Title: Pediatric leukemic lymphoblasts produce hemostatic system factors: a novel contributor to the hemostatic imbalance in pediatric acute lymphoblastic leukemia

Authors/Co-authors: Ghada Aborkhees, Kevin Dietrich, Lesley Mitchell
Pediatrics Department, University of Alberta

Introduction:
In pediatric Acute lymphoblastic leukemia (ALL) venous thromboembolism (VTE) is a serious secondary outcome resulting in significant morbidity and mortality. There is a well described acquired hemostatic abnormality in Pediatric ALL, but the mechanisms are poorly understood. We hypothesized that lymphoblasts can produce hemostatic factors and upon their death, hemostatic proteins are released into the circulation and cause the hemostatic disturbance accompanying ALL. The objective of the study was to determine whether peripheral blood pediatric leukemic cell lines can produce hemostatic factors at gene and protein level.

Methods:
The capacity of lymphoblasts for hemostatic factor production was assessed in two pediatric T-lymphoblastic cell lines (CCL-119 and MOLT-4), two pediatric B-cell lines (CCL-120, NALM-6) and lymphocytes from normal volunteers. RNA was isolated from lymphoblasts/lymphocytes and reverse-transcribed into cDNA. RT-qPCR was performed using TaqMan primer/probe sets and samples were analyzed on a LightCycler480. Total protein was isolated using RIPA and protease inhibitors, ran on SDS-PAGE and transferred to PVDF membranes and incubated with the primary antibodies, developed with species-specific HRP conjugated secondary antibodies and visualized by enhanced chemiluminescence. GAPDH was used for housekeeping.

Results:
A comprehensive screening for a total of 30 hemostatic factors were assessed at gene and protein level for constitutive expression in the 4 cell lines and normal lymphocytes. Hemostatic factors produced by B and T lymphoblasts were TF, FVIII, FXII, FXIIIa, TAFI, ADAMTS13, Antithrombin and TFPI. Normal lymphocytes expressed TF, FXIIIa and Antithrombin only.

Conclusion:
We report the novel observation that peripheral blood B and T lymphoblasts in childhood ALL express multiple hemostatic factors at gene and protein levels. The production of these hemostatic factors may contribute to the dysregulation of the hemostatic balance upon the cell death and protein release of different prothrombotic and antithrombotic proteins to the peripheral circulation.

Ghada Aborkhees
Graduate Student – Thrombosis
Supervisor: Professor Lesley Mitchell
Poster #1
Title:
Rare incidence of Interstitial lung disease related to NKX2.1 mutation with Urea cycle defect

Authors/Co-authors:
Tamer Abusido, Alisson Carroll, Christopher Gerdung, Alicia Chun

Introduction:
NKX2-1 gene mutations are associated with brain-lung-thyroid syndrome, it is a heterogenous disease that can present in multiple forms of severity. Patients usually present with interstitial lung disease that might manifest in severe cases as early as neonatal period or later in adult life in milder forms, usual associations include hypothyroidism and neurological disorders.

Methods:
We are reporting a rare incidence of a newborn who presented in a metabolic crisis because of urea cycle defect and respiratory failure in his 1st day of life which turned to be related to neonatal interstitial lung disease.

Whole exome sequencing confirmed the presence of two pathogenic mutations one causing NKX2-1 related disease and the second one causing arginine-succinate lyase (ASL) deficiency. The baby had severe metabolic crisis, hypothyroidism and severe respiratory failure and pulmonary hypertension which required pulse steroids and triple therapy of interstitial lung disease to get him extubated. At the end the neonate passed away after few months from another metabolic crisis.

Results:
The case we report possess a heterozygous de novo mutation for NKX2-1 gene variant (c. 1057_1058insTp,Ser353Metfs*86) which is most likely pathogenic and a homozygous mutation for ASL deficiency (c.892del,pSer298Alafs*14). The family history included 5 sibling deaths. At least one sibling had a similar metabolic condition.

First identification of NKX2-1 gene mutation was in late 90s in patients with neonatal hypothyroidism and respiratory failure. In the new century multiple case reports spoke about the condition and the triad of brain-lung-thyroid syndrome is not usually reported in all case reports. The severity of the disease is variable as well. In our case it was very challenging moments to treat his lung with pulse steroids specially with the presence of hardly controlled metabolic condition and hyperammonemia.

Conclusion:
NKX2-1 gene mutations are exceedingly rare. Clinical presentation is described in few reports in literature with high variability. Associations with other conditions are still not well understood. It is particularly important to report such cases and enrich evidence about such condition. Another highlight of this case is the presence of such disorder even in the presence of another rare condition such as arginine-succinate lyase deficiency.

Tamer Abusido
Clinical Fellow – Respiratory Medicine
Supervisor: Dr. Allison Carroll
Poster #2
Title:
Does a smartphone-based ECG recording system in pediatric patients with palpitations improve diagnostic yield?

Authors/Co-authors:
Hilal AL Riyami, Lisa Hornberger, Joseph Atallah, Carolina Escudero
Division of Cardiology, Department of Pediatrics, University of Alberta, Edmonton, Canada

Introduction:
Palpitations are defined as the feeling of a rapid, irregular, or abnormal heart beat, and can be caused by many different types of heart rhythms. There are several types of diagnostic equipment that can be used to obtain symptom-rhythm correlation, including Holter monitor, event recorder, and the more invasive option of an internally implanted loop recorder. The AliveCor Kardia monitor is a newer generation device that is smartphone enabled and it is smaller compared to the traditionally used Cardiocall event recorder.

Methods:
A prospective, randomized trial including pediatric patients presenting to pediatric cardiology consultation for investigation of palpitations. The study was started in July 2019 and still ongoing. The primary objective of this study is to determine the diagnostic utility and time to diagnosis using the AliveCor Kardia monitor compared to the current standard of care (Cardiocall event recorder).

Results:
A total of 60 participants have been enrolled to date, 35 receiving the AliveCor Kardia and 25 Cardiocall device. Seven participants were excluded and 5 (8%) were ineligible due to not having a landline. A total of 101 tracings have been recorded (69 with Kardia devices, 32 were from Cardiocall devices). Sixty-one (88%) of the Kardia tracing were of adequate quality for interpretation compared to 26 (81%, p=0.32) from Cardiocall. The Kardia tracing were diagnostic for 24 tracings (34.8%) while the Cardiocall tracings were diagnostic for 11 (34.4%, p=0.97). The diagnoses for the Kardia tracing were sinus rhythm in 55 (80%), AVRT or AVNRT in 5 (7%), atrial tachycardia in 2 (3%), atrial fibrillation in 1 (1%) and indeterminate in 3 (4%) while the Cardiocall tracing diagnoses were sinus rhythm in 28 (88%), AVRT or AVNRT in 3 (7%) and indeterminate in 1 (3%). Patients who used the Kardia monitor more often were willing to use the device again (88 vs 60%, p=0.23) and found it easy or very easy to transmit a recording (88 vs 40%, p=0.06).

Conclusion:
Our preliminary data suggest that using the Kardia device provided adequate quality for rhythm strip interpretation and no difference compared to the standard Cardiocall monitor. Patients who used the Kardia monitor found it at least as acceptable as using the Cardiocall monitor.

Hilal AL Riyami
Resident – Cardiology
Supervisor: Dr. Carolina Escudero
Poster #3
Title:
Partnerships to design communication instructions for mental health visits to the pediatric emergency department

Authors/Co-authors:
Amber Ali, Bruce Wright, Joelle Fawcett-Arsenault, Janet Curran, Amanda Newton

Introduction:
The emergency department is an important place of care when a child or youth experiences a mental health crisis. Common reasons for seeking care in an emergency department are suicidal ideation, panic attacks, and aggressive behaviours that risk hurting others. The aim of this research project is to improve the conversations that healthcare providers and families have about what to do after the emergency department visit. This conversational intervention is called discharge communication.

Methods:
This project is being conducted over a 2-year period in two phases. In the first phase of the project, a team of parents, youth, health care providers and researchers will design an approach to developing a discharge communication intervention using the principles of experience-based co-design (EBCD). In the second phase of the project, the research team will evaluate this discharge communication. This will include asking parents and healthcare providers to practice the communication and tell the research team what worked and what did not. Youth and parent participants will work through tasks related to interpreting and discussing discharge instructions; healthcare providers will complete tasks related to communicating and answering questions related to the discharge instructions. The feedback from this evaluation will be presented to the members of the design team and will be used to improve the final discharge communication approach that will used during visits for emergency mental healthcare.

Results:
The EBCD process will result in a co-designed discharge communication intervention that can be used by physicians and healthcare staff in the emergency department. Youth, parents, health care providers, and researchers will work together to co-create posters and pamphlets that will be provided to families during an emergency department visit so that they know what to expect before discharge and can asked informed questions during the discharge conversation.

Conclusion:
After this project, the new approach to discharge communication will be used in the Stollery Children’s Hospital emergency department with families who come to the hospital in crisis for their child’s mental health concern. Follow-up studies will be conducted to evaluate the impact of the discharge communication on patients and parents/caregivers, and healthcare system use after the emergency department visit.

Amber Ali
Graduate Student – Emergency Medicine
Supervisor: Drs. Amanda Newton, Bruce Wright
Poster #4
Title:
Practice Variation in Management of Restrictive Ventricular Septal Defects

Authors/Co-authors:
Alkanhal, Abdulrahman; Khoury, Michael (Supervisor); Seaman, Cameron; Mackie, Andrew; Mah, Kandice; Averin, Konstantin.

Introduction:
Ventricular septal defects (VSDs) are the most common form of congenital heart diseases (CHDs) which represent the most common congenital anomalies in children worldwide. Many VSDs are termed restrictive, indicating that a significant pressure gradient across the ventricular septum exists such that the patient has a normal pulmonary artery. These patients are typically asymptomatic and indications for surgical repair in this population are not established. Specifically, no clear agreement exists with respect to the timing and type of intervention for such patients. The aim from this study is to explore the reported practice variances between cardiac specialists in Canada, the United States, and Australia/New Zealand in the management of restrictive VSDs and the factors that influence their decisions.

Methods:
An electronic questionnaire about VSD management practices will be administered to pediatric cardiologists and adult CHD specialists from Canada, the United States, and Australia/New Zealand. The questionnaire consists of a demographic assessment followed by seven questions and two cases about the management of restrictive VSDs and the factors that influence the participants’ decisions.

Results:
Descriptive statistics (frequency with percentages for categorical variables or mean with standard deviation or median with ranges, as appropriate, for continuous variables) will be used to summarize participant’s demographic, clinical experience and practice patterns. Fisher’s exact test will be applied to compare categorical variables between different groups (specialty, country of training, location of current practice and year of experience). For the group analysis, statistical significance will be set at p-value <0.05.

Conclusion:
Our study will be the first study to review the practices of restrictive VSD management across multiple countries and the factors that influence these traditions.
Title:
Fundamental issues in identifying and characterizing pediatric seizures in emergency department visits: A Stollery Children’s Hospital pilot study.

Authors/Co-authors:
Sharan Preet Aulakh, Dr. D Barry Sinclair, Dr Natarie Liu, Grace T Wang, Dr. Samina Ali, Dr. Janani Kassiri*

Introduction:
Seizures are a common pediatric emergency department (ED) presentation. Demographics, clinical data, and accurate International Classification of Disease, 10th Version (ICD-10-CA) coding of pediatric seizures are essential to optimize epilepsy care pathways and health resource utilization planning. This study aimed to characterize children presenting with seizures to the ED and to validate the accuracy of their ICD-10-CA coding.

Methods:
Using emergency health records and a linked health system database (National Ambulatory Care Reporting System), we reviewed the demographics, clinical data, and diagnostic accuracy of the ICD-10 codes [G40 (Epilepsy), G41 (Status Epilepticus), and R56 (Convulsions, not elsewhere classified)] in patients aged 1–18 years who presented to the Stollery Children's Hospital ED from January 2018 to January 2019. The following information was extracted for each visit: age, sex, vital signs, Glasgow Coma Scale score, seizure type and duration, comorbidities, prehospital and hospital medications, level of neurological care, length of ED stay, prior ED visits, ED and discharge diagnoses, short-term outcome, and nosologist-assigned ICD-10 codes.

Results:
There were 1281 visits with a discharge diagnosis of epileptic seizure identified, of which 300 charts were randomly sampled. To date, 174 patient charts have been reviewed, 22 of which were incomplete and/or illegible. The mean age at ED presentation was 4.3 years, 47.4% were female, and 50.0% had a co-morbidity. With regards to disposition, 32 (18.4%) were admitted to ward, while 3 (1.7%) were admitted to ICU; the remainder were discharged home. Convulsions was the most frequent primary diagnosis (n=109). The overall diagnostic accuracy of ICD-10 coding was 59.8%. Based on chart review, 53 (34.9%) children had status epilepticus; of these, only 20 (37.7%) were coded accurately. Overall, the diagnostic accuracy of patients without status epilepticus was 84.4%. Neurologists were consulted for 70 (40.2%) children in the ED, with consultation more likely when a patient presented with status epilepticus or had multiple comorbidities (p<0.05).

Conclusion:
Ensuring the accuracy of healthcare database coding is an essential first step to accurately studying epileptic seizure care. This pilot study highlights the fundamental issues in identifying and characterizing pediatric seizure patients who present to the ED. In this validation study, the overall accuracy of epileptic seizure ICD-10 coding is low, with status epilepticus coding being particularly unreliable. The majority of children are of preschool age and approximately half have at least one comorbidity, suggesting this is a complex population for which a greater understanding is required.

Sharan Preet Aulakh
Undergraduate – Neurology
Supervisor: Drs. Janani Kassiri, Samina Ali
Poster #6
Title:
Tracheostomy Decision-Making Process at the Stollery Children’s Hospital: A Quality Improvement Initiative

Authors/Co-authors:
Zafira Bhaloo, Erin Boschee, Cathy Schellenberg, Hasmukhlal Rajani, and Tamizan Kherani

Introduction:
Medical advances have resulted in increased survival of children with complex medical needs leading to a higher incidence of children requiring tracheostomy and long-term ventilation. The decision to proceed with a tracheostomy, in light of its implications, has been termed a “threshold moment” requiring significant consideration. The current decision-making process for tracheostomy at the Stollery Children’s Hospital is inconsistent in the selection of stakeholders and variable in the timing of their involvement. A tracheostomy committee is available to support the decision-making process, however it is not always consulted and when involved, the timing of engagement is variable, including after the procedure has been completed. The goal of this project is to create a standardized, best practice process for decision-making in the consideration of tracheostomy for pediatric patients at the Stollery Children’s Hospital.

Methods:
The initial step of this Quality Improvement (QI) project involved consulting with healthcare providers to create a process map of the current decision-making process for tracheostomy and long-term ventilation at the Stollery and to identify areas of improvement. A survey was created asking stakeholders to:
1) outline the current the process as they understand and experience it;
2) identify individuals and/or services they feel should be involved in the process;
3) identify what works well with the current process;
4) identify challenges with the current process, and
5) provide ideas to improve the current process.
A qualitative thematic analysis was used to identify major themes. The process map and themes identified will be presented back to the stakeholders to identify change ideas. These change ideas will inform iterative plan-do-study-act cycles to improve the decision-making process for all stakeholders.

Results:
The current decision-making process was mapped out into 2 groups, acute and complex. A total of 127 survey responses were collected from various stakeholders including surgeons, pediatric and neonatal intensivists, respirologists, community and hospital pediatricians, unit managers, home care, and allied health members. Preliminary qualitative thematic analysis identified themes of variability, communication, caregiver expectations, roles, and conflict as challenges. Criteria, standardization, parent education, continuity, designated resources, and ultimate decision-making were identified as themes for improvement.

Conclusion:
Identified themes highlight the need for a decision-making process that includes caregiver expectations, roles of team members involved in the process including caregivers, and a standardized communication
strategy. This QI project actively engages stakeholders to inform the development of the Stollery’s best practice regarding tracheostomy and long-term ventilation and will inform future provincial guidelines.

Zafira Bhaloo
Clinical Academic Colleague – Hospital Medicine
Supervisor: n/a
Poster #7
Title: Flawed Fractures: are some fractures pathognomonic for non-accidental injury?

Authors/Co-authors: Bobyn A., Caluseriu O., Frolich B., Jetha, M., Campbell S., Grimbly, C

Introduction: Osteogenesis Imperfecta (OI) is a common differential in cases of suspected non-accidental injury (NAI). Metaphyseal corner and posterior rib fractures are highly suggestive of NAI, and their presence is often deemed sufficient to exclude OI. We submit a case of siblings with FKBP10 mutations, a rare cause of OI, who presented with metaphyseal corner fractures and rib fractures. We aim to demonstrate that OI cannot be excluded by fracture type alone and requires careful consideration when investigating NAI.

Methods: A healthy 18-month-old male presenting with limited shoulder movement was found to have multiple posterior rib fractures, bilateral ulnar fractures and wormian bones on x-ray. Exam showed mild features of OI, and history revealed isolated gross motor delay with benign family history. Genetic testing revealed pathologic compound heterozygous FKBP10 variants causing severe OI. His mother was pregnant at the time of investigations. The sibling was born with posterior rib and metaphyseal corner fractures. Genetic testing confirmed the same FKBP10 variants.

A literature review was conducted to examine the overall of fracture patterns in OI and NAI. Inclusion criteria were (1) English language, (2) age <18, (3) discussed fractures thought to be due to NAI but found to be OI, (4) patients formally diagnosed with OI.

Results: The literature review led to 212 articles being screened; 14 articles reported 78 children with OI initially diagnosed as NAI. 71 (91.0%) of these children were diagnosed with milder forms of OI. 64 (81.2%) had clinical signs of OI. 20 (25.6%) children had fractures of high specificity for NAI and 59 (75.6%) had fractures of moderate specificity for NAI. Negative outcomes due to the misdiagnosis of NAI included removal of the child from their home (44, 56.4%), siblings removed from their families (14, 17.9%), legal involvement and costs incurred (41, 52.6%), caretakers incorrectly charged with NAI (4, 5.1%) and court involvement (17, 21.8%).

Conclusion: No fracture is pathognomonic for NAI. Children with various severities of OI can experience fractures specific to NAI. Children with milder phenotypes of OI are more likely to be misdiagnosed with NAI, leading to significant negative consequences for the child and their families. These outcomes highlight the importance of a multidisciplinary assessment for suspected NAI.

Amy Bobyn
Undergraduate – Endocrinology
Supervisor: Dr. Chelsey Grimbly
Poster #8
Title
Incidence of Pediatric Eosinophilic Esophagitis in Edmonton Zone and Risk of Stricturing at Diagnosis

Authors/Co-authors:
David Burnett, Rabin Persad, Hien Q. Huynh

Introduction:
Eosinophilic esophagitis (EoE) is a common cause of esophageal dysfunction in children. A subset of children have a more severe phenotype of EoE, complicated by esophageal stricturing. Limited work has been done to characterize this phenotype.

Methods:
We retrospectively identified all new cases of EoE at the Stollery Children’s Hospital from 2015-2018 using esophageal biopsy reports for the province of Alberta (CoPath database), EoE clinic lists and an OR database for esophageal dilatation at the Stollery. Electronic medical records (EMR) were reviewed to confirm EoE diagnosis. For each confirmed case, clinical data was captured from the outpatient EMR and gastroscopy/pathology reports. A review of peri-endoscopy OR/nursing charts was performed on a subset of patients (n=75) to capture scope adverse event. Statistics Canada 2016 census data was used to calculate incidence rates.

Results
185 new cases of EoE were diagnosed at our center during the study period (see table). For patients < 15 years old living in Edmonton zone (n=73), the incidence over the 4 years was 11.1 cases per 100,000 person years (8.7 (0-4 year-old), 7.6 (5-9 year old), and 18.1 (10-14 year old)). There was limited variation in incidence in the 4 years (9.1-12.1 per 100,000 person years). 8 of 185 (4%) patients had endoscopically confirmed esophageal strictures, 4 of which required mechanical dilation (mean 3.75 dilations per patient, range 1-6). 11/185 (5.9%) patients had more subtle signs of esophageal narrowing, but no strictures. No perforations or episodes of significant bleeding were reported in peri-endoscopy charts reviewed for 239 gastroscopes, including 16 dilations. Pain was reported after 15% of all scopes, including 50% of the 28 scopes with strictures and 63% of the 16 scopes involving dilations.

Conclusion:
Edmonton zone has one of the highest incidences of EoE reported in children. In this cohort, 4% had esophageal stricture (half required dilatation) and 5.9% had more subtle narrowing. Patients with strictures were older, had more frequent food impaction and longer duration of symptoms (Table). This data will be included in an ongoing multicenter case-control study across Canada.

Dr. David Burnett
Faculty – University of Saskatchewan – Gastroenterology & Nutrition
Supervisor: Dr. Hien Huynh
Poster #9
Title
Impact of maternal intrapartum antibiotics, birth mode and breastfeeding status on levels of *Bifidobacterium* in infant gut microbiota

Authors/Co-authors:
Chen YY, Zhao DX, Mandhane PJ, Moraes TJ, Turvey SE, Subbarao P, Scott JA, Kozyrskyj AL.

Introduction:
The genus *Bifidobacterium* is a pioneer gut colonizer in early life and is considered as a foundation microbiota member that influences the intestinal microbial community and exerts a positive effect on host health. Breast milk is a rich source of glycans, the human milk oligosaccharides that selectively encourage growth of *Bifidobacterium*. Indeed, formula-feeding and subsequent deficiency of *Bifidobacterium*, are associated with detrimental health outcomes, such as overweight, allergies and asthma. However, the impact of birth mode, labour duration and maternal intrapartum antibiotic prophylaxis (IAP) on genus *Bifidobacterium* in the gut microbiota of early life remains scarce and will be determined in this study.

