM at diagnosis. **Results:** In total, 44 patients with new diabetes diagnosis were enrolled during the study period and opted to start CGM at diagnosis. Final data and analyses are pending at this time. **Conclusions:** Most families with children who were newly diagnosed with diabetes were interested in initiating CGM at diabetes onset. Final results are pending at this time.

Systems Analysis of Influenza Vaccine Response in Chronic Dialysis Patients

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Background: Chronic kidney disease (CKD) is a life-threatening condition that affects over 11,000 children in the US. Children with CKD can progress quickly to end-stage renal disease (ESRD) and become dependent on renal replacement therapy in the form of peritoneal dialysis or hemodialysis. Metabolic disarray resulting from ESRD causes notable impairments in the innate and adaptive immune system, the mechanisms of which are incompletely understood. As a result, patients are at a high risk of severe infections, including hospitalization and death from influenza. Though vaccination remains the best protection against influenza, there is mixed evidence regarding whether adult dialysis patients are able to consistently mount protective antibody responses to the influenza vaccine. No studies have assessed immune responses to influenza vaccination in the pediatric chronic dialysis population. **Objective/Hypothesis**: We hypothesize that chronic dialysis patients will exhibit impaired innate and adaptive immune responses to influenza vaccination compared to healthy children. **Methods**: To investigate this hypothesis, we recruited 7 chronic dialysis patients and 14 healthy children (6 months to 18 years) during the fall and winter of 2023-2024. We immunized patients using the quadrivalent influenza vaccine and collected peripheral blood samples on days 0, 2, 7 and 28, measured from the time of vaccine administration. Peripheral blood was collected on days 0, 2, and 7 into PAXgene tubes that will be used for total RNA isolation, library preparation, and RNA sequencing. Peripheral blood was also collected on days 0 and 28 for antibody titer measurement using a hemagglutination inhibition assay (HAI). We will use the DESeq2 R package to perform pairwise comparisons of pre- and post-vaccine gene expression in each group and to detect genes differentially responsive to vaccination between dialysis patients and controls. We will then identify gene expression signatures associated with antibody responses. **Results**: Patients were vaccinated with influenza vaccine during the fall and winter of 2023-2024 and samples were collected. RNA isolation, sequencing, HAI studies, and data analyses are ongoing. **Conclusions**: This study is the first to evaluate immune responses to influenza vaccination in pediatric chronic dialysis patients. Results will provide novel information that may guide future investigation of alternative vaccination strategies.

A Framework for Identifying and Addressing Health Disparities in the Use of Immunotherapy for Relapsed/Refractory B-cell Acute Lymphoblastic Leukemia

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Background: B-cell acute lymphoblastic leukemia (B-ALL) is the most common childhood cancer, accounting for 25% of all cases in children aged 0 to 14 years. Following treatment advancements in the 1970s, the 5-year survival rate for children diagnosed with B-ALL at ages 0 to 14 years improved from 57% in 1975 to 92% in 2012, with continued improvements likely contributing to further survival advantages. While the hope would be that advances in diagnosis and management of pediatric cancer have benefitted all patients equitably, this is not the case. It has been shown that access to the most novel therapies, even via standardized clinical trials, is insufficient to correct racial disparities. With the advent of CAR-T cells and other promising new immunotherapies that have been shown to improve survival in patients with relapsed/refractory (R/R) disease, as well as the challenges in providing equal access to these therapies given limited number of therapy centers, it becomes even more critical that health care disparities in historically disadvantaged populations be addressed. **Objective**: We aimed to determine if disparities existed within one institution by evaluating the relationship of race and ethnicity with access to CAR-T cell therapy and immunotherapies in R/R ALL patients cared for at Cincinnati Children's Hospital Medical Center (CCHMC), while developing a novel framework with which to understand and correct system level causes of disparate outcomes, with treatment as a surrogate for access to care. **Methods**: Our study was designed using Failure Modes and Effects Analysis (FMEA) and a Key Driver Diagram (KDD) to identify our hypothesis and ultimately shape the direction of our research. We queried a registry of patients seen at CCHMC's Cancer and Blood Diseases Institute (CBDI) to identify individuals, aged 0-32 years, with relapsed or refractory B-ALL who received immunotherapy. This was a retrospective, non-therapeutic study, and patients were seen between January 2015 and December 2022. We analyzed the data to measure time from R/R diagnosis to initiation of immunotherapy for each patient and determine if differences could be observed between different demographic groups. **Results and Conclusion:** In process.

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