Methods:
This study included 1,654 term infants representing a subset of the Canadian Healthy Infant Longitudinal Development (CHILD) birth cohort. Hospital birth records provided information on infant sex, birth mode, duration of the labor, and maternal IAP. Data on breastfeeding status at 3 months were obtained from standardized questionnaires completed by mothers. The gut microbiota of infant faecal samples collected at 3 months were profiled by 16S rRNA sequencing; genus *Bifidobacterium* was specifically quantified by qPCR. Group differences were determined by Kruskal-Wallis and LEfSE (linear discriminant analysis effect size). Associations between *Bifidobacterium* and other gut microbiota were examined by Spearman’s rank correlation.

Results:
*Bifidobacterium* was less abundant in the gut microbiota of IAP-exposed infants than those of unexposed infants who were exclusively or partially breastfed. This difference was not observed in non-breastfed infants. Across most birth modes in exclusively breastfed infants, genus *Bifidobacterium* exhibited a strong positive correlation with genus *Rothia, Prevotella, Enterococcus, Lactobacillus* and *Streptococcus*, and a negative correlation with *Clostridium*. *Bacteroides* showed a strong inverse correlation with *Bifidobacterium* among vaginally-delivered infants who were exclusively fed. Members of the Proteobacteria became more abundant when genus *Bifidobacterium* was depleted in infants delivered vaginally by CS, independent of feeding status.

Conclusion:
This study documents the impact of birth events and feeding status on the abundance of gut *Bifidobacterium*, and provides novel insights into its interaction with other gut microbiota, both of which potentially contribute to immediate and long-term health consequences.

Yuanyao Chen
Posdoctoral Fellow – Gastroenterology & Nutrition
Supervisor: Dr. Anita Kozyrskyj
Poster #10
Title:
Screening and diagnosis of heparin induced thrombocytopenia in the pediatric population: a tertiary centre experience

Authors/Co-authors:
Rozalyn Chok, Elona Turley, Aisha Bruce

Introduction:
Heparin-induced thrombocytopenia (HIT) is a life-threatening side effect of heparin therapy that necessitates immediate heparin discontinuation. There is considerable variability in the reported incidence and diagnosis of HIT in children. Missing a diagnosis of HIT carries significant morbidity and mortality, while overdiagnosis may result in unnecessary and potentially harmful use of alternative anticoagulants in the pediatric population. In the study, we aimed to determine the proportion of HIT screening tests at our pediatric tertiary care centre that ultimately led to a diagnosis of HIT by functional assay (either lumi-aggregometry or serotonin-release assay). We hypothesized that the frequency of HIT at our centre would be lower than that reported in the literature.

Methods:
We conducted a retrospective review including all patients aged less than 18 years who had HIT testing performed at our centre from 2010 through 2018. Our testing protocol involves a screening enzyme immunoassay, which, if positive, is followed by a functional assay which must be positive to establish the diagnosis of HIT. Data were analyzed to establish trends in demographic and clinical features of patients with a positive HIT screen. Our primary outcome was the rate of HIT confirmed on functional testing amongst all children screened for HIT from 2010-2018.

Results:
Out of 233 children referred and screened, one (0.4%) received a diagnosis of HIT based on functional assay. The false positive rate of the enzyme immunoassay was 9.4% (N=22). There were no positive enzyme immunoassay tests in the neonatal age group (N=49). There was a borderline association between HIT screen result and age, with infants less than 12 months of age having lower likelihood of screening positive (p=0.046). Of children with a positive HIT screen (N=23), nearly all patients (96%) were admitted to an intensive care unit. The most common underlying diagnosis was congenital heart disease (74%). Five patients were switched from heparin to bivalirudin, two of whom (40%) subsequently developed bleeding complications.

Conclusion:
These results reinforce that HIT is a rare condition in children, particularly in the neonatal population. Screening should be reserved for patients with high pre-test probability of HIT, and diagnosis should be confirmed using a functional assay.

Rozalyn Chok
Resident – iHOPE
Supervisor: Dr. Aisha Bruce
Poster #11
Title:
Themes emerging from reflections by pediatric residents during Social Pediatrics rotations

Authors/Co-authors:
Kimberly Connors, Marghalara Rashid, Jennifer Walton, Mercedes Chan, Bonnieca Islam

Introduction:
Social Pediatrics is the newest mandatory rotation included in the General Pediatrics Residency Program at the University of Alberta. At the end of the rotation, residents are required to complete a written reflective assignment identifying assets and disparities that have influenced the health of a child/family they encountered. These reflections have been rich in content and themes, highlighting the value of this novel rotation for enriching resident education. While there are published papers on reflective writing by medical students and residents, none exist in the area of social pediatrics, or address how social determinants of health (SDoH) impact an individual’s overall health. Our objective was to collate and analyze the residents’ written reflective assignments and the subsequent interviews that were conducted. The research question for this study is: during the Social Pediatrics rotation, how has exploring SDoH lead to changes in residents’ awareness of their own practice?

Methods:
Grounded theory was used as a methodology to analyze 35 resident reflections that had been submitted as an end-of-rotation assignment for their Social Pediatrics rotation. In addition, we conducted 10 semi-structured telephone interviews to develop a rich understanding of the residents’ perception of this rotation. Interviews were transcribed verbatim and analyzed using thematic analysis.

Results:
To analyze these reflections and our interviews, our analysis was guided by grounded theory using open, axial and selective coding, and revealed the following themes: 1) judgement/bias, 2) strong emotional response to experiences, 3) systemic challenges, 4) community, 5) frustration/hopelessness, 6) a sense that “everyone is doing their best” and 7) need for advocacy. The themes of judgement/bias, systemic challenges and advocacy were similarly apparent in the telephone interviews, in addition to the following themes: 1) exposures to new populations and locations, 2) increased knowledge of specific vulnerable populations, locations and resources; and 3) understanding the impact of SDoH on overall health.

Conclusion:
Themes that emerged from residents’ Social Pediatrics experiences highlight the value of this rotation in enhancing residents’ medical education regarding SDoH and their understanding of the patient as a whole. Analysis of residents’ written reflection assignments and follow-up interviews highlighted the importance of fostering learning experiences not typically encountered in traditional clinical learning environments. They also speak to the value of guided reflective practice in shaping physicians’ understanding of their own perspectives and experiences, as well as those of the communities they serve, and the systems in which they co-exist.

Kimberly Connors
Resident – General & Community Pediatrics
Supervisor: Dr. Bonnieca Islam
Poster #12
Title:
A Single Loading Dose of Caffeine for Apnea of Prematurity in Moderate to Late Preterm Infants

Authors/Co-authors:
Ellery Cunan, Marc-Antoine Landry, Sarah Rathwell, Jagmeet Bhogal, Tara Follett, Michael van Manen

Introduction:
Apnea of prematurity is a well-documented clinical phenomenon in preterm infants. Contemporary treatment includes caffeine administered as a loading dose, followed by daily maintenance therapy. Our objective was to evaluate the feasibility of a single loading dose of caffeine without subsequent doses in infants born moderate to late preterm.

Methods:
Infants born at a gestational age of 33 to 35 weeks’ gestation between January 2019 to July 2020 who received a loading dose of caffeine as treatment for apnea of prematurity were studied. Practitioners were able to give subsequent doses of caffeine at their discretion. Comparisons were made between patient groups based on whether subsequent caffeine doses were given.

Results:
Thirty-eight patients were enrolled in the study. Following the initial caffeine load, 28 patients (74%) did not receive additional caffeine doses. Male patients were more likely to receive additional doses of caffeine (p = 0.030). The mean head circumference of patients was lower of those receiving additional doses of caffeine (p = 0.048). While no adverse outcomes were identified, infants receiving only a single loading dose of caffeine had a shorter length of stay (p = 0.002) and lower gestational age at discharge (p = 0.008).

Conclusion:
A single loading dose of caffeine for treatment of apnea of prematurity is a feasible approach for infants born moderate to late preterm.

Ellery Cunan
Resident – Neonatal-Perinatal Care
Supervisor: Dr. Marc-Antoine Landry
Poster #13
Title: The impact of child life specialists in the pediatric emergency department

Authors: Lundy Day, Manasi Rajagopal, Kelly Raymond, Stephanie Smook, Bruce Wright, Maryna Yaskina, Jennifer Plume, Jennifer Woods, Samina Ali

Introduction: Children in the emergency department (ED) frequently experience pain, fear and emotional distress. Child life specialists (CLSs) aim to promote child well-being and minimize adverse events during healthcare experiences. Studies in the ED have shown that CLSs improve family experiences with painful procedures, however there is minimal literature looking at the overall impact of CLSs beyond procedure-specific support. For children and caregivers in the pediatric ED, we aim to compare and describe caregivers’ perceptions of their own and their child’s experiences, and children’s perceptions of their experience, with and without CLS involvement in care. We also aim to describe CLS’s perception of their impact on families, and the specific areas of their involvement in the pediatric ED setting.

Methods: We will perform a descriptive cross-sectional survey of caregivers of children aged 0-17 years (plus children if 8 years and older) and child life specialists at the Stollery Children’s Hospital ED from March to July 2021. Our surveys were created using Burns et al methodology, with multidisciplinary, expert panel input. Surveys will be distributed by research assistants to caregivers, children and CLSs in the ED via paper, tablet, and/or email (based on preference). We anticipate 250-300 caregiver surveys and 75-150 child surveys to be completed. Analyses will be completed under the guidance of an expert biostatistician. Between group comparison will be tested by t-test or Mann-Whitney U test for continuous variables and chi-square test or Fisher’s exact test for categorical variables. Multivariable associations will be assessed by linear regression models for continuous variables and logistic regression models for binary variables.

Results: We will present interim results at the 2021 Department of Pediatric Research day. We hypothesize that involvement of CLSs will positively impact caregiver and child experiences. Specifically, caregivers will experience less stress and report better ratings of their experience if a CLS is involved in their child’s ED visit.

Conclusion: We anticipate that this survey will provide insight into the perspectives of child and caregiver experiences in the ED and the impact of CLS involvement on adverse effects such as pain and distress. This survey will also help define the role and benefits of CLS in the ED beyond supporting medical procedures. By better understanding child and caregiver experiences, as well as the role of CLSs, we can inform stakeholders on how to optimize resource planning in order to improve the experience of our patients.

Lundy Day
Resident – Emergency Medicine
Supervisor: Dr. Samina Ali
Poster #14
Asparaginase decreases endothelial expression of the vWF propeptide resulting in decreased high molecular weight vWF multimer expression.

Dietrich K, Mitchell LG

Introduction:
Treatment of pediatric acute lymphoblastic leukemia (ALL) is associated with abnormalities in the hemostatic system including variations in vWF. Primarily, research has investigated the effect of chemotherapy on plasma levels of vWF. To date, effects of chemotherapy on the endothelial surface in relation to protein expression of vWF or vWF propeptide (VWFpp) have not been investigated. VWFpp is essential for packaging of VWF dimers into high molecular weight (HMW) multimers. The purpose of the study was to assess the effects of standard chemotherapy agents used in treatment of childhood ALL on endothelial gene expression of vWF and VWFpp.

Methods:
HUVECs from a pool of 10 donors (ATCC) were cultured following suppliers recommendation. HUVECs were incubated with 100 nM dexamethasone, 10 nM vincristine, 300 nM daunorubicin and 10 IU/ml asparaginase separately or in combination for 24 hours. Protein was isolated and expression of vWF and VWFpp were measured by western blotting. To quantify changes in expression, membranes were stained with amido black and densitometry was performed using the no drug incubation as a baseline for expression. To screen for abnormal packaging of HMW VWF multimers, HUVEC culture media was separated on 1% agarose/SDS gels and analyzed by western blotting.

Results:
Asparaginase incubation separately (1.24 ± 0.25) or in combination (1.45 ± 0.43) with the other chemotherapy drugs did not significantly change protein expression of mature VWF relative to the no drug treatment. However, expression of VWFpp was significantly decreased with asparaginase incubation (0.27 ±0.10) and in combination chemotherapy (0.17 ± 0.05) relative to the no drug treatment. VWFpp expression did not decrease with dexamethasone, vincristine or daunorubicin incubation. Western blot analysis of HMW VWF multimers in the culture media of asparaginase treated HUVECs displayed aberrant packaging; a decrease in HMW multimers with an increase in VWF dimers. VWF multimers showed a normal distribution in culture media when cells were incubated with either dexamethasone, vincristine or daunorubicin.

Conclusion:
This is the first report of asparaginase treatment decreasing endothelial expression of vWF propeptide resulting in endothelial release of an abnormal vWF with decreased high molecular weight multimers.

Kevin Dietrich
Non-Faculty staff – Thrombosis
Supervisor: Professor Lesley Mitchell
Poster #15
Title:
Determining stakeholders’ priorities for child and family health research – progress to date

Authors/Co-authors:

Introduction:
Community engaged research includes partnering with stakeholders to identify research priorities and improve health outcomes. The Northeast Community Health Centre (NECHC) in Edmonton, Alberta serves a diverse population and this project presents a unique opportunity to engage stakeholders (parents and healthcare providers [HCPs]) from this site throughout the research process. Highlighting meaningful issues for this community will encourage future research to align with stakeholders’ priorities, increasing the likelihood of active participation in future health research and healthcare engagement as well as improved longer-term health outcomes. The objective of this ongoing study is to identify and prioritize unanswered research questions that stakeholders have regarding child and family health

Methods:
This mixed methods, participatory study is based at the NECHC. Study activities began in summer 2019 and will be completed by spring 2021. Following a modified James Lind Alliance (JLA) framework (a step-by-step process designed to establish research priorities), stakeholders and research team members formed a steering committee to inform and guide study processes. A REDCap survey was created by the steering committee for stakeholders (parents of 0 – 17 year olds and NECHC-based HCPs) to submit questions regarding child and family health that they perceived to be unanswered.

Results:
Data from our survey included 1,265 unique submissions from 125 stakeholders (n=100 parents; n=25 HCPs). Our survey generated questions related to diverse topics, most of which related to diet/nutrition (n=182; 14.4%), mental health (n=162; 12.8%), healthcare access/support (n=136; 10.7%), screen time (n=98; 7.7%), parenting (n=73, 5.7%), and Covid-19 (n=63; 4.9%). Submissions were reviewed for redundancies and collated to create a master list of unique questions (n=389) related to child and family health. Comparing these questions with information derived from high-quality, evidence-based sources (e.g., Canadian Paediatric Society, American Academy of Pediatrics, Cochrane) revealed that 112 of the 389 questions remain unanswered.

Conclusion:
Parents and HCPs at the NECHC reported a variety of unanswered questions. Our next steps include stakeholders (parents n=75; HCPs n=25) rank-ordering unanswered questions according to perceived importance, followed by a stakeholder focus group to review, discuss, and finalize prioritization of the remaining unanswered questions to establish a ‘top 10’ list that will guide future research activities at the NECHC.

Andrea Eaton
Graduate Student – General & Community Pediatrics
Supervisor: Geoff Ball
Poster #16
**Title:**
*Early hippocampal hyperintensities may help predict long-term seizure outcomes in febrile status epilepticus patients*

**Authors/Co-authors:**
Nozima Fayzieva, Dr. D Barry Sinclair, Dr Janette Mailo, Dr Ravi Bhargava, Dr. Janani Kassiri

**Introduction:**
Febrile seizure (FS) is a first-time seizure occurring after 1 month of age, is associated with a febrile illness not caused by a central nervous system infection, and does not meet the criteria for other acute symptomatic seizures. Status epilepticus is a seizure with 5 minutes or more of continuous clinical and/or electrographic seizure activity, or recurrent seizure activity without recovery between seizures. FSs lasting longer than 5 minutes with a variety of complex signs is called febrile status epilepticus (FSE). FSE can be associated with hippocampal sclerosis and/or development of temporal lobe epilepsy. Our objective was to understand the association between early hippocampal magnetic resonance imaging (MRI) signal changes and long-term seizure outcomes of FSE patients.

**Methods:**
Patients aged between 1 and 60 months with FSE admitted to the Stollery Children’s hospital PICU from August 2002 to December 2007 were studied. The study was approved by the University of Alberta Health Research Ethics Board (Pro00101017). Demographics and long-term seizure outcomes were studied via chart reviews. Early brain MRI scans performed within 30 days of FSE were reviewed and hippocampal T2 signals were assessed. Hippocampal T2 signal intensity (T2Score) on coronal MRI sections was rated from 0 to 4 (0 = normal to 4 = markedly abnormal), and only T2Scores ≥ 2 were considered definitely hyperintense.

**Results:**
Out of 309 patients, 54 met the inclusion criteria. 30/54 patients (56%) were male, with a mean age of 18 months. 14/54 (26%) patients had an early hippocampal T2score ≥ 2, and 23/54 (42%) developed epilepsy in the long term. Of the patients with an early MRI hippocampal T2score ≥ 2, 9/14 developed epilepsy in the long term. The odds ratio of patients with a T2Score ≥ 2 of developing epilepsy was 2.143 [95% CI (0.46, 9.984)].

**Conclusion:**
This small study shows that FSE patients with early T2 signal hyperintensities may have increased odds of developing future epilepsy. Larger studies are needed to better correlate early hippocampal changes with long-term epilepsy outcomes of FSE patients.

Nozima Fayzieva  
Graduate Student– Neurology  
Supervisor: Drs. Janani Kassiri. Ravi Bhargava  
Poster #17
Title: Timely evidence syntheses to optimize patient care: Evaluation of a machine learning and text mining tool for the extraction of data from pediatric randomized trials

Authors/Co-authors: Allison Gates, Michelle Gates, Shannon Sim, Sarah A. Elliott, Jennifer Pillay, Lisa Hartling

Introduction: Systematic reviews are foundational to evidence-informed healthcare decision making; however, they are time consuming and labor intensive to produce and keep updated. Relying on evidence that is out-of-date can negatively impact patient care by resulting in recommendations for treatments that are less effective, ineffective, or harmful. Machine learning tools that semi-automate data extraction from randomized trials may create efficiencies in systematic review production. We evaluated a machine learning and text mining tool’s ability to automatically extract data elements from pediatric randomized trials and save time compared with manual extraction and verification.

Methods: For 75 pediatric randomized trials, we manually extracted and verified data for 21 data elements. We uploaded the pediatric randomized trials to an online machine learning and text mining tool (ExaCT), and quantified performance by evaluating its ability to identify the reporting of data elements (reported or not reported), and the relevance of the extracted sentences, fragments, and overall solutions. For each pediatric randomized trial, we measured the time to complete manual extraction and verification, and to review and amend the data extracted by the tool. We calculated the median (interquartile range [IQR]) time to extract and verify data, both manually and using the tool, and overall time savings.

Results: The tool identified the reporting of data elements with median 91% (IQR 75% to 99%) accuracy. Among the top five sentences for each data element at least one sentence was relevant in a median 88% (IQR 83% to 99%) of cases. Among a median 90% (IQR 86% to 96%) of relevant sentences, pertinent fragments had been highlighted by the tool; exact matches were unreliable (median 52% [IQR 32% to 73%]). A median 48% of solutions were fully correct, but performance varied greatly across data elements (IQR 21% to 71%). Using ExaCT to assist the first reviewer resulted in modest time savings compared with manual extraction by a single reviewer (18 vs. 22 hours total extraction time across 75 pediatric randomized trials).

Conclusion: Using ExaCT to assist with data extraction resulted in modest gains in efficiency compared with manual extraction. The tool was reliable for identifying the reporting of most data elements. The tool’s ability to identify at least one relevant sentence and highlight pertinent fragments was less reliable. The evaluation of this and other tools that intend to create efficiencies in systematic review processes will inform their continued development and could ultimately result in improved patient care.

Allison Gates
Non-faculty Staff – ARCHE
Supervisor: n/a
Poster #18
LOCATE: A prospective evaluation of the value of Leveraging Ongoing Citation Acquisition Techniques for living Evidence syntheses

Authors/Co-authors:
Michelle Gates, Sarah A Elliott, Allison Gates, Meghan Sebastianski, Jennifer Pillay, Liza Bialy, Lisa Hartling

Introduction:
Evidence-based decision making in healthcare relies on conclusions about the body of evidence from systematic reviews. These can be time- and resource-intensive to produce, resulting in many becoming out of date soon after publication and potentially having conclusions that are no longer accurate. Living systematic reviews (LSRs) can circumvent these issues by incorporating new evidence in real time. However, the methods needed to identify new studies in a timely manner are not well established. We aimed to explore the value of complementary search approaches in terms of search performance, impact on results and conclusions, screening workload and feasibility versus the reference standard.

Methods:
We developed three complementary search approaches for a systematic review on treatments for bronchiolitis: Automated Full Search, Pubmed Similar Articles, and Scopus Citing References. These were automated to retrieve results monthly; pairs of reviewers screened the records and commented on feasibility. After one year, we conducted a full update search (reference standard). For each complementary approach, we compared search performance (proportion missed, number needed to read to locate one included trial [NNR]), and reviewer workload (number of records screened, time required) to the reference standard. We investigated the impact of the new trials on the effect estimate and certainty of evidence for the primary outcomes. We summarized comments about feasibility.

Results:
Via the reference standard, reviewers screened 505 titles/abstracts, 24 full texts, and identified four new included trials (NNR 127; 12.4 hours). Of the complementary approaches, only the Automated Full Search located all four trials; these were located six to 12 months sooner than via the reference standard but did not alter the results nor certainty in the evidence. The Automated Full Search was the most resource-intensive approach (816 records screened; NNR 204; 17.1 hours). The Pubmed Similar Articles and Scopus Citing Articles approaches located fewer records (452 and 244, respectively), thereby requiring less screening time (9.4 and 5.2 hours); however, each of these approaches located only one of the four new trials. Reviewers found it feasible and convenient to conduct monthly screening for searches of this yield (median 15-65 records/month).

Conclusion:
The Automated Full Search was the most resource-intensive approach, but also the only approach to locate all of the newly included trials. Although the monthly screening time for the Pubmed Similar Articles and Scopus Citing Articles was far less, most relevant records were missed. All approaches were feasible to integrate into reviewer work processes.

Michelle Gates
Non-faculty staff – ARCHE
Supervisor: n/a
Poster #19
Title:
Severe Obesity and Global Developmental Delay in Preschool Children: Findings from a Canadian Paediatric Surveillance Program

Authors/Co-authors:
Nicole D. Gehring¹, Geoff D.C. Ball¹, Stacey Belanger², Tracey Bridger³, Jean-Pierre Chanoine⁴, William T. Gibson⁴, Stasia Hadjiyannakis⁵, Jess Haines⁶, Jill Hamilton⁷,⁸, Andrea Haqq¹, Melanie Henderson², Josephine Ho⁹, Brittany Irvine¹⁰, Laurent Legault¹¹, Paola Luca⁹, Jonathon Maguire⁷,¹², Amy C. McPherson⁷,¹³, Katherine Morrison¹⁴, Gita Wahi¹⁴, Rosanna Weksberg⁷,⁸, Lonnie Zwaigenbaum¹, Catherine S. Birken⁷,⁸

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Introduction:
No Canadian studies have examined co-occurring severe obesity (SO) and global developmental delay (GDD) in preschool children. We aimed to determine (1) minimum incidence, (2) current use of healthcare services, and (3) age of onset and risk factors as well as to (4) improve healthcare providers’ awareness of SO and GDD.

Methods:
A monthly survey was distributed to general paediatricians and paediatric subspecialists (~2,500) participating in the Canadian Paediatric Surveillance Program (CPSP) from February 1, 2018 to January 31, 2020 to report new cases of SO and GDD among children ≤5 years of age. SO was defined as body mass index ≥99.9th percentile for age and sex. GDD was defined as a significant delay in ≥2 developmental domains (i.e., gross motor, fine motor, speech/language, cognitive, social/personal, delay in activities of daily living). We used descriptive statistics and qualitative synthesis to summarize the data.

Results:
In total, 89 cases were reported to the CPSP, however only 62 were received and only 47 cases (64% male; mean age: 3.5±1.2 years; BMI z-score: 7.2±3.6) met the case definition and were included in the analysis. Genetic tests were ordered for 64% (n=30) of cases, including microarray (n=27; 57%). A variety of clinicians and services were involved in their care, including general pediatricians (n=39; 83%), dietitians (n=35; 75%),
speech therapy (n=33; 70%), family physicians (n=32; 68%), and child development programs (n=29; 62%). CPSP participants reported age of first weight concerns at 2.5±1.3 years and age of GDD diagnosis at 2.7±1.4 years. Family history revealed that 32% (n=15) of mothers and 19% (n=9) of fathers were also diagnosed with obesity. Reported health problems included school and/or behavioural problems (n=17; 36%), snoring (n=14; 30%), and asthma or recurrent wheezing (n=10; 21%). 34% of cases (n=16) were also diagnosed with Autism Spectrum Disorder. Challenges in supporting children with SO and GDD included family dynamics and difficulties accessing appropriate services and resources.

Conclusion:
Fewer than 50 cases were confirmed which is likely an underestimate of SO and GDD in Canada. Limited reporting may have been due to physicians’ competing priorities and new privacy legislation which ceased surveillance in Quebec. However, based on the confirmed cases, age of onset for weight concerns and GDD diagnosis was between 2.5-2.7 years of age. Multidisciplinary service provision was common; however, challenges with access were identified. Increasing awareness of SO and GDD in Canadian preschool children may help direct appropriate management strategies.
Title:
Systematic review of antimicrobial lock solutions for prevention of central venous catheter infections in pediatric patients with intestinal failure

Authors/Co-authors:
Bridget Gibson, Claire McNiven, Meghan Sebastianski, Robin Featherstone, Ben Vandermeer, Rabin Persad, Joan Robinson

Introduction:
Children with intestinal failure (IF) are dependent on parenteral nutrition (PN) via a central venous catheter (CVC) for survival, and are at high risk of catheter-related bloodstream infections (CRBSI). Prevention of CRBSI is imperative, as these infections can require catheter removal and access site loss. Eventually there may be no available CVC sites, necessitating an intestinal transplant. Antimicrobial locks (AML) are solutions instilled in CVCs to prevent CRBSI. There are multiple solutions available, but limited evidence guiding the optimal choice and regimen for prophylactic AML solution in children with IF. Guidance for appropriate prophylactic AML use has the potential to decrease rates of CRBSI and reduce morbidity and mortality in pediatric IF patients.

Methods:
Children with intestinal failure (IF) are dependent on parenteral nutrition (PN) via a central venous catheter (CVC) for survival, and are at high risk of catheter-related bloodstream infections (CRBSI). Prevention of CRBSI is imperative, as these infections can require catheter removal and access site loss. Eventually there may be no available CVC sites, necessitating an intestinal transplant. Antimicrobial locks (AML) are solutions instilled in CVCs to prevent CRBSI. There are multiple solutions available, but limited evidence guiding the optimal choice and regimen for prophylactic AML solution in children with IF. Guidance for appropriate prophylactic AML use has the potential to decrease rates of CRBSI and reduce morbidity and mortality in pediatric IF patients.

Results:
A total of 991 studies were identified (initial search May 2018, update search July 2020). After screening by two reviewers, 28 observational studies were included in the systematic review. References were screened with no additional studies identified. The most frequently studied AMLs were ethanol (15 studies) and taurolidine (9 studies). Other AML solutions used were tobramycin with tissue plasminogen activator (tPA), tPA alone, and tetrasodium-ethylenediaminetetraacetic acid (EDTA), gentamicin, vancomycin, and amikacin. Of the 28 included studies, 19 demonstrated statistically significant reduction in CRBSI with AML use, 8 had a trend toward reduction of CRBSI, and 1 showed no improvement.

Conclusion:
This research aims to provide guidance on AML use for CRBSI prophylaxis in pediatric patients with IF. A meta-analysis will be performed with the data. Although there is still a need for randomized trials to select the optimal AML and regimen, it appears that AML may prevent some CRBSI.

Bridget Gibson
Resident – Gastroenterology & Nutrition
Supervisor: Dr. Joan Robinson
Poster #21
Title:
Impact of early surgical correction/palliation of congenital heart defects in infants with symptomatic viral respiratory tract infections in the current era.

Authors/Co-authors:
Dr. Nick A. Giffin, Dr. Gonzalo Guerra, Dr. Joan Robinson, Dr. Chloe Joynt, Dr. Ivan Rebeyka and Dr. V. Ben Sivarajan.

Introduction:
Convention has been to wait 4-6 weeks after a respiratory tract infection in infants with congenital heart disease to undergo surgical correction of their underlying cardiac defect. This study investigates the impact of timing of surgery among infants with congenital heart disease and active respiratory tract infections in a contemporary Western Canadian cohort.

Methods:
This was a retrospective matched cohort study of infants 1 week to 6 months of age undergoing surgical repair of congenital heart disease between 2014 and 2017. Cases had active respiratory tract infections preoperatively and were matched to controls based on primary heart lesion. The primary outcome was time to extubation.

Results:
We identified 20 cases of infants with active respiratory tract infections in our study time period who underwent surgical intervention (median age 3.4 [2.4, 4.3] months). Cases were matched to 40 controls (1:2 ratio). In cases, surgery occurred at a median of one day after the positive viral testing. There were no statistically significant differences between cases and controls in time to extubation (59 vs 34 hours; p = 0.12), postoperative vasoactive scores at 24 hours (0 vs 0; p = 0.53), 48 hours (0 vs 0; p = 0.23), maximum vasoactive score in postoperative period (5 vs 5.5; p = 0.54), or time to hospital discharge (13 vs 12 days; p = 0.39). Cases had increased duration of total respiratory support (including non-invasive ventilation, 3.5 vs 2 days; p = 0.02) and postoperative intensive care unit length of stay (5.5 vs 3 days; p = 0.01).

Conclusion:
Cardiac surgery on infants with congenital heart disease during an acute viral respiratory tract infection may yield a clinically relevant prolongation in time to extubation.
Title:
Building Capacity for Community Pediatric Autism Diagnosis: A Systemic Review of Physician Training Programs

Authors/Co-authors:
Xiaoning Guan, Lonnie Zwaigenbaum, Lyn Sonnenberg

Introduction:
Training primary care providers in autism diagnostic assessment could improve access and decrease wait times. Several training models have been described, but their outcomes with respect to quality of assessment and impact on system capacity have not been systematically examined. To identify and summarize published studies that included an ASD diagnosis training for community clinicians, including details of the training models, and evaluation measures and outcomes.

Methods:
Systematic searches of electronic databases, reference lists, and journals identified 6 studies that met predetermined inclusion criteria. These studies were critically reviewed in order to characterize a) study design (sampling, measurement and evaluation), b) training model, c) outcomes.

Results:
All studies were either pre-post design or non-randomized trials with a relatively small number of participants and patients. There was considerable heterogeneity among studies regarding the training provided and the program evaluation process. The most evaluated outcomes were access to autism diagnosis, and accuracy of diagnosis.

Conclusion:
There is some evidence that training primary care providers to make autism diagnosis can lead to improved access and decreased wait time with a high level of diagnostic agreement between trained providers and traditional expert teams. The low-quality methods, and the heterogeneity of training program and outcome assessments limited the ability of the review to compare programs and combine data across studies. This review also highlights important questions about what are relevant outcomes to consider when evaluating the quality of ASD diagnostic assessments, across the continuum of approaches.

Xiaoning Guan
Resident – General & Community Pediatrics
Supervisor: Dr. Lonnie Zwaigenbaum
Poster #23
Title:
Caregiver Engagement in Perinatal Stroke Research

Authors/Co-authors:
Leah Hammond, John Andersen, Jacqueline Pei, Jerome Y. Yager, Adam Kirton, Brian Brooks, Lisa Smithson, & Carmen Rasmussen

Introduction:
Perinatal stroke is a leading cause of cerebral palsy and lifelong disability. For many families, a diagnosis of perinatal stroke is unexpected and devastating. Despite the growing clinical awareness of perinatal stroke and an expanding body of research literature, the research priorities of families may not be reflected in current perinatal stroke research. Our primary aim was to identify the research priorities of caregivers of children with perinatal stroke. As a secondary aim, we sought to understand caregivers’ current awareness of, and access to, perinatal stroke research.

Methods:
Participants included 19 primary caregivers of children aged 5-16 years with perinatal stroke. All children were previously diagnosed with neonatal arterial ischemic stroke, arterial presumed perinatal ischemic stroke, or periventricular venous infarction. Thirteen children reported impairment of both upper and lower extremities and 5 reported no motor impairment. Participants were identified from the Alberta Perinatal Stroke Project (APSP). All caregivers were biological mothers. Caregivers completed the Research Engagement Questionnaire, a 16-item questionnaire designed by our study team, which included questions about their research priorities, their awareness of ongoing perinatal stroke research, and their access to information about perinatal stroke. Most questions were in a multiple-choice format, including either a 5-point Likert scale or checkboxes. Responses to an open-ended item were considered through inductive theme analysis.

Results:
Caregivers identified important research questions clustered around two themes: causes/prevention (76.5%) and improving outcomes (58.8%). Within the theme of Improving Outcomes, two subthemes were identified: Neurobehavioural (29%) and Motor (17.6%). On Likert ratings of research priorities, caregivers consistently ranked treatments for behavioural difficulties (78.9%), mental health (73.7%), communication (68.4%), and self-care abilities (68.4%) as high research priorities.

Forty-two percent of caregivers were aware of ongoing Canadian perinatal stroke research. Fifty-five percent did not use any existing internet resources for information about perinatal stroke. However, eighteen of the nineteen caregivers (94.7%) reported that they were interested in receiving information about research findings. The majority of caregivers (68.4%) agreed that research was helping their family and others with perinatal stroke.

Conclusion:
Caregivers of children with perinatal stroke may prioritize areas, such as improving neurobehavioural outcomes, that may not be well represented by current areas of research focus. Caregiver access to information needs to be improved. Closer collaboration among researchers and family partners be advantageous in setting research priorities.

Leah Hammond
Graduate Student – Developmental Pediatrics
Supervisor: Dr. Carmen Rasmussen
Poster #24
Title:
The impact of marijuana legalization on Albertan children and youth

Authors/Co-authors:
Dr. Sarah Johnson, Dr. Dominic Allain, Dr. Michelle Simonelli, Dr. Scott Lucyk

Introduction
With Bill C-45 Canada legalized recreational cannabis use with sales in Alberta beginning in October 2018. The effect of this decision on children and youth remains unknown. There is plentiful literature from the United States showing where legalization occurred there has been an increase of calls to poison control centres and presentations to emergency departments for pediatric cannabis overdoses. There is preliminary data from the Canadian Paediatric Surveillance Program showing high rates of accidental cannabis ingestion in children and youth. These exposures can be quite dangerous to children — in some cases resulting in intubation and admission to the pediatric intensive care unit. We also know adolescents are at high risk of problems related to cannabis use such as dependency, overuse, and cannabis hyperemesis syndrome which is characterized by intractable vomiting and abdominal pain. Our project aims to discover the effect of legalization of recreational cannabis on pediatric patients in Alberta.

Methods:
This is a retrospective multi-site chart review analyzing the 2 year periods before and after legalization of recreational cannabis in Canada. We will analyze information from the two tertiary pediatric hospital emergency departments in the province – the Stollery in Edmonton, and Alberta Children’s Hospital in Calgary. We will analyze the periods before and after legalization to see if there has been a significant change, as well as describe the details of the presentations to the emergency department considering patient and exposure characteristics, the final diagnosis, and what management was required. We will also be collecting data from Alberta’s poison control centre over this same four year period to see whether there was a change in the volume of calls post-legalization.

Results:
This is an ongoing study and is one of the first studies of its kind published in Canada following the legalization of recreational cannabis. With this information we will be able to characterize not only overdoses in pediatric patients, but also the utilization of emergency services for cannabis related concerns in adolescents in Alberta.

Conclusion:
This study will help us know more about the impact of recreational cannabis legalization on Albertan children and youth. This information may help guide provincial policies and injury prevention strategies for the especially vulnerable populations that tend to be affected by this issue.
Title:
Pediatric Impact of Mycotoxins: A World Health Organization Review

Authors/Co-authors:
Kaden Lam, Caseng Zhang, Patrick Hicks, Lesley Brennan, Anne Hicks

Introduction:
A team at the University of Alberta is responsible for creating and updating World Health Organization “train the trainer” resources for clinical educators in pediatric environmental health. This literature review updated the mycotoxin module and explored the pediatric impacts of mycotoxins. The global prevalence of mycotoxins, along with their acute and chronic effects, significantly impact pediatric health outcomes. With global concerns such as global warming, poverty, food insecurity, and flooding, mycotoxins are becoming increasingly prevalent and concerning on a global level.

Methods:
Information was identified through a literature search on health impacts of mycotoxins using PubMed and Google Scholar. Abstracts were screened for relevant content. Information lacking scientific validity or clinical relevance was removed from the outdated module.

Results:
Mycotoxins are secondary metabolites of fungal growth that result in acute and chronic effects in humans. Exposure occurs mainly through ingestion, but inhalation and skin contact can also cause disease. Developing nations are most at risk due to food insecurity and a lack of adequate storage and sanitation practices. Children are also more sensitive to mycotoxin exposure due to their lower body weight, higher metabolic rate, and organ immaturity resulting in less efficient liver detoxification mechanisms. Mycotoxins also have a higher prevalence in infant food and formula. Due to their higher sensitivity, some mycotoxicoses can only be found in children and some are more apparent in children compared to adults. The acute impacts of mycotoxin poisoning are also more frequent and severe in children. Additionally, mycotoxins can be transferred from mother to child through the placenta and certain mycotoxins also have teratogenic effects, making pregnant women and their fetuses another vulnerable population.

Conclusion:
Factors associated with global warming and poverty increase the risk of acute mycotoxin-related illness and chronic effects that jeopardize long-term pediatric health outcomes. Developing areas with high food insecurity and lack of proper food-storage techniques are particularly at risk, with children and pregnant women being the most vulnerable. There is a lack of research in this field and treatments with clinical based evidence are minimal, so only supportive therapies are used. Therefore, the most effective way to prevent and reduce global mycotoxin exposure in vulnerable pediatric and pregnant populations is by advocating for improved food security and storage, providing education about mycotoxins, and addressing climate change.

Kaden Lam
Undergraduate – iHOPE
Supervisor: Dr. Anne Hicks
Poster #26
Title:
Midline Spikes and Intractable Seizures in Pediatric Epilepsy: Case Series and Review

Authors/Co-authors:
Kailie Luan MD; David Barry Sinclair MD; Janani Kassiri MD, PhD

Introduction:
Pediatric refractory epilepsy accounts for 10-30% of pediatric epilepsy resulting in severe long-term consequences of the developing brain. Epileptic discharges localized to the midline vertex are rare in pediatric epilepsy and not well understood. Previous studies suggest seizure onset often occurs within the first ten years of life with abnormal neuroimaging in 30-40% percent of patients. However, pathological findings underlying the epileptogenic zone, electroclinical correlation, and long-term outcomes of children with midline seizures are not adequately described. Our study aimed to understand the etiology of midline epileptic discharges using radiological and clinical features, and to define post-surgical seizure outcomes in these patients.

Methods:
Ethics approval was obtained. We reviewed clinical charts, electroencephalography (EEG) records, and neuroimaging studies of ten pediatric patients in the Comprehensive Epilepsy Program with epileptic discharges localized to the midline vertex (Fz, Cz, Pz) on EEG. The seizures were classified according to the International League Against Epilepsy criteria and semiology. Patient age, sex, seizure types, seizure etiology, Magnetic Resonance Imaging results reported by a neuroradiologist, coexisting neurological diagnoses, and seizure outcomes in these patients were obtained.

Results:
In our cohort of ten patients, focal seizures with and without impaired awareness were the most prevalent seizure types experienced by 90% of patients with midline discharges. Age of seizure onset was within the first 10 years of life in nine out of ten patients. Heterogenous radiological and pathological etiologies were found in children with midline seizures. However, focal cortical dysplasia (FCD) type II was the most common and present in 50% of patients. Four out of five children with FCD had normal neuroimaging studies and medically intractable epilepsy. However, seizure freedom was achieved in three out of four of these patients following surgical resection of the epileptogenic zone.

Conclusion:
In this small case series we demonstrated that patients with midline epileptic discharges on EEG are associated with intractable focal seizures and early seizure onset. Although neuroimaging studies are often reported as normal, surgery may be beneficial for seizure control as the most common pathology found in our study was FCD. These results have the potential to treat otherwise intractable epilepsy by localizing midline epileptic discharges early, defining the epileptogenic zone for surgical resection, and achieving seizure freedom in children with this electroclinical syndrome.

Kailie Luan
Resident – Neurology
Supervisor: Dr. Barry Sinclair
Poster #27
Pre-Transplant Vaccination Rates in Pediatric Solid Organ Transplant Recipients

Authors/Co-authors:
Sarah Lum, Bsc MD, Shannon MacDonald, PhD RN, Wendy Vaudry, MD, Catherine Burton, MD MSc

Introduction:
Children receiving a solid organ transplant (SOT) are at an increased risk of severe infections from vaccine-preventable diseases. Risks associated with vaccine preventable diseases can be minimized by optimizing immunization in this vulnerable population, ideally prior to transplant when maximum immune response is expected and risks are minimal. In Alberta, we have protocols and processes in place to optimize immunization of children prior to SOT. Since 2006, we have had formal immunization guidelines for pediatric SOT candidates and recipients in Alberta. Immunizations in Alberta are provided by Public Health in the community and can be provided to children in hospital upon request. In addition, evaluation of immunization status by a pediatric infectious disease specialist is a standard part of the pre-transplant assessment process for pediatric recipients.

Objectives:
To determine the pre-transplant immunization coverage for vaccines recommended in the ‘Alberta Immunization Guidelines for children expecting SOT’ among all children who received SOT (heart, lung, liver, kidney, small bowel) at the Stollery Children’s Hospital from 2006 to Dec 2019. To investigate associations between immunization coverage and patient factors including age at transplant, organ transplanted, and time on the transplant list.

Methods:
This study will be carried out through retrospective chart review. Children receiving SOT at the Stollery Children’s Hospital from 2006 to 2019 will be identified from an existing transplant database. Pre-transplant immunization records and patient baseline characteristics, including the organ transplanted, age at transplant, time on waiting list and waitlist status, will be obtained through the Organ Transplant Tracking Records (OTTR) database and Connect Care. We will compare immunization records to the Alberta Immunization Guidelines for children expecting SOT to determine vaccine coverage according to patient age and organ transplanted. Descriptive statistics will be used to describe the pre-transplant immunization coverage by vaccine as well as the baseline patient characteristics. Logistic regression will be used to explore associations between patient characteristics and pre-transplant immunization coverage.

Results: n/a

Conclusion: N/A

Expected Outcomes and Implications:
This project will allow us to determine the pre-transplant immunization coverage for pediatric SOT candidates with our current protocols and processes in place and potentially identify patient characteristics associated with lower pre-transplant immunization coverage, thus allowing us to target specific groups in future quality improvement projects to increase pre-transplant immunization coverage.

Sarah Lum
Resident – General & Community Pediatrics
Supervisor: Dr. Catherine Burton
Poster #28
Title:
*Developmental Changes in Phosphate Homeostasis*

Authors/Co-authors:
MacDonald, Tate; Alexander, Todd

Introduction:
Phosphate (Pi) is a multivalent ion critical for a variety of physiological functions including plasma membrane composition, energy currency and bone integrity. The role of Pi in conferring bone strength is via formation of the calcium-phosphate salt hydroxyapatite. Formation of hydroxyapatite occurs rapidly in infancy and childhood given the high rate of bone development during this period. A positive Pi balance is necessary for this to occur, which is likely accomplished by a combination of elevated renal reabsorption and intestinal absorption of Pi. At the level of the small intestine, absorption can occur via the transcellular pathway mediated by secondary active sodium (Na\(^+\))–Pi transport, namely via the transporter NaPiIIb, or by the paracellular pathway mediated by tight junction proteins known as claudins. This work investigates how the young mammal optimizes dietary Pi absorption from the small intestine to establish the Pi balance sufficient for rapid bone formation.

Methods:
Real-time qPCR performed was performed on tissue from FVB/N wild-type mice aged 1, 7, 14 days and 1, 2, 3 and 6 months to determine the developmental small intestinal expression profile of secondary active transporters and claudins involved in Pi absorption. Ussing chamber studies were employed to determine developmental changes in paracellular Pi permeability *ex vivo* on mice aged 7-11 days (infant) or 8-17 weeks (adult) of age. To determine age-related differences in Pi absorption, net Pi flux studies were performed *ex vivo* in Ussing chambers on 7-11-day-old or 8–15-week-old mice using the radioisotope phosphorus 33. Notably, all mice were weaned at 3 weeks of age.

Results:
NaPiIIb displayed peak expression prior to weaning in all small intestinal segments, followed by a decline into adulthood. In the duodenum and jejunum, NaPiIIb expression was nondetectable beyond 14 days of age. In the ileum, NaPiIIb expression persisted into adulthood. No notable developmental changes in claudins mediating Pi absorption were observed. Accordingly, no alterations in paracellular Pi permeability were observed in the two age groups assessed. P33 flux studies have only been completed in adults, which have shown consistent net absorption in the ileum and a combination of absorption and secretion in the duodenum and jejunum.

Conclusion:
Based on these results it is likely that increased Pi absorption in young mammals compared to adults owes to elevated secondary active Na\(^+\)–Pi transport in the small intestine early in life, and that paracellular Pi absorption likely does not contribute to this difference.
Title:
Implementing Solar Oxygen Systems in Somalia: A Qualitative Study

Authors/Co-authors:
Qaasim Mian, Sophie Namasopo, Robert Opoka, Abdiwali Mohamed Ahmed, Michael Hawkes

Introduction:
Access to sustainable therapeutic oxygen for hypoxemia management in low-resource settings remains a significant global health issue. Our team has previously implemented solar-powered oxygen delivery (SPO2) systems for the management of pediatric pneumonia, the leading cause of childhood mortality worldwide, and demonstrated the feasibility, reliability and effectiveness of these systems. During the COVID-19 pandemic, the demand for oxygen has risen significantly. Here we describe the implementation of solar-powered oxygen systems in a conflict zone in Somalia and the experience of local users, including their knowledge, attitudes, and practices.

Methods:
We performed a qualitative study with three focus group discussions (FGDs), each with five stakeholders, including nurses, midwives, and family members of patients. Focus group discussion questions were probing and elastic, allowing participants to shape the discussion. Thematic analysis of the English translated transcripts was performed to synthesize qualitative data.

Results:
In January 2021, we installed a SPO2 system at Xanaano Referral Health Centre in Galmudug State, Somalia, a conflict-ridden region with poor health care services. FGDs (N=15) were conducted in February 2021 to understand the experiences of local users of the system. Nurses described poor access to oxygen prior to the implementation of SPO2, knowledge gaps with utilization of oxygen and pulse oximetry, and barriers in educating families about the need for oxygen. Additional barriers to access included difficulty transporting patients to higher acuity centres and local conflict. This resulted in solar oxygen being utilized for victims of conflict, such as during anaesthesia for gunshot wound management.

Conclusion:
SPO2 is an effective and sustainable means of oxygen delivery in low-resource settings with local conflict. FGDs with nurses and users highlight the effectiveness of these systems as well as some potential barriers to uptake that should be further addressed.

Qaasim Mian
Resident – Infectious Diseases
Supervisor: Dr. Michael Hawkes
Poster #30
Title:
The accuracy and clinical implications of point-of-care testing in children

Authors/Co-authors:
Chelsea Morin, Ambikaipakan SenthilSelvan, Anna K Füzéry, Manjula Gowrishankar

Introduction:
Point-of-care testing (POCT) is commonly used at our institution to gather data quickly for sick patients, including electrolytes, glucose, and hemoglobin. Serum electrolytes, hemoglobin, and glucose are the gold standard of testing, but the results often lag POCT by a significant time period. Management decisions are made on the results returned by POCT. Thus, it is imperative to determine the accuracy of POCT at our institution.

We aimed to determine whether POCT is an accurate and clinically appropriate method to measure electrolytes, glucose, and hemoglobin compared to standard serum testing.

Methods:
This study retrospectively reviewed 128 consecutive patients either assessed in the emergency department or admitted prior to November 1, 2019 who had both POCT and serum electrolytes (+/- glucose, hemoglobin, and lactate) performed within four hours of each other. A sample size of 128 was required to determine a difference of 3 mmol/L in sodium for an effect size of 0.5 with 0.05 level of significance and 80% statistical power. Patient demographics and additional labs drawn within four hours of POCT were extracted. Paired t-tests were used to compare values between serum testing and POCT for each patient. Secondary kappa coefficient analyses were performed to look at agreement within clinically-determined normal ranges. POCT was performed on Radiometer ABL835 FLEX analyzers, while serum testing on Beckman Coulter DxC 800 analyzers.

Results:
There were 56 males and 72 females; age range 0.01 - 17.93 years. There were statistically significant differences between POCT and serum values for all electrolytes and hemoglobin with POCT over-estimating but not for glucose. Within clinically-determined normal ranges, there was substantial agreement between POCT and serum potassium, glucose, and hemoglobin and fair agreement for sodium and bicarbonate.

Conclusion:
Our study highlights the importance of verifying abnormal POCT electrolytes and hemoglobin with serum values. Even when POCT values are normal, clinically significant hyponatremia and hypokalemia may not be detected and when abnormal, hypernatremia and hyperkalemia may be overestimated. In patients with dysnatremia, if diagnosed with serum sodium and monitored with POCT or vice versa, there is a potential for incorrect diagnosis and/or rate of correction with clinical impact. Thus, when following electrolytes and hemoglobin values in a patient, POCT and serum should not be interchanged and if there is clinical suspicion for these to be abnormal, verification with serum is warranted. Our study is limited to the specific POCT analyzer used and behaviour of another analyzer may be different.
Title: Antibiotic use in Multisystem Inflammatory Syndrome patients at Stollery Children’s Hospital

Authors/Co-authors: Morin, E., Lee, B. and Tse-Chang, A.

Introduction: Multisystem Inflammatory Syndrome in Children (MIS-C) is an inflammatory disorder that occurs following SARS-CoV-2 infection and can manifest initially with symptoms concerning for sepsis or bacterial infection, resulting in high rates of antibiotic administration. This study aims to describe the presenting features of children with MIS-C admitted at Stollery Children’s Hospital (SCH) and document the management for these patients, focusing on antibiotic utilization.

Methods: Children (<18 years of age) admitted to SCH between July 1, 2020 and February 28, 2021 with a possible diagnosis of MIS-C were identified. Patient characteristics, presenting symptoms, investigations and management were extracted from chart review. Antibiotic prescriptions were reviewed for choice, changes, and duration.

Results: Sixteen patients were admitted with a possible diagnosis of MIS-C during the study period. All had laboratory evidence of inflammation and multi-system involvement and 13 patients (81.3%) had either a positive COVID-19 test (PCR or antibody) or exposure to a confirmed COVID-19 case. Eleven patients required intensive care unit (ICU) admission with a median duration of ICU stay of two days and ten required inotropic support. Thirteen children (81.3%) received empiric antibiotics on admission, most commonly ceftriaxone, vancomycin and piperacillin-tazobactam (administered in 61.5%, 46.2% and 30.1% of patients receiving antibiotics, respectively). Days of therapy (DOT) were calculated for each antibiotic for all patients and ceftriaxone, vancomycin and piperacillin-tazobactam had the highest DOT at 23, 22 and 16 days respectively. The most common reasons for a change in antibiotics within the first three days of therapy was discontinuation due to an alternative diagnosis or lack of indication for the antibiotic. The median duration of inpatient antibiotics was two days. There was one positive blood and one positive urine culture, both considered contaminants. Fourteen patients had MIS-C as their primary diagnosis at discharge, while two had more likely diagnoses (drug reaction and hypotensive shock presumably due to appendicitis). Two children had concurrent diagnoses of lymphadenitis.

Conclusion: Of patients admitted with a potential diagnosis of MIS-C, the majority required admission to the ICU and inotropes. As expected, there was a high rate of empiric antibiotic prescriptions for possible sepsis. However, no invasive bacterial infections were identified, and most antibiotics were stopped or de-escalated appropriately within 3 days. The top three prescribed antibiotics were ceftriaxone, vancomycin and piperacillin-tazobactam. Empiric antibiotic choices can be refined. Ceftriaxone can be considered for sepsis coverage pending cultures, but additional empiric antibiotics should be tailored to each patient.

Estelle Morin
Resident – Infectious Disease
Supervisor: Dr. Alena Tse-Chang
Poster #32
Title:
The Pediatric Dystonia Management Protocol at the Stollery Children’s Hospital

Authors/Co-authors:
Ng A, Goez H, Mailo J

Introduction:
We have previously introduced the Pediatric Neuroirritability Management Protocol as a guide for clinicians to help patients with central pain behaviours due to previous pain injury. The literature on the management of dystonia in children with progressive genetic and metabolic conditions is also sparse, and a dystonia management protocol has yet to be developed at our institution.

Methods:
We searched for relevant primary research and articles on PubMed. We reviewed the evidence of each pharmacological agent and added non-pharmacological strategies. We developed management guidelines for dystonia at our hospital. This protocol was reviewed by several pediatric neurologists and pediatric palliative care specialists at the Stollery and SickKids Hospitals.

Results and Conclusion:
We present the Pediatric Dystonia Management Protocol for the Stollery Children’s Hospital. Further study is required to assess whether this protocol can be adapted to treat dystonia in the context of other neurological conditions such as hypoxic-ischemic encephalopathy and non-accidental injury. In addition, we plan to quantify patient’s improvement by a patient survey after the protocol is implemented.

Cheuk-Him (Andy) Ng
Resident – Neurology
Supervisor: Dr. Janette Mailo
Poster #33
Title: Exploring Virtual Teaching Approaches Among Pediatricians During the SARS-CoV-2 Pandemic: A Virtual Ethnographic Study

Authors/Co-authors: Marghalara Rashid, PhD1,†; Julie Nguyen, MA1,†; Jessica L. Foulds, MD1; Sarah E. Forgie, MD, MEd1,*
1Department of Paediatrics, University of Alberta, Edmonton, Alberta, Canada
†These authors contributed equally to this work.

Introduction: In early 2020, as an adaptation to the uncertainty of what effect SARS-CoV-2 would have on our healthcare system, and out of an abundance of caution, medical education shifted radically. With campus closures, remote delivery, and altered clinical rotations and experiences, fundamental changes were occurring in our society and in our medical training programs.1,2 These shifts were experienced abruptly and worldwide, with numerous local experiences of these transitions having been shared including a systematic review of teaching innovations.3 Student and learner perspective, was the reported measure or outcome in many of these reports. There is little empirical research conducted on understanding pediatricians' experiences with synchronous online teaching specifically, during the SARS-CoV-2 pandemic. To address this knowledge gap, we wanted to gain an in-depth understanding of pediatricians' perspectives virtual teaching and their pedagogical approaches, focusing on the following question: How is synchronous virtual teaching during a pandemic impacting and transforming the experiences of pediatricians?

Methods: A virtual ethnography was conducted guided by an online collaborative learning theory. This approach used both interviews and online field observations to obtain objective descriptions and subjective understandings of the participants, and the data obtained underwent thematic analysis. Pediatric educators (clinical and academic faculty) were recruited using purposeful sampling and invited to participate in individual interviews and online teaching observations. Data was recorded and transcribed verbatim. Thematic analysis was conducted on data obtained.

Results: Fifteen pediatricians from a large research-intensive university in Canada were recruited. Four main themes, with sub-themes, emerged: (i) The love/hate relationship with the virtual shift; (ii) The pressure to increase virtual engagement; (iii) Looking back, moving forward; (iv) Accelerated adaptation and enhanced collaboration

Conclusion: The SARS CoV-2 pandemic had substantial impact on pediatric medical education. Pediatricians adopted new delivery methods quickly and found many efficiencies and opportunities in this shift. Continued use will lead to increased collaboration, enhanced student engagement strategies and blending the advantages of virtual and face to face learning.

Julie Nguyen
Staff – Medical Education
Supervisor: Dr. Sarah Forgie
Poster #34
Title:
Parent and Adolescent Perspectives of Patient Navigation in Managing Pediatric Obesity

Authors/Co-authors:
Marcus O’Neill¹, Maryam Kebbe², Arnaldo Perez¹, Mitchell Rath³, Josephine Ho³, Ian Zenlea⁴, Geoff D.C. Ball¹
1 University of Alberta, Edmonton, AB
2 Pennington Biomedical Research Center, Louisiana State University, Baton Rouge, LA
3 University of Calgary, Calgary, AB
4 University of Toronto, Toronto, ON

Introduction:
Families face numerous barriers to access health services for managing pediatric obesity. Patient navigators have been used successfully to improve health care access among adults in some areas of chronic disease management (e.g., cancer, diabetes), but the feasibility and acceptability of this strategy to enhance access to pediatric obesity management remains to be established. The objective of this study is to describe parents' and adolescents' perspectives and preferences of using navigators to enhance access in pediatric obesity management.

Methods:
Data were collected between March and December, 2020 from the Pediatric Centres for Weight and Health (Stollery Children's Hospital and Alberta Children's Hospital) located in Calgary and Edmonton, AB. Parents and adolescents (13–18y; BMI ≥85th percentile) who currently attend or have previously attended these clinics were interviewed individually by telephone using a structured interview guide. Descriptive data analysis included calculating measures of central tendency and proportions.

Results:
Twenty-three parents (21 females; 45.7±7.0y) and 14 adolescents (6 females; 15.5±1.6y) were interviewed (total n=37). Most participants (n=27; 73.0%) reported that a patient navigator would improve their access to obesity management. Participants reported that the most important things (ranked on a scale of 1 to 5) a patient navigator could offer to improve access included (i) facilitating late afternoon/evening appointments (mean 4.4), (ii) facilitating weekend appointments (mean 4.1), and (iii) providing appointment reminders (mean 4.1). The most preferred attributes of a patient navigator included being (i) empathetic (n=11; 29.7%), (ii) a good verbal communicator (n=10; 27.0%), (iii) knowledgeable (n=10; 27.0%), (iv) a good listener (n=9; 24.3%), and (v) compassionate (n=9; 24.3%). Preferred patient navigator backgrounds included (i) healthcare professional (n=27; 73.0%), (ii) adolescent who participated previously in the clinic (n=19; 51.3%), and (iii) parent who participated previously in the clinic (n=14; 37.8%).

Conclusion:
Based on parent and adolescent reports, patient navigators have the potential to improve family access to pediatric obesity management. Interventional research is needed to examine the feasibility, acceptability, and ultimately, effectiveness of patient navigation in obesity management.

Marcus O’Neill
Non-faculty staff – General & Community Pediatrics
Supervisor: Dr. Geoff Ball
Poster #35
Title: Probiotics *Lactobacillus* and *Bifidobacterium* Increase Short Chain Fatty Acid Production and Adaptation in Neonatal Piglets with Short Bowel Syndrome

Authors/Co-authors: Mirielle Pauline; Patrick N. Nation; Pamela Wizzard; Tierah Hinchliffe; Justine M. Turner; Paul W. Wales.

Introduction: Infants and children with short bowel syndrome (SBS) have been shown to have dysbiosis. Intestinal bacteria are metabolically active in producing short chain fatty acids (SCFAs) that are fuel for the intestine and can promote gut adaptation, hence weaning from parenteral nutrition. In neonatal piglets with SBS, we compared SCFA production and adaptation following treatment with the probiotic cocktail FLORAbaby versus the standard of care for dysbiosis using a broad spectrum antibiotic.

Methods: Following 75% distal small intestinal resection, neonatal piglets receiving 20% enteral nutrition were allocated to four treatments given via the gastric tube: probiotic FLORAbaby (PRO, 500mg BID n=7), antibiotic metronidazole (MET, 15mg/kg BID n=8), placebo (PLA, 500mg BID n=8) and saline (SAL, 3mL BID n=5). Serial fecal samples were taken at d2, d5, d10. At surgery and termination (d10) jejunal effluent, colon effluent, jejunal tissue and colon tissue were taken. Small intestinal length and weight were measured along with histology of jejunum. SCFA analysis was performed on fecal samples along with jejunal and colon effluent. 16S Illumina sequencing of d2 and d10 fecal samples for microbial composition was also undertaken.

Results: SCFA results showed that MET decreased the production of SCFAs by d10 compared to PRO, PLA, and SAL. By d10 structural adaptation, measured as total jejunal weight, was significantly increased for PRO compared to PLA (g) (PRO: 17, MET: 16, PLA: 13, SAL: 15; p=0.017). At d10 acetate, propionate and butyrate respectively were increased in colon effluent for PRO compared to MET, while PLA and SAL were not different (umol/mL) (PRO: 10.65, MET: 2.71, PLA: 5.10, SAL: 8.79; p=0.022), (PRO: 5.97, MET: 0.11, PLA: 0.68, SAL: 1.73; p=0.005), (PRO: 1.39, MET: 0.00, PLA: 0.53, SAL: 0.27; p=0.003). Colon effluent and d10 fecal samples showed similar results, with no significant differences between treatments for jejunum d10 effluents. Microbial characterisation is pending.

Conclusion: The current standard of care for dysbiosis in SBS children is broad spectrum oral antibiotics, including Metronidazole. As shown, this can decrease the production of beneficial SCFAs with potential for negative impact on adaptation. Probiotic FLORAbaby treatment was superior compared to standard of care in increasing SCFA production along with improving total jejunal weight as compared to placebo.

Mirielle Pauline
Graduate Student – Gastroenterology & Nutrition
Supervisor: Dr. Justine Turner
Poster #36
Title: 
*Health Related Quality of Life in 4-year-old children after open heart surgery in early infancy*

Authors/Co-authors: 
Almeida, Luiz; Vohra, Sunita; Al Sayah, Fatima; Robertson, Charlene; Garcia Guerra, Gonzalo; and the Western Complex Pediatric Therapies Follow-up Program (WCPTFP).

Introduction: 
Health Related Quality of Life (HRQL) is an individual’s perception of their physical, mental and social aspects of health. It is an important outcome measure in pediatric studies. This study investigated HRQL of children around 4 years of age who underwent open heart surgery at up to 6 weeks of life and compared it to a reference population of healthy children and to a population of chronically ill children.

Methods: 
Data were from a prospective cohort study of patients that are followed by the WCPTFP after having open heart surgery at Stollery Children’s Hospital between 2000 and 2014. At the 4.5-year visit, parents complete a HRQL questionnaire – the Pediatric Quality of Life Inventory 4.0 Generic Core Scales (PedsQL) as proxy respondents for their children. This is a commonly used HRQL measure that has been validated in multiple pediatric populations, including PICU patients. Our population scores were compared to a reference healthy children population, as well as with a population of chronically ill children of a similar age. We also compared HRQL of single ventricle children with the biventricular physiology patients, and with the population of children who required ECMO or heart transplant or have known chromosomal abnormalities.

Results: 
During the study period, 712 children underwent open heart surgery before or at 6 weeks of life. Of those, 119 died before the 4.5-year visit. Of the 593 eligible children, we analyzed data from 453 patients that had complete PedsQL data. Among those, 136 (30%) had a single ventricle physiology; 47 (10%) had a chromosomal abnormality; 33 (7%) required ECMO; and 14 (3%) required heart transplant before the 4.5-year visit.

Our population had a significantly worse HRQL score (mean 79.5, SD 16.29) compared to the healthy children population (mean 87.4, SD 12.67), but similar to the chronically ill children (mean 76.0, SD 19.34). The single ventricle group also had significantly lower scores (mean 72.8, SD 17.10) than the biventricular group (mean 82.4, SD 15.05). Again, the groups of patients who required ECMO, heart transplant, or had a chromosomal abnormality had lower scores than those who didn't.

Conclusion: 
The quality of life of patients with congenital heart disease who require surgical repair in early infancy is lower than that of healthy children, but is similar to other chronically ill children. Hence, efforts should be made to improve the HRQL in this population.

Luiz Cesar Pinto de Almeida Junior
Graduate Student – Critical Care (PCICU $ PICU)
Supervisor: Drs. Gonzalo Guerra & Sunita Vohra
Poster #37
**Title:**
*Online anxiety resources for Canadian youth: a systematic environmental scan*

**Authors/Co-authors:**
Megan Pohl, Liza Bialy, Shannon Scott, Lisa Hartling, Sarah Elliott

**Introduction:**
In a recent child health research priority setting exercise conducted in Alberta (CA), youth identified “mental health” as a priority topic. Specifically, youth were interested in understanding what the early signs and symptoms of anxiety were, and when they should seek help.

The objective of this study was to understand what information is currently available online for youth about the signs and symptoms of anxiety, what resources are available for self-assessment, and what are youth’s behaviours, experiences and information needs around seeking care for anxiety.

**Methods:**
We conducted a systematic environmental scan of Internet resources and academic literature.

Internet and literature search results were screened by one reviewer and verified by another. Relevant information (e.g., self-screening resource features and population characteristics such as age, presence of anxiety, and education) were then extracted and verified. Information sources were categorized relating to the research concepts regarding; signs and symptoms, self-assessments, information needs and experiences.

We complimented our environmental scan with youth consultations to understand how anxiety resources are perceived by youth, and what if anything could be improved about the information they are receiving. Consultations were conducted over Zoom with three Canadian Youth Advisory Groups (2 local, 1 national) and took a semi-structured focus group format

**Results:**
A total of 100 information sources (62 addressing signs and symptoms, 18 self-assessment resources, and 20 reporting on information and help seeking behaviours) met the inclusion criteria.

The majority of information sources on signs and symptoms were webpage-based articles, and 36 (58%) specifically stated that they were targeting youth. 72% of self-assessment resources were provided by private organizations. The resources varied markedly in the post-assessment support provided to youth according to their source (i.e. private, academic, governmental). Regarding information and help seeking preferences, three main themes were apparent and related to 1) obtaining in-person professional help, 2) searching for online help, and 3) stigma associated with seeking help for anxiety disorders.

The Youth Group consultations identified several areas that need to be considered when developing resources for youth. The key considerations highlighted by youth across the consultations suggested resources needed to be; youth friendly; align with a credible institute (e.g. University, Health Institution); and provide tangible action items post online assessment.
Awareness of the information and resources available to youth, coupled with an understanding of their help seeking behaviors and information needs regarding anxiety can help support the development and dissemination of appropriate knowledge translation tools targeting to youth.

Megan Pohl  
Graduate Student – ARCHE  
Supervisor: Dr. Lisa Hartling  
Poster #38
Title:
Acceptability of a Virtual Model for Diagnosis for Fetal Alcohol Spectrum Disorder (FASD)

Authors/Co-authors:
Hasu Rajani, Colleen Burns, Brent Symes, ShwanaLee Jessiman, Amber Bell, Monty Nelson

Introduction:
A multidisciplinary team is required for diagnosis and recommendations of Fetal Alcohol Spectrum Disorder (FASD). The process involves assessments of growth and facial features, a caregiver interview with the physician, assessment of the patient by a psychologist, speech language pathologist and occupational therapist, a multidisciplinary meeting of the above clinicians, clinic coordinators, school personnel and other support workers. A final meeting is held with the caregiver to debrief on the team findings, diagnosis and recommendations.

A literature search supported the feasibility to complete a reliable and accurate assessment of patients adhering to the recommended Canadian FASD diagnostic guideline. As a result of a "Virtual Model for FASD Diagnosis" was developed.

Objectives:
1. Pilot a project to assess a Virtual Model of FASD Diagnosis
2. Promote the model, by webinars, to FASD diagnostic teams nationally and internationally
3. Survey acceptability of the model amongst webinar attendees

Methods:
A literature search revealed that teams used virtual platforms for some components of FASD diagnostic process, but a complete virtual process does not exist. Virtual assessment of motor skills domain was not completed as in the project team's experience this domain is rarely impaired. The project leaders developed a model and partnered with two diagnostic teams to complete a small pilot project of 6 patients using Telehealth and Gotomeetings virtual platform accommodating patients. The patients were scheduled as per the waitlist for each team. Support workers were trained to be with the patient and the caregiver to support any technological aspects, present testing materials, complete growth measurements and photographs for the photographic software for facial measurements.

The coordinator scheduled clinicians to complete their assessments and caregiver interview, a multidisciplinary team meeting to discuss the resulting findings and assign diagnoses and develop recommendations, and a meeting with the caregiver to debrief. A project member analyzed the photographs to measure the sentinel facial features.

A survey of the caregivers, clinicians, support workers and diagnostic team members was conducted to assess experience, the reliability and feasibility of the virtual model.

Webinars of the model were held (one provincial in Alberta and one for Canada, New Zealand, Australia). Survey of participants', pre- and post-webinar use of virtual platforms for part or all of the FASD assessment was completed.
Results:
The results of the pilot project survey (Table 1) confirmed the feasibility, acceptability and reliability of the virtual model of assessment. The caregivers confirmed that the process was rigorous and acceptable. 40% of
team members indicated they would not have been present if an in-person meeting was held, indicating virtual format enabled attendance.

Webinars’ surveys indicate a significant increase in interest of completing at least portions of the assessment via virtual format enabled attendance.

**Conclusion:** Results indicate that a Virtual Model for FASD diagnosis is feasible, reliable and acceptable. Increased interest in parts or whole project was indicated by teams nationally and internationally. Endorses increased member attendance for team deliberations if virtual.

Hasu Rajani  
Faculty – General & Community Pediatrics  
Supervisor: n/a  
Poster #39
Title:
The natural history of arrhythmogenic right ventricular cardiomyopathy (ARVC) caused by a p.S358L mutation in TMEM43 in the paediatric population.

Background
Arrhythmogenic right ventricular cardiomyopathy (ARVC) is a cause of sudden cardiac death (SCD) in young people due to ventricular tachyarrhythmia. It is an autosomal dominant disease characterized by alterations in the myocardium of the right (RV), and the left ventricle (LV). Cardiomyocytes are replaced by fat and fibrous tissue. ARVC is a genetically heterogeneous disease, caused by mutations in multiple genes. One gene (TMEM43) was discovered in the Newfoundland and Labrador (NL) population and a missense mutation resulting in an amino acid change (p.S358L) causes disease. At least 24 multiplex NL families are ascertained, the largest family comprising 12 generations, representing the largest, genetically homogeneous, population of individuals with ARVD worldwide. The natural history of TMEM43 p.S358L is known in adults. 50% of males die by 40 years, 80% by 50 years in the absence of treatment (5% and 20% respectively in women). The disease is fully penetrant for at least one clinical sign of disease across the lifespan. The clinical course has been documented. Males who receive an Implantable Cardioverter Defibrillator (ICD) following a positive mutation test gain 31 years of life. The disease is very variable between and within families, and no prognostic clinical markers have been determined to allow for accurate planning and management of disease. The natural history of ARVC caused by TMEM43 p.S358L, remains unknown for children.

Research Question
Can we define a prodromal phenotype in children from NL families with ARVC caused by TMEM43 p.S358L?

Methods
A large dataset exists containing clinical and genetic data from individuals born at a-priori 50% risk from TMEM43 p.S358L families. Retrospective and current pediatric data is available. Data was abstracted from persons born between 1982 and 2018. The data included those with the p.S358L mutation, those negative for the mutation and those yet to be tested (remaining at 50% risk)

Results to Date
The final sample comprised 196 pediatric patients ascertained from 24 families. (NUMBERS male/female affected unaffected etc and so on). Clinical test information included 12 lead ECG, Holter monitor and Echocardiography.

Research Plan
To determine incident and prevalent clinical events and symptoms and compare between affected and unaffected subjects.

Sowith Rangu
Resident – Cardiology
Supervisor: Dr. Kathy Hodgkinson
Poster #40
Title:
Effect of Dietary Branched Chain Amino Acid Supplementation on Neurodevelopmental Outcomes in Infants with Cholestatic Liver Disease Undergoing Assessment for Liver Transplantation

Authors/Co-authors:
Razcón Echeagaray, A., Hager, A. Robert, C., Snyder, T., Yap J., Gilmour, S., Mager, D.R.

Introduction:
Evidence shows that infants with cholestatic liver disease (CLD) pre- and post-liver transplantation have higher needs for branched chain amino acid (BCAA) when compared to age-matched healthy subjects. Nutrient malabsorption, protein-energy malnutrition, along with a very novel, not-yet well-defined component called pediatric sarcopenia, all add to the nutritional insult, and neurodevelopmental outcomes are further compromised. We hypothesized that daily BCAA supplementation will lead to significant improvements in growth, body composition, and neurodevelopmental outcomes.

Methods:
10 infants (mean age: 0.43±0.14 years) with CLD were randomly allocated to the supplementation group (+BCAA, n=6) or the standard of care group (-BCAA, n=4) for 12 weeks. Supplementation consisted of 300 mg/kg/d of powdered BCAA, mixed with the standard casein hydrolysate formula (Pregestimil®). Demographic (age, sex, liver, diagnosis, Pediatric End-Stage Liver Disease (PELD) scores), anthropometric (weight (Wt), Wt z-score, height (Ht), Ht z-score, head circumference (HC), HC-Z score), skinfold measures (mid-arm circumference (MAC), triceps, biceps), intake and body composition (fat mass (FM) and fat free mass (FFM) using air-displacement-plethysmography) were measured at baseline, 4, 8 and 12 weeks. Laboratory markers (alanine transaminase (ALT), aspartate aminotransferase (AST), gamma-glutamyltransferase (GGT), International Normalized Ratio (INR), partial prothrombin time (PTT), bilirubin, albumin, bile acids, ammonia, amino acid profile) and neurodevelopmental tests (Vineland Adaptive Behavior Scales-II/Bayley Cognitive Scales) were measured at baseline and 12 weeks.

Results:
No significant differences in demographic, anthropometric, energy/protein intake (total, kcal/kg, g/kg), FFM, FM, %FM, %FM, neurodevelopment scores or serum laboratory markers were observed at baseline between groups (p>0.05). Energy and protein intakes ranges between 110-130 kcal/kg, 2-3.5 g/kg/d. BCAA supplementation resulted in significant increases in FFM (0.83 ± 0.16 kg [+BCAA] vs 0.66 kg ± 0.05 [-BCAA]; p=0.007, r²=0.51) and a trend towards smaller declines in absolute/percentile cognitive scores (-10.8 ± 3.5 [+BCAA] vs -17.5 ± 6.5 [-BCAA] p=0.057 and -18.5 ± 2.5 [+BCAA] vs -30.4 ± 8.9 [-BCAA]; p=0.04 ), but no other major differences in anthropometric, growth, body composition or neurodevelopmental measures.

Conclusion:
BCAA supplementation in infants with CLD over 12 weeks resulted in significant differences in FFM and modest differences in cognitive scores, but without effects in other body composition or neurodevelopmental parameters.

Andrea Razcón Echeagaray
Graduate Student – Gastroenterology & Nutrition
Supervisor: Diana Rolande Mager
Poster #41
Title:
The Significance of Non-Significance: The Lack of Relation Between Infant Body Mass Index and 36-Month Health Outcomes

Authors/Co-authors:
Kyle Reid¹, Lori-Ann R. Sacrey¹ PhD, Katharine Magor PhD¹, Lonnie Zwaigenbaum¹ MD, Susan Bryson² PhD, Jessica Brian³,⁴ PhD, Isabel M. Smith² PhD, Wendy Roberts⁴ MD, Peter Szatmari⁴,⁵,⁶ MD, and Tracy Vaillancourt⁷ PhD
¹University of Alberta, ²Dalhousie University/IWK Health Centre, ³Bloorview Research Institute, ⁴University of Toronto, ⁵The Hospital for Sick Children, ⁶Centre for Addiction and Mental Health, ⁷University of Ottawa.

Introduction:
Pediatric obesity is a major growing concern worldwide. The prevalence of obesity is higher in children diagnosed with autism spectrum disorder (ASD) relative to the general population. While the rate of weight gain during early childhood can be linked with adverse health outcomes later in life, few studies explore the relationship between early infant adiposity and developmental outcomes in either a general pediatric population or one at high-risk for being diagnosed with ASD. The objective of this study was to determine if changes in infant body mass index (BMI) predict developmental outcomes in infants at high-risk of an ASD diagnosis. It was hypothesized that infants with higher BMIs would score more poorly on 36-month developmental assessments compared to typically developing infants, and that higher BMI may be associated with ASD severity.

Methods:
Multiple BMI trajectories between 6 and 24 months were generated using the statistical program Stata, with participant group allocation governed using the PROC TRAJ command. One-Way ANOVAs examined the relationship between BMI trajectory group scores and 36-month health outcomes.

Results:
Changes in infant BMI between 6 and 24 months were unrelated to 36-month developmental outcomes or later diagnosis of ASD. No differences were observed for socioemotional or cognitive development in infants using either a grouped (male and female) trajectory model or individual (male only, female only) sex-specific BMI trajectory models. Importantly, no differences in the distribution of individuals diagnosed with ASD were seen across any of the trajectory models.

Conclusion:
Temporal changes in childhood BMI during infancy prior to age 2 were not associated with later development of ASD symptomology or changes in infant socioemotional or cognitive development in both infants at high-risk for developing ASD or typically developing children. To date, no published studies have investigated postnatal infant BMI as it relates to early cognitive and developmental outcomes – likely due publication bias against studies reporting negative results. Given that time, effort, and resources are wasted when data remains unpublished, publication of negative results like these prevent not only a waste of time and resources but can also protect against the emergence of biases in scientific literature.

Kyle Reid
Graduate Student – Developmental Pediatrics
Supervisor: Lori Sacrey (PhD), Katherine Magor (PhD)
Poster #42
Multicenter cohort study of children hospitalized with SARS-CoV-2 infection

Introduction:
A cohort study was conducted to describe and compare the characteristics of SARS-CoV-2 infection in hospitalized children in one high income country (Canada) and two middle income countries (Costa Rica and Iran).

Methods:
This was a retrospective cohort of consecutive children admitted to 15 hospitals (13 in Canada and one each in Iran and Costa Rica) up to November 16, 2020. Cases were included if they had SARS-CoV-2 infection or multi-system inflammatory syndrome in children (MIS-C) with molecular detection of SARS-CoV-2 or positive SARS-CoV-2 serology.

Results:
Of 211 included cases (Canada N=95; Costa Rica N=84; Iran N=32), 103 (49%) had a presumptive diagnosis of COVID-19 or MIS-C at admission while 108 (51%) were admitted with other diagnoses. Twenty-one (10%) of 211 met criteria for MIS-C. Eight (4%) had healthcare-associated SARS-CoV-2 infection. Eighty-seven (41%) had comorbidities. There were 23 bacterial and 16 viral coinfections and 147 children (70%) received antibiotics. Of the 211 cases, 140 (66%) did not require supplemental oxygen or ICU admission, 30 (14%) required supplemental oxygen but not ICU admission, one (0.5%) developed healthcare-associated COVID-19 while already in ICU, and 7 (3%) tested positive for SARS-CoV-2 on the day that they were admitted from home to ICU but the ICU admission was for other indications. The remaining 33 (16%) required ICU admission for COVID-19 (N=14) or MIS-C (N=19; 33% of MIS-C cases), of which 18 (55%) required mechanical ventilation for COVID-19 (N=14) or MIS-C (N=4; 19% of MIS-C cases). Four children died (3 in Iran and one in Costa Rica) of which 3 had malignancies. Children admitted in Canada were older than those admitted to non-Canadian sites (median 4.1 versus 2.2 years; p<0.001) and less likely to require mechanical ventilation (3/95 [3%] versus 15/116 [13%]; p<0.05). Sixty-four of 211 (30%) required supplemental oxygen or intensive care unit (ICU) admission and 4 (1.9%) died. Age < 30 days, admission outside Canada, presence of at least one comorbidity and chest imaging compatible with COVID-19 predicted severe or critical COVID-19 (defined as death or need for supplemental oxygen or ICU admission).

Conclusion:
Approximately half of hospitalized children with confirmed SARS-CoV-2 infection or MIS-C were admitted with other suspected diagnoses. Disease severity was higher at non-Canadian sites. Neonates, children with comorbidities and those with chest radiographs compatible with COVID-19 were at increased risk for severe or critical COVID-19.

Joan Robinson
Faculty – Infectious Diseases
Supervisor: n/a
Poster #43
Title: 
Maternal depression impacts infant gut microbial composition dependent on breastfeeding status

Authors/Co-authors: 
Nicole Rodriguez BSc, Hein M. Tun PhD, Catherine J. Field PhD, Piushkumar J. Mandhane MD, James A. Scott PhD, Anita L. Kozyrskyj PhD

Introduction: 
Depressive symptoms are common during pregnancy and are estimated to affect 7% to 20% of pregnant women. When left undiagnosed, prenatal depression increases adverse health risks to the infant including impaired cognitive development, behavioral problems, and higher susceptibility to physical illnesses. Accumulating research evidence supports the association between maternal physical health factors to infant gut health. However, specific maternal prenatal psychosocial factors and their effect on infant intestinal microbiota remains an area that is not well understood.

The objective of the current study is to examine the effect of maternal prenatal psychosocial and physical health on the microbial gut compositions of infants at 3-4 months of age. Specifically, we will investigate the association of maternal prenatal depression status within stratified breastfeeding groups on the infant gut microbiota

Methods: 
The current study employed a large subsample of 996 infants (mean age: 3.7 ± 1.0 months) from the CHILD Cohort Study (www.childstudy.ca). Maternal psychosocial health, specifically depression, was assessed using self-reported questionnaires at the time of recruitment during pregnancy. Additionally, hospital records were used to provide information related to the birth scenario, UTI occurrence, antibiotics, and other factors. The infant gut microbiota at 3-4 months of age has been profiled using 16S rRNA sequencing and characterized by microbial beta-diversity (Bray-Curtis distance) to represent community composition.

Results: 
In our study mothers, 6.1% reported prenatal depression, 19.1% had depression in the past and 74.8% indicated never having depression. 29.4% of infants had been exclusively breastfed since birth, 13.8% briefly received formula in the hospital, 34.3% were partially breastfed, and 22.4% were not breastfed. Stratification by infant diet revealed that maternal depression had the strongest effect on infant gut microbial beta-diversity in the partially breastfed (p = 0.023) and the non-breastfed group (p = 0.022), adjusted for maternal prenatal diet, birth mode, and other covariates. Maternal prenatal diet was crudely associated with gut microbial beta-diversity of non-breastfed infants but not in the adjusted model with maternal depression

Conclusion: 
Maternal depression impacts infant gut microbial diversity, dependent on breastfeeding status at 3 to 4 months. These changes in the microbial composition of infants born to depressed mothers are known to be predictive of metabolic diseases in later life. Early cessation of breastfeeding among depressed moms may ultimately result in a compromised immunity and negative developmental outcomes for infants

Continued next page
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Nicole Rodriguez
Graduate Student – General & Community Pediatrics
Supervisor: Dr. Anita Kozyrskyj
Poster #44
Introduction:
We aimed to describe indications for, and outcomes from non-cardiac neonatal ECMO used over 30 years at our referral center.

Methods:
From 1989 to October 2000 (Era 1, 11 years) ECMO was done in NICU based on oxygenation index, and from November 2000 to Jan 2018 (Era 2, 17 years) ECMO was done in PICU based on clinical criteria. Parents/guardians signed informed consent. Eras were compared using two-tailed Fisher’s Exact Test.

Results:
There were 182 (16.5/year) patients in Era 1 and 44 (2.6/year) in Era 2, with similar birth weight, gestational age, CPR prior to ECMO (11, 25% vs 41, 23%), and male sex (20, 46% vs 116, 64%, p=0.04). In Era 2 a larger proportion had Veno-Arterial ECMO (31, 71% vs. 88, 48%, p=0.008), ECMO start later than 48 hours of life (39% vs. 21%, p<0.0001) and after the first week of life (11, 25% vs. 5, 3%, p<0.0001), ECMO for sepsis (11, 25% vs. 21, 12%, p=0.03), and had a lethal condition (surfactant deficiency, pulmonary lymphangiectasia, severe lung hypoplasia, or alveolar capillary dysplasia; 5, 11% vs. 2, 1%, p=0.004). In Era 2 a smaller proportion of neonates had ECMO for meconium aspiration (5, 11% vs. 72, 40%, p=0.0004) or hyaline membrane disease (0% vs. 13, 7%, p=0.08). The proportion having ECMO for congenital diaphragmatic hernia was similar (16, 36% vs 64, 35%). Mortality was higher in Era 2, 26 (59%) vs. 60 (33%) (p=0.002); most deaths (85% and 78%) occurred before hospital discharge. Of survivors, only 5 (3.6%) were lost to follow-up, all from Era 1. Cerebral palsy (3, 17% vs. 14, 12%), seizure disorder (1, 6% vs. 7, 6%), FSIQ (83.3 (SD 22.1) vs 86.3 (SD 18.1)), VIQ (81.5 (21.6) vs 85.7 (17.9)), PIQ (84.5 (22.9) vs 86.9 (SD 28.3), FSIQ <70 (6, 33% vs 21, 18%, p=0.20), and disability free (13, 72% vs 59, 50%, p=0.13) were similar between eras. In Era 2 there were fewer with permanent sensorineural hearing loss (SNHL 0% vs. 47, 40%, p=0.0008).

Conclusion
In Era 2 there were fewer patients/year, higher severity of illness, different causes of respiratory failure (more with later onset, sepsis, and lethal conditions, and fewer with meconium aspiration). These selection biases likely explain higher mortality in Era 2. Outcomes in survivors were similar except for SNHL. With attention to slower rates of bolus furosemide administration SNHL has been eliminated in Era 2.
Title:
Antenatal Surveillance: Frequency, Results and Relationship With Survival in High-Risk Fetal Cardiac Disease

Authors/Co-authors:
Samuel, R., Trakulmungkichkarn, T., Hornberger, LK., Stryker, T., Eckersley L, McBrien, A.

Introduction:
Certain congenital heart diseases (CHD) are associated with a high risk of intrauterine fetal demise (IUFD) and post-natal death, including Ebstein’s anomaly, tetralogy of Fallot with absent pulmonary valve and cardiomyopathy. Established obstetric guidelines that recommend frequent antenatal surveillance (AS) of fetal wellbeing, in the case of maternal and fetal risk factors which increase perinatal mortality, do not currently include fetuses with high-risk CHD. We sought to establish whether frequent AS could improve fetal outcomes in high-risk fetal CHD and if surveillance results are predictive of outcomes in this setting.

Methods:
We undertook a single centre, retrospective review of 61 pregnancies with high-risk fetal CHD diagnosed from 2006-2020. Data pertaining to frequency of AS (with biophysical profile, non-stress testing and/or fetal echocardiogram), AS results and the fetal echocardiographic based cardiovascular profile score (CVPS) were collected. Frequent surveillance was defined as at least weekly fetal wellbeing testing commencing by 28-32 weeks gestation, or from later diagnosis, until delivery. Outcome measures included survival and mode of delivery.

Results:
A final CVPS of ≤7 carried a significantly higher mortality rate (11/21, 52%) than a score of ≥8 (6/31, 19%), p 0.01. AS results were abnormal in 18% (10/56) of pregnancies. Where AS results were abnormal, significantly more had emergency caesarean sections for fetal indications, compared to those with normal AS results, (7/10 (70%), vs. 2/46 (4%), p <0.001). There was a trend toward more patients alive at last follow up when AS results were normal (33/46, 72%) compared to those in which AS results were abnormal (46/10, 40%), p 0.07. IUFD occurred in 2/10 (20%) cases where AS results were abnormal, compared to 3/46 (7%) of cases where AS results were normal, p 0.21. Where AS was infrequent, IUFD occurred in 13% (4/30), compared to 3% (1/31) where AS was frequent (p=0.20).

Conclusion:
Abnormal AS results and/or a CVPS of ≤7 may identify compromised fetuses with high-risk CHD who could benefit from altered management or expedited delivery. Given the high rates of abnormal AS results in this population, frequent AS should be considered, however a larger trial is warranted to establish whether this leads to a reduction in IUFD in fetuses with high-risk CHD

Rosh Samuel
Clinical Fellow – Cardiology
Supervisor: Drs. Lisa Hornberger, Angela McBrien
Poster #46
Title:
The role of whole exome sequencing in a metabolic clinic setting

Authors/Co-authors:
Angela Schinkinger¹, Alicia Chan¹, Shailly Jain¹ and Komudi Siriwardena¹
¹Medical Genetics Clinic, Stollery Children’s Hospital/University of Alberta Hospital, Edmonton, Alberta, Canada

Introduction:
Whole exome sequencing (WES) is a substantial advancement in molecular genetic testing when compared to single gene and phenotypic panel testing. For patients who have endured a diagnostic odyssey for years, the value of WES is immeasurable. We critically analyzed the utility of WES, the most comprehensive clinical molecular test available in Alberta, by reviewing outcomes in a 28 month time period and using case examples to demonstrate the implications in a metabolic clinic setting.

Methods:
We reviewed the reports from WES performed on 75 patients during the time period of September 2017–January 2020. We also present a series of clinical cases to illustrate the outcomes of WES from a patient perspective: the end of a diagnostic journey, failing to identify a genetic cause to molecularly confirm a clinical diagnosis and uncertain findings.

Results:
The reports consisted of 32 pathogenic/likely pathogenic, 30 negative and 13 variants of uncertain significance. WES is a worthwhile pursuit when the differential is wide or phenotype specific testing has failed. There is a need for collaboration to set up functional studies for more metabolic conditions. Certainty is required in order for testing to be of benefit to patients.

Conclusion:
The power of WES is best demonstrated in this current era of atypical presentations and expanding phenotypes. Although WES cannot replace clinical assessment and metabolic investigations; it can be the necessary tool to achieve a diagnosis. WES re-analysis should be pursued when possible and we recommend storing raw data for future analysis.

Angela Schinkinger
Clinical Academic Colleague – Medical Genetics
Supervisor: N/A
Poster #47
Title:
Patterns and Attitudes Regarding Disclosure of Sickle Cell Disease: Experiences of Children and their Families

Authors/Co-authors:
Anna Serebrin, Michelle Dang, and Aisha Bruce

Introduction:
Children with Sickle Cell Disease (SCD) may have frequent medical appointments and hospitalizations. However, complications of SCD are often not visible, allowing people to delay or avoid disclosure of the diagnosis. Decisions to disclose depend on weighing perceived risks and benefits in a given context. Little is known regarding patterns of disclosure of SCD, for young people and their families in Canada.

Objectives:
1) Understand motivating factors and implications of disclosure of SCD among children and families.
2) Identify if children and parents differ in attitudes toward disclosure

Methods:
A survey was administered to families while attending hematology clinic appointments in Edmonton, Canada. Parents/guardians of a child with SCD could complete the parent survey. Children 8-18 years, with SCD, completed the patient survey. Data were analyzed with quantitative and descriptive statistics.

Results:
42 families participated (42 parents, 14 children) with a total of 50 children with SCD. Median age of children with SCD was 7.5 years, with the majority born in Canada. The majority of parents were born outside Canada. Median age of children completing the survey was 13 years, 43% were born in Canada.

Parents reported disclosure of the diagnosis to all of the child’s grandparents (60%), some grandparents (24%), and to at least one other extended family member (70%). 73% disclosed to at least some of the child’s teachers. 46% had not disclosed to their employer. Among patients, 77% disclosed to at least one friend.

98% of parents indicated they always disclosed to a Family Doctor/Pediatrician. They were less likely to always disclose to a walk-in-clinic (86%), or emergency room doctor (90%). 5% felt they/their child had been treated badly by a nurse or doctor because their child had SCD. 22% of parents, and 15% of children regret telling someone. 15% and 32% of children and their parents felt they/their child were treated differently after disclosure, respectively.

Patients reported disclosing so others could understand if they are sick or needed help. Reasons not to disclose included: fear of being treated differently, and desire for privacy. Parents commonly reported motivation for disclosing so that others could take care of their children. Children and parents identified the importance of only disclosing to trusted individuals.

Conclusion:
These data help us better understand challenges our patients and their families face and highlights the need for ongoing education of healthcare providers to ensure patients are confident they can disclose a diagnosis of SCD and continue to receive unbiased care.

Anna Serebrin
Resident – IHOPE
Supervisor: Dr. Aisha Bruce
Poster #48
Title:
Associated genetic and extra-cardiac anomalies and outcomes in prenatally detected tetralogy of Fallot

Authors/Co-authors:
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1Fetal & Neonatal Cardiology Program, Division of Pediatric Cardiology, Department of Pediatrics and 2Department of Medical Genetics, University of Alberta

Introduction:
Historically, prenatal detection of tetralogy of Fallot (ToF) was poor and around 60% had major extracardiac (ECA) or genetic anomalies. Recently, prenatal detection of ToF has improved, along with a wider range of genetic testing options. Knowledge of outcomes and risk of associated anomalies is crucial for prenatal counselling. We hypothesize that prenatal ToF now has a different risk profile for ECAs and genetic anomalies than previously reported.

Methods:
A retrospective chart review was conducted for cases of ToF diagnosed prenatally between 1st January 2012 and 31st December 2019 in our Fetal Cardiology Program. ToF type double outlet right ventricle was excluded. Pre and postnatal charts and imaging reports were reviewed for ToF subtype, additional cardiac and extra-cardiac diagnoses and outcomes.

Results:
Of 83 cases, 49 had standard ToF, 24 pulmonary atresia (14 with major collateral arteries, 10 without), and 10 absent pulmonary valve. There was ≥1 ECA in 41% (34/83), including 6% (5/83) with 2 and 4% (3/83) with 3. ECA sub-types were: 10 gastrointestinal, 8 neurological, 8 pulmonary, 7 renal, 4 musculoskeletal, and 8 others. Ninety-two percent (76/83) had genetic testing, of whom 30% (23/76) had genetic anomalies, which included Trisomy 21 (39%, 9/23), 22q11 deletion (35%, 8/23), Trisomy 18 (9%, 2/23), Trisomy 13 (9%, 2/23), and 9% (2/23) had other genetic diagnoses. Variants of uncertain significance were identified on genetic testing in 5% (4/76). There were a further three cases with VACTERL spectrum (4%, 3/76). Right aortic arch was significantly associated with 22q11 deletion (28% (7/25) vs 2% (1/51) p<0.001). All (3/3) with ToF with atrioventricular septal defect (AVSD) had Trisomy 21. Of the forty-one percent (34/83) with 1 or more major ECAs 41% (14/34) also had a genetic anomaly. Of the total cohort, 22% (18/83) had pregnancy termination, 5% (4/83) an intrauterine fetal death (IUFD), 72% (60/83) a live birth with 1 case lost to follow-up. In the live birth cohort, 3% (2/60) had a neonatal death, 7% experienced a late death (4/60) and 90% (54/60) were alive at last follow-up (mean age 3.5±2.4 years).

Conclusion:
In a cohort of fetuses with ToF and high rates of genetic testing, genetic anomalies were more common than reported in the older literature; whereas, there were similar rates of ECAs in prenatally detected ToF to those previously reported. ToF with right aortic arch and ToF with AVSD in particular have strong genetic associations.

Rishav Sharma
Undergraduate - Cardiology
Supervisor: Dr. Angela McBrien
Poster #49
Title: 
The role of Surf4 in expression and secretion of proprotein convertase subtilisin/kexin type 9 (PCSK9) in vitro and in vivo

Authors/Co-authors: 
Yishi Shen\textsuperscript{a,1}, Bingxiang Wang\textsuperscript{b,1}, Shijun Deng\textsuperscript{a,1}, Lei Zhai\textsuperscript{c,1}, Hong-mei Gu\textsuperscript{a}, Adekunle Alabi\textsuperscript{a}, Xiaodan Xia\textsuperscript{a}, Yongfang Zhao\textsuperscript{c}, Xiaole Chang\textsuperscript{c}, Shucun Qin\textsuperscript{c,*}, Da-wei Zhang\textsuperscript{a,**}

Affiliations: 
\textsuperscript{a} Group on the Molecular and Cell Biology of Lipids and Department of Pediatrics, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Alberta, Canada  
\textsuperscript{b} Department of Physiology, Shandong First Medical University (Shandong Academy of Medical Sciences), Taian, China  
\textsuperscript{c} Institute of Atherosclerosis in Shandong First Medical University (Shandong Academy of Medical Sciences), Taian, China

Introduction: 
Circulating proprotein convertase subtilisin/kexin type 9 (PCSK9) promotes degradation of low-density lipoprotein receptor (LDLR) and thus plays a critical role in the regulation of plasma LDL cholesterol levels. PCSK9 is mainly secreted from hepatocytes. Surfeit 4 (Surf4) is a cargo receptor that facilitates protein secretion. However, the mechanism of PCSK9 secretion and the role of Surf4 in this process are not well understood.

Methods: 
Expression of Surf4 in human hepatoma-derived cell lines, Huh7 and HepG2, as well as human primary hepatocytes was knocked down by siRNA. mRNA and protein levels were assessed by qRT-PCR and Western blot, respectively. Co-immunoprecipitation was applied to determine protein-protein interaction. We also generated liver specific Surf4 knockout mice

Results: 
Surf4 siRNA efficiently knocked down expression of Surf4 in Huh 7, HepG2, and primary human hepatocytes. Reducing Surf4 expression significantly increased PCSK9 levels in cells and medium. Additionally, knockdown of Surf4 increased nuclear form of SREBP2 and mRNA levels of PCSK9 but did not alter expression of ER stress markers, Grp78 and CHOP. Hepatic deficiency of Surf4 did not affect PCSK9 expression and secretion.

Conclusion: 
Knockdown of Surf4 expression increased transcriptional activity of SREBP2 and expression of PCSK9 but did not affect PCSK9 secretion. These findings indicate that Surf4 is not required for endogenous PCSK9 secretion in cultured human hepatocytes or mice.

Yishi Shen  
Graduate Student – Gastroenterology & Nutrition  
Supervisor: not indicated  
Poster #50
Title: 
Preferred Pediatric Resident Learning Styles: A Longitudinal Study

Authors/Co-authors: 
George Slim MB BCh, Michelle Huie MD, Karen Forbes MD, MEd, FRCPC

Introduction: 
Studies in medical trainees have shown that individual learning styles change during progression from medical school to residency. Further, learning styles differ across varying sub-specialties with limited literature in non-surgical specialties such as Pediatrics. The Kolb Learning Style Inventory (LSI) classifies learning styles into four classifications: Divergers, Assimilators, Accommodators, and Convergers. This study’s objective was to evaluate learning styles in our pediatric residents, and how they may change throughout residency.

Methods: 
The Kolb LSI uses 12 questions with 4 self-identified options ranked from most to least in keeping with one’s learning preferences. Recruitment started with junior (PGY-1 and PGY-2) residents for the first year. Those were then given the option to participate in the study over the following 2 years with a new junior residents’ cohort (incoming PGY-1 residents) added annually. For all three years of the study, all participating pediatric residents were offered individualized follow-up of their results. A total of 42 pediatric residents participated in the study with 21 residents participating for two consecutive years and 9 residents taking part of all three years of the study.

Results: 
Through the three years of data collection, participation rate was 70%. All three groups of pediatric residents had similar distributions of learning styles with no significant relation between residency training year and LS distribution (P >0.05 for all). Convergers represented the largest portion with 38% of all completed Kolb LSI Forms. An equal and non-specific distribution of the remaining three learner styles was demonstrated amongst all forms completed (Assimilators- 25%, Accommodators- 21%, and Divergers- 16%). Similarly, when comparing junior residents to senior residents; there was no significant relation to LS distribution (P >0.05) and Convergers again constituted the highest portions in both groups (34%- junior residents and 50%- senior residents). Remarkably, of the residents who participated in at least two years of the study, 21 residents had changed their LS (60%) while 14 residents had the same LS as the year prior (40%).

Conclusion: 
Our study found no one preferred LS of Pediatric residents in contrast to other subspecialties; rather there is a diversity of all four LS within our Pediatric group. Further, LS are individualized and dynamic in many learners, although there was no predictable pattern of change. Importantly, pediatric residents work in a range of environments. Hence, residents understanding their learning style may help enhance their clinical educational experiences and ultimately, impact patient and family care.

George Slim
Resident – General & Community Pediatrics
Supervisor: Dr. Karen Forbes
Poster #51
Title:
Utility of Machine Learning in Predicting Response to Dietary Therapy in Luminal Paediatric Crohn Disease

Authors/Co-authors:
Ricardo G. Suarez, Stephanie I. Dijk, Russell Greiner, Eytan Wine

Introduction:
Crohn disease (CD) is a chronic disorder of the intestinal tract commonly presenting in childhood. CD is usually more severe in children and can impact growth, delay puberty, and reduce bone density. There is currently no cure for pediatric CD (pCD), only medications to control the disease, such as biologic therapies and glucocorticoids, which suppress the immune system. Therefore, selecting the most appropriate treatment is not always straightforward, leading to over-treatment of some patients and under-treatment of others.

Dietary therapies, specifically exclusive enteral nutrition (EEN) and the CD exclusion diet (CDED) are attractive alternatives as they induce remission in pCD patients without significant side effects. However, these treatments are challenging for patients and mechanisms are not fully understood, highlighting the need to distinguish between the responders and non-responders.

Methods:
Machine learning has been widely used in healthcare applications. Unsupervised machine learning (U.ML) is commonly used to extract patterns and correlate variables within patient data; supervised machine learning (S.ML) can predict patient outcomes from labeled datasets. This work uses U.ML and S.ML techniques to identify dietary patterns among pCD patients and predicts response to dietary therapy.

Dietary information is gathered from pCD patients using frequency food questionnaires (FFQs). The FFQs assessed dietary intakes over the previous 12 months. U.ML by means of Principal Component Analysis (PCA) is then used to analyze the information and find dietary patterns. Consequently, the patterns are used with S.ML technique (logistic regression) to develop classifiers to assess the probability of response of a specified patient to a particular dietary therapy.

For further analysis, stool microbiome, metabolomics, and detailed clinical data will be introduced into neural network platforms with the primary outcome being response to dietary therapy.

Results:
This project is in very early stages (as my PhD just started in Jan 2021) and builds on previous work in our lab, using standard statistics. We have already found that disease location in the intestinal tract and sex, through impacts on microbes, are linked to clinical outcomes. By expanding our dataset and using machine learning we expect to identify and then validate a model to define causes and predictors of response to therapy in pCD

Conclusion:
This work will provide a systematic analysis to predict therapy response in pCD, which could introduce novel dietary recommendations, tailor pCD therapies, and precisely identify therapy candidates

Ricardo Suarez
Graduate Student – Gastroenterology & Nutrition
Supervisor: Dr. Eytan Wine
Poster #52
Title:
Can MRI accurately identify pre-surgical lesions in refractory epilepsy patients?

Authors/Co-authors:
J. Szelewicki, Dr. B. Sinclair, Dr. N. Liu, Dr. A. Tamm, Dr. J. Kassiri

Introduction:
Poorly controlled seizures in childhood have a detrimental impact on the developing brain. In children with refractory epilepsy, surgical resection of epileptogenic foci can be an effective means of achieving seizure control. Neuroimaging is crucial to accurately localize epileptogenic foci and also influences pre-surgical patient counselling and post-surgical seizure control. The objective of our study is to compare pediatric epilepsy surgery patients’ pre-surgical MRI findings with post-surgical neuropathology results and post-surgical seizure outcome.

Methods:
Retrospective chart review was performed on 62 pediatric patients enrolled in the Comprehensive Epilepsy Program at the Stollery Children’s Hospital between January 1, 2015 to April 30, 2020; 25 met inclusion criteria. Data including patient demographics, pre-surgical MRI findings, tissue pathology results, and post-surgical seizure outcome at 12 months were collected from electronic medical records, entered into REDCap database, and analyzed. Complete (correct category of neuropathology identified on MRI) was assigned a score of 1; no concordance (correct category of neuropathology not identified on MRI) was assigned a score of 0.

Results:
Complete and no concordance between MRI and pathology diagnoses were observed in 18/25 (72.0%) and 7/25 (28.0%) of patients, respectively. Excluding patients with focal cortical dysplasia (FCD), complete and no concordance were observed in 16/18 (88.9%) and 2/18 (11.1%) of patients, respectively. 16 of the original 25 patient cohort currently have post-operative follow-up data available at 12 months. Of these, 10/12 patients (83.3%) with complete concordance were seizure-free.

Conclusion:
These data demonstrate that MRI can accurately identify pre-surgical lesions in most refractory epilepsy patients, with the exception of patients with FCD. Radiologists will be performing a blind review of the images with and without a detailed clinical history to help understand how factors such as the underlying pathology, provided clinical information at the time of imaging, magnetic field strength/image resolution, and varying sensitivity of the reporting radiologist affect radiologic-pathologic correlation. Depending on the results, this research is expected to help the multidisciplinary epilepsy team optimize pre-operative imaging for pediatric epilepsy patients.

Jonas Szelewicki
Undergraduate – Neurology
Supervisor: Drs. Janani Kassiri, Alex Tamm
Poster #53
Probiotics, prebiotics, synbiotics, and fecal microbiota transplantation in the treatment of behavioral symptoms of autism spectrum disorder: A systematic review


Introduction:
The emerging role of a microbiota-gut-brain axis in autism spectrum disorder (ASD) suggests that modulating gut microbial composition may offer a window into novel treatment strategies for ASD. The aim of this systematic review was to provide an overview and critically evaluate the current evidence on the safety and efficacy of probiotic, prebiotic, synbiotic, and fecal microbiota transplantation therapies for core and co-occurring behavioral symptoms in individuals with ASD.

Methods:
Comprehensive searches of MEDLINE, EMBASE, Scopus, Web of Science Core Collection, Cochrane Library, and Google Scholar were performed to identify all microbial-based intervention studies in patients with a clinical diagnosis of ASD from inception to March 5, 2020. An update search was completed on October 25, 2020. Only clinical trials assessing behavioral symptoms before and after interventions were included. The methodological quality of the included studies was assessed, and data were extracted using a preconstructed form, independently by two reviewers.

Results: The search yielded 4306 publications, of which 14 articles met the inclusion criteria. The selected articles reported on 13 different interventional studies, including probiotic (n = 8), prebiotics (n = 2), synbiotics (n = 2), and fecal microbiota transplantation (n = 1; reported in two separate papers) trials. All studies were carried out in pediatric patients (aged 3 to 16 years) with sample sizes ranging from 8 to 85 subjects, and treatment duration varied between 3 weeks and 3 months. Serious adverse events were not reported in any of the included studies; diarrhea was a common minor adverse event as reported in six studies. The five randomized controlled trials (RCTs), which were of higher methodological quality, showed no effects of the use of probiotics on ASD behavioral symptoms. In contrast, findings from non-RCTs suggest that probiotics could modulate behaviors in children with ASD. Prebiotics and synbiotics appear to be efficacious in selective behaviors characteristic to ASD, but the magnitude of benefit is uncertain and there were fewer studies using these approaches. Evidence of the efficacy of fecal microbiota transplantation in ASD is still scarce but supports further research.

Conclusion:
Overall, the current evidence base to suggest beneficial effects of gut microbiota-base modalities in ASD is limited and inconclusive. Findings of current studies should be taken with caution as a majority of them were of suboptimal designs, with inadequate power to detect an effect. Appropriately planned and rigorously conducted RCTs are needed to elucidate the efficacy of these therapies.

Qiming Tan
Graduate Student – Gastroenterology & Nutrition
Supervisor: Dr. Andrea M. Haqq
Poster #54
**Title:**
Exploring the Gut-Brain Axis: Impact of Prenatal Depression on Child Cognition is Sequentially Mediated by Breastfeeding and *C. difficile* Colonization

**Authors/Co-authors:**

**Introduction:**
Colonization of the infant gut with *Clostridioides difficile* (*C. difficile*) is on the rise. While colonization appears asymptomatic, colonized infants are at increased risk for atopic diseases and inflammatory conditions. We have previously reported that prenatal depressive symptoms were associated with decreased duration of breastfeeding, and that breastfeeding can reduce the likelihood of *C. difficile* colonization. Moreover, recent evidence is emerging on the impact of gut inflammation on early brain development. Therefore, this study aimed to examine the impact of prenatal depressive symptoms on child cognition at 2 years of age by exploring a novel pathway sequentially mediated by breastfeeding duration and *C. difficile* colonization during infancy.

**Methods:**
This study used a substudy of 336 term infants from the CHILD birth cohort study. Maternal prenatal depression was measured using the CES-D at 36 weeks of gestation with a cut-off score above 16 describing clinically significant depression. Exclusive breastfeeding duration and fecal samples were collected at 4 months during a home assessment. Analysis of *C. difficile* was performed using qPCR with appropriate primers. Child cognition was assessed using the BSID-III administered at 2 years. Structural equation modelling was used to test the direct and indirect effects. The sequential mediations were bootstrapped with the recommended 1000 repetitions. Statistical analyses were completed using STATA v16.

**Results:**
In our sample, 42% of the infants were colonized with *C. difficile* at four months of age. During their third trimester of pregnancy, 9.8% of mothers experienced clinically significant depressive symptoms. We found that prenatal depression marginally decreased cognitive scores at 2 years of age through the sequential path of decreasing breastfeeding duration which increased infant colonization with *C. difficile* (Indirect Coef: -1.43; 95%CI= -3.04, 0.17; p=0.080). Additionally, we found a second pathway in which exclusive breastfeeding duration significantly increased cognitive scores at 2 years of age by decreasing infant colonization of *C. difficile* (Indirect Coef: 0.16; 95%CI= -0.19, -0.02; p=0.012)

**Conclusion:**
Infant colonization with *C. difficile* may not be as asymptomatic as the literature believes it to be. We found that mothers experiencing prenatal depressive symptoms tended to exclusively breastfeed for a shorter duration which increased colonization with this pathobiont during infancy and ultimately resulted in lower cognitive scores later in childhood. Our novel pathway further suggests that maternal mood may contribute to alterations in early infant microbiome with implications for the developing infant brain. Interventions should focus on promoting exclusive breastfeeding duration during infancy.

Carmen Tessier  
Graduate Student – Respiratory Medicine  
Supervisor: Dr. Anita Kozyrskyj  
Poster #55
Title:
Parenteral nutrition-associated cholestasis and growth pre- and post-SMOFlipid® introduction in neonates and infants with intestinal failure

Authors/Co-authors:
Alexandra S. Hudson*, MD HBSc; Nicole Tyminski*, MD BSc; Justine M. Turner, MBBS FRACP PhD; Jason A. Silverman, MD MSc FRCPC
*both authors contributed equally.

Introduction:
Parenteral nutrition (PN) is essential for survival in infants with intestinal failure (IF). PN-associated cholestasis (PNAC) is a life-threatening complication of long-term use. SMOFlipid® (soybean oil, medium-chain triglycerides, olive oil, and fish oil) has recently been approved (2013 in Canada and 2016 in the USA) as an off-label alternative to conventional soy-based lipid emulsions, and is thought to have anti-cholestatic properties. We aimed to determine if infants receiving SMOFlipid® had significantly lower rates of PNAC and improved growth compared to conventional Intralipid®.

Methods:
We conducted a retrospective cohort analysis. All patients (<1 year old) who received PN of any duration (minimum six weeks) at two tertiary pediatric hospitals in Edmonton (2010-2018) were identified using a shared pharmacy database. Data included liver parameters, growth, and complications. Non-parametric tests were used to compare PNAC (serum conjugated bilirubin >34 µmol/L) and growth (weight/length/head circumference z-scores) between SMOFlipid® and Intralipid®.

Results:
1777 patients were reviewed; 36 infants (21 SMOFlipid®, 15 Intralipid®) were included. Reasons for exclusion were received PN for <6 weeks (n=1485), duplicate patients (n=154), receiving multiple types of PN with each less than 6 weeks total (n=62), an initial serum conjugated bilirubin >50µmol/L (n=21), more than 5 consecutive days off of PN (n=12), and >1 year of age at time of PN start (n=3). Patient demographics and medical history did not differ significantly between the two groups. Those on SMOFlipid® were on PN for significantly longer (median 9.3 weeks, IQR 7.3-13.4 vs. 7.6 weeks, IQR 6.4-8.4). There were no significant differences (p>0.05) in SMOFlipid® vs. Intralipid® median serum conjugated bilirubin at baseline (29 vs. 6.5 umol/L), six weeks (9 vs. 5 umol/L), PN cessation (3 vs. 4 umol/L), or peak serum conjugated bilirubin (29 vs. 16 umol/L). Comparing PN initiation to PN cessation, the proportion of patients with PNAC decreased from 37% to 16% for SMOFlipid® and remained stable from 8% to 10% for Intralipid®. There were no differences in weight, length, or head circumference z-scores (p>0.05) between the two groups up to 12 months post-PN initiation.

Conclusion:
In our tertiary pediatric institutions, chronic intestinal failure was rare, with SMOFlipid® being the predominant lipid choice for these infants, particularly for those who needed longer courses of PN. Overall rates of PNAC from initiation to cessation of PN decreased with SMOFlipid® compared to Intralipid®, although this was not statistically significant. There were no differences in growth..

Nicole Tyminski
Resident – Gastroenterology & Nutrition
Supervisor: Drs. Jason Silverman, Justin Turner
Poster #56
Title:
An Unexpected Cause of Acute Jaundice in a Post-transplant Patient

Authors/Co-authors:
K. Wong, J.A. Silverman

Introduction:
Complications post liver transplantation are common. These may include thromboses, primary graft nonfunction, biliary complications, chylothorax, infection, and rejection. Hepaticojejunostomy with Roux-en-Y limb is a common technique for pediatric liver transplantation. Complications of hepaticojejunostomy include small bowel obstruction due to incarceration of the Roux-en-Y limb within an internal hernia. Acquired diaphragmatic hernia has previously been reported in liver transplant patients. Here we present a unique case of acute biliary obstruction secondary to incarceration of a Roux limb within an acquired diaphragmatic hernia.

Methods: Retrospective chart review and case review with the surgical and medical teams.

Results: A 14 month old girl with unresectable hepatoblastoma received a living donor, left lateral segment liver transplant using standard venous reconstruction, microvascular plastics arterial reconstruction, and the recipient common hepatic duct was anastomosed to the donor left hepatic duct. Serial ultrasounds showed persistent intrahepatic duct dilation with cholestasis. Given the concern of biliary obstruction, 10 days post-transplant, she underwent repeat laparotomy and was found to have a dilated common bile duct with a proximal obstruction. A Roux-en-Y hepaticojejunostomy was performed to establish adequate biliary drainage.

Three months post-transplant she developed lung metastases that required wedge resection and chemotherapy. 7 months post-transplant, while admitted for routine chemotherapy she acutely developed jaundice, pruritus, and transaminitis. Liver ultrasound showed an apparent fluid collection at the cut surface of the liver, and biliary dilatation. Extrinsic compression of the biliary tree was suspected and so a percutaneous biliary drain was placed to drain the collection and decompress the biliary system.

Despite improvement in the transaminitis and cholestasis, several days later, she developed severe abdominal pain and associated grunting respirations. An MRI with MRCP to reassess the previous findings and rule out a new intraabdominal cause for her symptoms was completed and unexpectedly showed herniation of her Roux-en-Y limb into a diaphragmatic hernia. She had urgent diaphragmatic hernia repair with reduction of the incarcerated bowel loop, with resolution of her pain and jaundice.

Conclusion:
Post liver transplant Roux-en-Y herniation is uncommon, but can occur with internal hernias and in diaphragmatic hernias. This uncommon complication should be considered for the post liver transplant patient with hepaticojejunostomy in the setting of acute jaundice, particularly if accompanied by acute onset abdominal pain and/or increased work of breathing.

Kerry Wong
Resident – Gastroenterology & Nutrition
Supervisor: Dr. Jason Silverman
Poster #57
Title:
A novel germline GNAS variant causes Nephrogenic Syndrome of Inappropriate Antidiuresis as part of an emerging multisystem phenotype

Authors/Co-authors:
Ashlee Yang1, Marian Thorpe1, Abdullah AlAbbas2, Elizabeth Rosolowsky1, Oana Caluseriu3
(1) Department of Pediatrics, Division of Endocrinology, University of Alberta, Edmonton, AB (2) Department of Pediatrics, Division of Nephrology, University of Alberta, Edmonton, AB (3) Department of Medical Genetics, University of Alberta, Edmonton, AB

Introduction:
The GNAS gene encodes the stimulatory G protein alpha-subunit (Gαs), which mediates the signalling of G protein-coupled receptors, including arginine vasopressin receptor 2 (AVPR2). GNAS mutations cause a spectrum of phenotypes from hyperfunctioning endocrinopathies in McCune-Albright Syndrome to hormone resistance in Pseudohypoparathyroidism. Recently, a new condition with hyponatremia, precocious puberty, skeletal abnormalities (Bieberman et al, 2019) and nephrogenic syndrome of inappropriate diuresis has been described (NSIAD; Miyado et al, 2019) due to germline GNAS mutations. We highlight a three generation family with this newly described genetic condition due to a novel GNAS variant, expanding on the variability of the phenotype.

Methods:
We performed whole-exome sequencing and genotype-phenotype correlation in a family with multihormone abnormalities including hyponatremic seizures and NSIAD.

Results:
The index 9-year-old male was referred for subclinical hyperthyroidism. Past medical history included childhood hyponatremic seizures consistent with NSIAD (low-normal antidiuretic hormone with high urine osmolality), responsive to fluid restriction. Z-score for height was +3.33, and weight plotted at the 98th percentile. Thyroid was unremarkable on exam, and he was prepubertal. Thyroid Stimulating Hormone (TSH) was 0.08 (0.3-5 mU/L) with free thyronine (fT3) of 8.0 (4.1-7.9 pmol/L) and free thyroxine (fT4) of 15.3 (8.0-20.0 pmol/L). TSH receptor and thyroperoxidase (TPO) antibodies were negative; Tc-99m-pertechnetate thyroid scintigraphy demonstrated diffuse uptake. Skeletal survey identified acro-osteolysis in the distal phalanges of the hands and feet. AVPR2 testing was negative. Family history included hyponatremic seizures and tall stature in his mother and hyponatremia in his younger brother. His mother and grandfather were found to have elevated parathyroid hormone (PTH) with normocalcemia, pending further evaluation. Whole exome sequencing identified a new variant in the GNAS gene c.1121G>A, p.(R374H), shared with his brother, mother, and maternal grandfather.

Conclusion:
This family highlights the clinical variability associated with a new syndromic entity including NSIAD, non-autoimmune subclinical hyperthyroidism, elevated PTH with normocalcemia, skeletal manifestations, and tall stature, due to a novel dominant germline GNAS variant. NSIAD has not been linked to GNAS mutations until now, and imprinting does not appear to play a role in this new GNAS-related disorder. The variable intrafamilial phenotype in members sharing the same genotype expands on the clinical features described recently in the literature. Preliminary studies suggest a gain of function underlying molecular mechanism. Importantly, this
emerging multisystem condition refutes the notion that germline GNAS gain-of-function mutations are lethal and contributes to our understanding of the genetic basis of multihormone imbalances.

Ashlee Yang
Resident – Endocrinology
Supervisor: Dr. Elizabeth Rosolowsky
Poster #58
Title:
The impact of donor demographics and donor cold ischemic time on post-transplant outcomes in pediatric heart transplant recipients

Authors/Co-authors:
Dr. Simon Urschel, Dr. Kayla Young

Introduction:
Pediatric heart transplant candidates continue to have very high waitlist mortality despite efforts to improve approaches to donor allocation. Approximately 50% of US offered donor hearts are refused and subsequently discarded annually. A practice of donor selectivity has evolved whereby the standards of acceptance for donor organs has been set unreasonably high, especially in centers with an abundance of donor offers. This has the potential to increase waitlist mortality and influence post-transplant outcomes should a recipients’ clinical status decline while searching for the “perfect heart”. Donor cold ischemic time, a factor controversially debated for its potentially harmful impact on donor transplant outcomes, is a major driver of offer refusal. At Stollery Children’s Hospital we receive a smaller number of donor offers each year and as such accept donors with relatively longer cold ischemic times in addition to accepting donor organs that have refused by at least 19 centers in the US. Despite these so called “adverse demographics”, the overall survival of our transplant patients is significantly better than the US average. The aim of this study is to characterize the independent impacts of duration of cold ischemic time as well as distance and nation of donor origin on post-transplant outcomes in pediatric heart transplant recipients.

Methods:
Retrospective chart review evaluating the impact of the donor cold ischemic time (continuous variable), donor distance (continuous variable) and donor country of origin (Canadian vs American as binary variables) on post-transplant outcomes. Primary outcome was defined as graft survival. Secondary outcomes were defined as freedom from rejection and graft vasculopathy at both 1 and 5 years. All patients who underwent heart transplant at the Stollery Children’s Hospital from January 2000 to December 2019 were included. Both uni/multivariate cox and logistical regression analyses will be used determine the impact of donor origin and cold ischemic time on outcomes while controlling for confounding variables. Kaplan Meier curves and log-rank test will be used to for the comparison between survival curves. Quantitative parameters will be compared between groups using non-parametric testing (Wilcoxon-Mann U-test). Qualitative differences will be assessed using Fischer’s exact test due to small sample size

Results:
Results and statistical analysis are pending during completion of data collection

Conclusion:
Conclusions to follow completion of data collection and statistical analysis.

Kayla Young
Resident – Cardiology
Supervisor: Dr. Simon Urschel
Poster #59
Title:  
*Emergency Department Use in Children and Youth Facing Death Secondary to Self-Harm: A Population-Based Cohort Study in Alberta, Canada*

Authors/Co-authors:  
Rajesh Alphonse and Rhonda J. Rosychuk

Introduction:  
In Canada, death by self harm (SH) is the second highest cause of mortality in people aged 15-24 years and the emergency department (ED) is one way individuals with SH behaviour enter the healthcare system. Studying the demographic/clinical characteristics of this high-risk population in the context of SH-associated ED presentations is critical to developing efficient and evidence-based SH prevention/treatment services.

Methods:  
Using linked population based databases, we examine visits made by children/youth aged 10-24 yrs for SH reasons to EDs from 2010/11 to 2014/15, in Alberta. The case definition is any youth in this population who presented to an Alberta ED for injury secondary to intentional SH and who either died in the ED or died within 30 days of an ED visit (due to SH or otherwise). Multivariable logistic regression model was used to determine the independent association of age, sex, fiscal year, occurrence of death when still being managed in the ED and number of ED visits for SH before dying with increased likelihood of death due to SH.

Results:  
Among 118 individuals who matched the case definition, 64.4% died due to SH and 35.6% died for reasons other than SH. Both groups were similar in sex distribution with the former having a lower mean age. No major difference was noted in the proportion of SH vs non-SH deaths in the fiscal years studied. 67.1 % of the individuals in the SH group presented with a level-1 triage code (“resuscitation”) compared to only 29% of level-1 triage presentations in the non-SH group. Via multivariable logistic regression, we show that age is independently associated with increased likelihood of death due to SH (Odds ratio [OR] 0.85 per year of age, 95% confidence interval [CI] 0.74 to 0.96, P = 0.01). Occurrence of death in the ED, in contrast to death in the community after discharge, was also independently associated with SH death (OR=2.92, 95%CI 1.14 to 8.25, P = 0.031).

Conclusion:  
Our study indicates that being younger increases the odds of SH death among those presenting to EDs for SH and these deaths are more likely to happen in the ED during presentation for SH. Future assessments which include non-fatal SH ED presentations and deaths resulting from SH that did not have an ED component can better predict fatal outcome in high-risk youth.

Anthuvan Rajesh Stanislaus Alphonse  
Resident – General & Community Pediatrics  
Supervisor: Dr. Rhonda Rosychuk  
Oral Session #2; Residents Stream (3:30 p.m.)
Title:
Adolescent and Caregiver Perspectives on Living with a Limb Fracture: A Qualitative Study

Authors/Co-authors:
M Bharadia, S Golden-Plotnik, M Van Manen, M Sivakumar, A Drendel, N Poonai, M Moir, S Ali

Introduction:
Fractures occur in up to half of children by age 16 years. After initial emergency care for a fracture, function is universally impaired in children, and impacts extend to the immediate family. Knowledge of expected functional limitations is key to providing proper discharge instructions and anticipatory guidance to families.

Statement of Purpose and Objectives:
Our study objectives were to understand: 1) how adolescents (12-17 years) describe the functional impact of fractures on their lives, 2) how adolescents’ reports of their experience compare to those of their caregivers, and 3) the impact of the fracture on the family unit.

Methods:
We conducted individual, semi-structured interviews from June 2019 to November 2020 with adolescents and their caregivers 7-14 days following their initial visit to a pediatric emergency department. We utilized qualitative content analysis methodology; recruitment proceeded, until thematic saturation was achieved. Coding and analysis were concurrent with recruitment and interviews. A secondary coder reviewed 40% of the transcripts, and the coding team met regularly to discuss the coding framework and key themes. The interview script was modified in an iterative process, to reflect emerging themes.

Results:
We completed a total of 29 interviews. The most commonly affected functions were a) showering and hygiene (which required the most caregiver support), b) sleep variability (due to pain and cast-related discomfort), and c) exclusion from sports/activities. Many adolescents experienced disruptions to social activities and gatherings. Adolescents valued independence and often chose to take more time to complete a task to preserve this, regardless of inconvenience. Both adolescents and caregivers reported feelings of frustration as a result of day-to-day impacts imposed by the injury. Generally, caregivers’ perspectives were in keeping with the experiences that adolescents described for themselves, however there were some important divergent perspectives. Notable family impacts included what we described as ‘sibling burden’ or conflicts that arose when a sibling had to take on extra chores/tasks.

Conclusion:
These themes highlight an opportunity to better tailor discharge instructions for adolescents with fractures. Key messages include: 1) expect pain and impaired sleep especially in the first few days, 2) allow extra time to complete tasks independently, especially for grooming and hygiene, 3) consider family impact, especially sibling burden, 4) prepare for changes in activities and social dynamics, and 5) frustration is normal, for both adolescents and caregivers. Future work can focus on developing a novel, family-informed tool to assess functional outcomes following injury.

Manisha Bharadia
Undergraduate – Emergency Medicine
Supervisor: Dr. Samina Ali
Oral Session #2; Undergraduate Students Stream (4:00 p.m.)
Title:
*Elucidating the mechanistic role of GLP-1R in the Inflammatory Response of Macrophages and B-cells to Dietary Fibres in Pediatric IBD*

Authors/Co-authors:
Sarah Hanstock, Aja Rieger, Robyn Dickner, Jeremy Jerasi, Heather Armstrong, Eytan Wine

Introduction:
Both diet and the microbiome have been implicated in the pathogenesis of inflammatory bowel diseases (IBD). Fibre is not digested by the host; it is fermented by microbes in the large bowel. High fibre intake is related to lower risk for the development of IBD, and a high fibre diet is usually recommended, also for individuals with IBD. However, work in our lab suggests that select dietary fibres may be pro-inflammatory in a pediatric IBD cohort. Importantly, large bowel dysbiosis in IBD could limit the fermentation of dietary fibres, leading to reduced production of beneficial microbiome metabolites as well as an accumulation of intact fibre in the large bowel. These intact fibres may then interact with immune cells residing in the large bowel, through specific receptors, and perpetuate the inflammatory state seen in IBD. Based on preliminary findings, we hypothesized that the dietary fibre oligofructose acts through the glucagon-like peptide-1 receptor (GLP-1R) on macrophages and B-cells to regulate the inflammatory environment. We expected to find changes in the expression of cytokines and chemokines, and their receptors.

Methods:
Changes in immune cell secretions (ELISA) and the expression of selected inflammatory markers (RT-qPCR) were measured to determine potential pathways involved in response to dietary fibres in vitro. Knockdown (siRNA) of GLP-1R, the fibre receptor, was performed to validate the involvement of these pathways in the inflammatory response to dietary fibres. Cells were treated with oligofructose, or no fibre

Results:
Qiagen RT² profiler array (human inflammatory cytokines and receptors) and cytokine secretion (ELISA) indicated that in response to oligofructose macrophages have a predominantly pro-inflammatory response while B cells have an anti-inflammatory response. Presence of GLP-1R in large bowel and terminal ileum biopsies collected during endoscopy was higher in pediatric IBD (Crohn disease n=7; Ulcerative colitis n=7) than non-IBD patients (n=7), and expression was confirmed on both B-cells and macrophages. Knockdown of GLP-1R (siRNA) significantly reduced the pro-inflammatory response (IL-1β ELISA) with oligofructose application in THP-1 macrophage cells. Other targets involved in inflammatory pathways are still being investigated with GLP-1R knockdown.

Conclusion:
Improving our understanding of the mechanistic link between dietary fibres and immune response will aid us in developing a model for the interactions of oligofructose with the GLP-1R in B cells and macrophages. Findings from this study may be able to inform dietary interventions, prebiotic/probiotic administration, and drug development for treatment of IBDs.

Sarah Hanstock
Undergraduate – Gastroenterology & Nutrition
Supervisor: Dr. Eytan Wine
Oral Session #1; Undergraduate Students Stream (2:45 p.m.)
**Title:**

*Is impaired energy production a novel insight into the pathogenesis of pyridoxine-dependent epilepsy due to biallelic variants in ALDH7A1?*

**Authors/Co-authors:**

Anastasia Minenkova, Erwin EW Jansen, Jessie Cameron, Rob Barto, Thomas Hurd, Lauren MacNeil, Gajja S. Salomons, Saadet Mercimek-Andrews

**Introduction:**

Pyridoxine-dependent epilepsy (PDE) is due to biallelic variants in *ALDH7A1* (PDE-ALDH7A1). *ALDH7A1* encodes α-aminoadipic semialdehyde dehydrogenase in lysine catabolism. We investigated the gamma aminobutyric acid (GABA) metabolism and energy production pathways in human PDE-ALDH7A1 and its knock-out *aldh7a1* zebrafish model.

**Methods:**

We measured GABA pathway, and tricarboxylic acid cycle metabolites and electron transport chain activities in patients with PDE-ALDH7A1 and in knock-out *aldh7a1* zebrafish.

**Results:**

We report results of three patients with PDE-ALDH7A1: low paired complex I+II and complex II+III and individual complex IV activities in muscle biopsy in Patient 1 (severe phenotype); significantly elevated CSF glutamate in the GABA pathway and elevated CSF citrate, succinate, isocitrate and α-ketoglutarate in the TCA cycle in Patient 3 (severe phenotype); and normal CSF GABA pathway and TCA cycle metabolites on long-term pyridoxine therapy in Patient 2 (mild phenotype). All GABA pathway metabolites (γ-hydroxybutyrate, glutamine, glutamate, total GABA, succinic semialdehyde) and TCA cycle metabolites (citrate, malate, fumarate, isocitrate, lactate) were significantly low in the homozygous knock-out *aldh7a1* zebrafish compared to the wildtype zebrafish. Homozygous knock-out *aldh7a1* zebrafish had decreased electron transport chain enzyme activities compared to wildtype zebrafish.

**Conclusion:**

We report impaired electron transport chain function, accumulation of glutamate in the central nervous system and TCA cycle dysfunction in human PDE-ALDH7A1 and abnormal GABA pathway, TCA cycle and electron transport chain in knock-out *aldh7a1* zebrafish. Central nervous system glutamate toxicity and impaired energy production may play important roles in the disease neuropathogenesis and severity in human PDE-ALDH7A1.
Introduction:
Pain affects all children and youth. In order to continue to tailor the improvement of pain management practices at the Stollery Children’s Hospital, it is necessary to understand healthcare professionals’ (HCPs) perceptions of how pain is currently managed and how practices can continue to be improved.

Methods:
Semi-structured interviews were conducted via Zoom and telephone with 18 HCPs from the Stollery between October and December 2020 by a trained qualitative researcher. As part of a quality improvement initiative, this study received ethics exemption from the Research Ethics Board (University of Alberta). The interview guide was co-designed by the study team, clinical staff, and a patient partner. Interview questions included general views on pain management, understanding of patient-and family-centred care, and perceptions of barriers and facilitators to improving hospital-based pain management. Members of the hospital’s Pain Management Committee were first recruited, with further participants being recruited through snowball sampling. Recruitment continued until data saturation was reached. A conventional thematic content analysis of verbatim transcripts and reflexive field notes imported into MAXQDA2020 is being conducted to interpret the data collected by gaining insight into how HCPs understand and implement pain management practices.

Results:
Participants worked in the following areas: administration/leadership (n=4), nursing (n=8), psychology (n=1), child life (n=2), and medicine/surgery (n=3). One of the primary areas of improvement observed by HCPs at the Stollery included improving the mobilization of evidence-based pain management practices to, and clinical education opportunities for, staff and physicians across the hospital. Participants noted an interest and belief in adequate pain care for children among themselves and their colleagues, but also stated that they typically need to seek out this information on their own. There are currently few opportunities offered at the hospital to learn more about the most current evidence and practice in the field; some opportunities identified included continued collaboration with the national knowledge mobilization network Solutions for Kids in Pain, further dissemination of the Stollery Pain Management Handbook, more frequent in-services, a hospital-wide pain education day, and the development of a nurse-led resource program.

Conclusion:
The results of this quality improvement study will be used to inform the development of resources for HCPs, clinical education opportunities, and quality improvement initiatives to improve children’s pain management.

Elise Reiter
Non-Faculty Staff – Emergency Medicine
Supervisor: n/a
Oral Session No. 1; Faculty, Clinical Academic Colleagues, Non-faculty Staff Stream (3:15 p.m.)
Title:
Give Me a Break! Medical Student Anxiety and Observed Structured Clinical Examinations

Authors/Co-authors:
Karen Forbes, Qaasim Mian, Jessica Foulds, Jonathan Duff

Introduction:
Medical students experience higher rates of depression and anxiety than general population age-matched peers. Many aspects of medical training contribute, including examinations; Observed Structured Clinical Examinations (OSCE) may be particularly stressful. Many medical schools have developed curricula and programs to support student wellness; however, to our knowledge no one has implemented strategies during examinations to reduce anxiety. We sought to examine the effect of stress-reducing activities on third-year medical students’ anxiety rates compared to no activities during “break” stations of a core pediatric OSCE. Secondary objectives included comparing OSCE performance between these two groups and evaluating student perceptions of stress-relieving interventions around anxiety and performance

Methods:
In the 2019-2020 academic year, students on their core pediatric rotation participated in a 10-station end-of-rotation OSCE. OSCEs were administered as two tracks, each with 3 break stations. Students were block randomized by track to standard break stations (empty room) or optional stress-relieving activities (coloring, building toys, or puzzles) in break stations. All participants completed the State-Trait Anxiety Inventory (STAI) before and after the OSCE, and a short questionnaire about their experiences.

Results:
Seventy-one students participated in the study (control group n=34; intervention group n=37). Control group median pre- and post-OSCE STAI scores were 46 and 50 respectively, and for the intervention group were 51 and 50 respectively, suggesting no significant difference in anxiety within and between the two groups. Median individual STAI increased by 2 in the control group and decreased by 4 in the intervention group although these changes were not statistically significant. Overall OSCE performance was similar between the two groups (control 80% ± 7.9%; intervention 78% ± 7.4%). Subjectively, 51% of students in the intervention group felt their anxiety improved with activities, although only 14% felt their performance was improved.

Conclusion:
Medical students exhibited high levels of anxiety (82-94th percentile) before and after an end-of rotation OSCE, compared to normative data for age-matched controls. Break stations may be required for logistical reasons during an OSCE and may provide opportunity to briefly relax during a high-stress exam; however, some students reported stress and perseverating on prior stations. Optional stress-relieving activities were positively received by students and did not negatively impact performance, although a validated anxiety tool did not identify significant differences. Only three of six cohorts were enrolled due to the pandemic; this study will resume when able to collect further data to help evaluate and improve exam-related anxiety.

Dr. Karen Forbes
Faculty - Hospital Medicine
Supervisor: n/a
Oral Session #1; Faculty, Clinical Academic Colleagues, Non-faculty Staff Stream (2:45 p.m.)
Introduction:
The bidirectional cavopulmonary shunt (also known as the Glenn procedure) is the second of three staged surgical procedures for children with single ventricles. While the mortality and failure rate for this interstage procedure is low, there exists enough mortality and morbidity that risk factors should be delineated.

Objectives:
We aimed to determine potentially modifiable risk factors for a complicated Glenn procedure (cGP), and whether a cGP predicted adverse neurodevelopmental and functional outcomes. A cGP was defined as post-operative death, heart transplant, extracorporeal life-support, Glenn takedown, or prolonged ventilation

Methods:
This was a prospective inception-cohort study that included all consecutive patients having the Glenn procedure done at the Stollery Children’s Hospital from January 2012 to December 2017. All 169 patients during this time period were included. Previously agreed upon demographic, pre-operative, intraoperative, and postoperative variables were collected prospectively. Some variables were added by retrospective chart review. Neurodevelopmental assessments were performed at age two-years in consenting survivors (n=156/159 survivors). The Bayley Scales of Infant and Toddler Development-3rd Edition (Bayley-III) and the Adaptive Behavior Assessment System-2nd Edition (ABAS-II) were administered. Adaptive functional outcomes were determined by the General Adaptive Composite (GAC) score from the ABAS-II. Predictors of outcomes were determined using univariate and multiple variable linear or Cox regressions.

Results:
Of patients who had a Glenn procedure 10/169 (6%) died by two-years of age and 27/169 (16%) had a cGP. Interventional variables statistically significantly associated with a cGP were the inotrope score on postoperative day 1 (HR 1.04, 95%CI 1.01, 1.06; p=0.010) and use of inhaled nitric oxide post-operatively (HR 7.31, 95%CI 3.19, 16.76; p<0.001). A cGP was independently statistically significantly associated with adverse Bayley-III Cognitive (ES -12.32, 95%CI -18.99, -5.64; p<0.001) and Language (ES -13.64, 95%CI -22.16, -5.12; p=0.002) scores, and adverse GAC score (ES -15.11, 95%CI -24.08, -6.13; p=0.001).

Conclusion:
Higher inotrope score and inhaled nitric oxide (iNO) used post-operatively were associated with a cGP. Further study is required to explain the relationship of iNO use with cGP. A cGP was independently associated with adverse 2-year neurodevelopmental and functional outcomes and should be added to the list of risk factors that increase the need for surveillance for adverse neurodevelopment. Whether early recognition and intervention for risk of a CGP can prevent adverse outcomes warrants study.

Gurpreet Khaira
Clinical Academic Colleague – Critical Care (PCICU & PICU)
Supervisor: Ben Sivarajan
Oral Session #1; Faculty/Clinical Academic/Non-faculty Staff Stream (2:30 p.m.)
Establishing priorities in child health research: giving parents and youth a voice

Sarah Elliott, Lisa Hartling, Shannon Scott

Introduction
In child health research prioritization and dissemination, the perspectives of parents, children, and other key consumers are rarely acknowledged, despite a growing body of literature supporting their active involvement. Our objective was to engage parents and youth in identifying and developing priority lists of research topics that are most relevant and important to youth and their families.

Methods
Parents and youth across Alberta were invited to participate in a modified James Lind Alliance priority setting exercise. From initial consultations with parent and youth groups, two lists of 27 relevant child health topics were developed. These lists were sent to parents and youth via anonymous online surveys, where parents and youth ranked the topics by rating the degree to which they agreed it was a priority for child health research. Ratings were based on a 5-point Likert scale from strongly disagree to strongly agree. There was an additional section allowing participants to suggest other relevant topics.

All highly rated topics (rated “agree” or “strongly agree” by ≥70% of respondents) were retained for discussion. Online focus groups to discuss priority topics were held with parents and youth, separately. These discussions were analyzed using thematic analysis; resultant themes and subthemes were used to produce representative research questions. These questions were then sent via a second online survey to parents and youth, who were asked to rank their ‘top 10’ child health research topics.

Results
Initial surveys were completed by 273 parents and 344 youth. This resulted in 5 highly rated health research topics for parents (behaviour, learning, and developmental disorders; mental health; food, environment and lifestyle; quality of health care; and vaccines) and 4 for youth (brain and nerve health, mental health, quality of health care, and vaccines). The research questions stemming from 4 parent (n=12) and 6 youth (n=21) focus group discussions were ranked by 43 parents and 62 youth. Parents’ highest ranked research topic was “effect of screen time on children’s neurodevelopment”, while the highest ranked topic from youth was “early signs of anxiety and depression in children and youth”.

Conclusion:
Utilising the knowledge and experience of Albertan parents and youth, relevant lists of priority topics in child health research were developed. These lists highlight the areas where funding and research should be directed to improve child health outcomes and patient care experiences that are important to parents and youth.

Key words: priority setting, parents, youth
Sarah Elliott
Non-Faculty Staff – TRAS/Alberta Research Centre for Health Evidence (ARCHE)
Supervisor: Dr. Lisa Hartling
Oral Session #1; Faculty, Clinical Academic Colleagues, Non-faculty staff Stream (2:15 p.m.)
Introduction:
Dietary fibers pass through the bowel undigested and are instead fermented within the intestine by microbes, typically promoting gut health. However, many IBD patients describe experiencing sensitivity to dietary fibers. β-glucan, found on the surface of fungal cells during fungal infection, has been shown to bind to fiber receptors, such as Dectin-1, on host immune cells, resulting in a pro-inflammatory response. These fungal fibres share properties with dietary fibers. As an altered gut microbial composition has been associated with IBD, we hypothesized that the loss of fiber-fermenting microbes populating the gut in IBD could lead to dietary fibers not being efficiently broken down into their beneficial biproducts (e.g. short chain fatty acids; SCFA), resulting in binding of intact fibers to pro-inflammatory host cell receptors.

Methods:
Immune and epithelial cell lines in vitro and colonic biopsies cultured ex vivo were incubated with oligofructose or inulin (5g/L), or fiber solutions pre-fermented by patient intestinal microbes (24hr anaerobic fermentation). Immune responses were measured by cytokine secretion (ELISA) and expression (qPCR). Biproducts of fermentation were measured by chromatography. Patient microbe abundance was determined by metagenomic sequencing. Barrier integrity was measured by transepithelial resistance (TEER). Food frequency questionnaire (FFQ) data of patient fiber consumption were correlated with gut microbes (shotgun sequencing) and immune responses to fiber in patient biopsies.

Results:
Unfermented oligofructose induced IL-1β secretion in leukocytes (macrophage, T cell, neutrophil) and in colon biopsies from pediatric Crohn disease (CD; n=38) and ulcerative colitis (UC; n=20) patients cultured ex vivo, but not in non-IBD patients (n=21). IL-1β secretion was greater in patients with more severe disease. Pre-fermentation of oligofructose by whole-microbe intestinal washes from non-IBD or remission patients reduced secretion of IL-1β, while whole microbe intestinal washes from severe IBD patients were unable to ferment oligofructose or reduce cytokine secretion. Fiber-associated immune responses in patient biopsies cultured ex vivo (ELISA) was correlated with fiber avoidance (FFQ), gut microbiome (sequencing), and SCFA production (chromatography) in matching patient samples. Furthermore, fiber effects on IL-1β secretion in biopsies positively correlated with effects on epithelial barrier integrity in T84 cells.
Conclusion
Our findings demonstrate that intolerance and avoidance of prebiotic fibers in select IBD patients is associated with the inability to ferment these fibers, leading to pro-inflammatory immune responses and intestinal barrier disruption. This highlights select disease state scenarios, in which administration of fermentable fibers should be avoided and tailored dietary interventions should be considered in IBD patients.

Heather Armstrong
Postdoctoral Fellow – Gastroenterology & Nutrition
Supervisor: Dr. Eytan Wine
Oral Session #1; Fellows (Clinical & Postdoctoral) Stream (2:30 p.m.)
Title: Endocrine Sequelae in Pediatric Hematopoietic Stem Cell Transplant Recipients with Sickle Cell Disease: A Retrospective Cohort Analysis

Authors/Co-authors: Richelle Waldner 1, Sunil Desai2, Gregory Guilcher3, Dania Monagel4, Josephine Ho5, Elizabeth Rosolowsky1

2. Division of Immunology, Hematology, Oncology and Palliative Care. Department of Pediatrics. University of Alberta.
3. Paediatric Oncology and Blood and Marrow Transplant. Departments of Pediatrics and Oncology. University of Calgary.
4. King Saud Bin Abdulaziz University for Health Sciences, Jeddah, Saudi Arabia.

Introduction:
In an effort to reduce late complications of hematopoietic stem cell transplantation (HSCT), including endocrine sequelae and infertility, a novel non-myeloablative regimen has been successfully implemented at our institution for pediatric sickle cell disease (SCD) patients who receive matched sibling donor (MSD) HSCT. Our objective was to assess the prevalence of endocrine complications in this population.

Methods:
A retrospective chart review of pediatric SCD patients who underwent MSD HSCT with non-myeloablative conditioning between June 1, 2013 and June 30, 2020 was performed. Subjects were included if they were ≤18 years at HSCT and were followed at either Alberta Children's Hospital or Stollery Children's Hospital post-HSCT. Data collection time points included baseline and 1, 2, 3, and 5-years post-HSCT. Clinical, laboratory, and radiographic variables relating to anthropometrics, pubertal status, thyroid status, gonadal function, metabolic health, and bone health were collected. Descriptive data analysis was utilized, with prevalence reported as a percentage.

Results:
17 subjects were included. Age at HSCT ranged from 3.0-18.0 years with 12 females (70.6%) and 5 males (29.4%). Event free survival was 100%. All (100%) had 1 and 2-year follow-up; 15 (88.2%) had 3-year; and 7 (41.2%) had 5-year follow-up. Pre-HSCT, 1 of 17 had short stature and 1 of 5 (a male) had elevated follicle stimulating hormone (FSH). FSH elevation post-HSCT occurred in 7 of 17 (41.2%; 5 female and 2 male). All females with elevated FSH had normalization of their values with follow-up. The 2 males did not have FSH normalization, though luteinizing hormone and testosterone values were normal for age. Post-HSCT secondary amenorrhea or oligomenorrhea was described in 4 females, with improvement or resolution documented in all at later follow-up. One female subject with normal gonadotrophin levels post-HSCT had a successful pregnancy and live birth. Vitamin D deficiency was present in 4 of 5 subjects pre-HSCT and 5 of 5 post-HSCT. Pre-HSCT, 1 subject (5.9%) was overweight and 2 (11.8%) were obese. Post-HSCT, 4 subjects (23.5%) were overweight and 3 (17.6%) were obese.

Conclusion:
A notable endocrine issue post-HSCT described in this cohort is FSH elevation. The elevation was transient in females, and we identified one successful pregnancy, suggesting that non-myeloablative conditioning may
convey improved fertility outcomes compared to busulfan-based conditioning. Not all patients had baseline endocrine evaluations or consistent post-HSCT endocrine testing. We recommend standardizing pre- and post-HSCT endocrinology assessments for this population.

Richelle Waldner
Clinical Fellow – Endocrinology
Supervisor: Dr. Elizabeth Rosolowsku
Oral Session #1; Fellows (Clinical & Postdoctoral) Stream (2:45 p.m.)
Title:
Cardiac insulin resistance and the role of branched-chain keto acids

Authors/Co-authors:
Qutuba G Karwi, Cory S Wagg, Liyan Zhang, John R Ussher, Gary D Lopaschuk
Cardiovascular Research Centre, University of Alberta, Edmonton, Alberta, Canada

Introduction:
Perturbed branched-chain amino acids (BCAA) oxidation positively correlates with the severity of cardiac insulin resistance in heart failure. We previously demonstrated that cardiac-specific deletion of the BCAA oxidative enzyme mitochondrial branched-chain aminotransferase (BCATm) increases cardiac BCAA levels and decreases branched-chain keto acids (BCKA) levels, enhances insulin-stimulated cardiac glucose oxidation rates. This increased cardiac insulin sensitivity is associated with an increase in the phosphorylation of protein kinase B (Akt) and activation of pyruvate dehydrogenase (PDH), the rate-limiting enzyme of glucose oxidation. However, whether it is the accumulation of BCAA or BCKA that is critical in mediating cardiac insulin resistance is unknown. How perturbed BCAA oxidation may mediate cardiac insulin resistance in heart failure is also unknown.

Methods:
To address these questions, we first examined the effects of selectively enhancing cardiac BCKA levels on cardiac insulin-stimulated glucose oxidation. We perfused isolated working mice hearts (male and female C57BL/6N, n=8-10) with high levels of BCKA (α-keto-isocaproate 80 μM, α-keto-β-methylvalerate 100 μM, α-keto-isovalerate 70 μM), levels that can be seen in diabetes and obesity.

Results:
High levels of BCKA completely blunted insulin-stimulated glucose oxidation rates and increased fatty acid oxidation rates. We also found that BCKA abolished insulin-stimulated mitochondrial Akt, an effect that was associated with PDH deactivation. We next determined the potential protective effect of reducing cardiac BCKA levels in the failing heart. We randomized WT\textsuperscript{Cre+/+} and cardiac-specific BCATm\textsuperscript{−/−} mice (male, 25-30g, n=6-8) to undergo either sham surgery or transverse aortic constriction surgery to induce heart failure. Five weeks post-surgery, there was a marked increase in insulin-stimulated glucose oxidation rates in the BCATm\textsuperscript{−/−} failing hearts compared to the WT\textsuperscript{Cre+/+} failing hearts, with no significant effect on glycolysis rates. Enhanced cardiac insulin sensitivity was associated with a significant decrease in fatty acid oxidation rates in the BCATm\textsuperscript{−/−} failing hearts compared to the WT\textsuperscript{Cre+/+} failing hearts. This decrease in fatty acid oxidation in the BCATm\textsuperscript{−/−} failing hearts was associated with a significant decrease in myocardial oxygen consumption rates. As a result, cardiac efficiency (cardiac work/myocardial oxygen consumption) was significantly increased in the BCATm\textsuperscript{−/−} failing hearts compared to the WT\textsuperscript{Cre+/+} failing hearts.

Conclusion:
We conclude that the accumulation of BCKA, and not BCAA, is a major contributor to cardiac insulin resistance via abrogating mitochondrial translocation of Akt. Targeting BCKA may represent a potential therapeutic approach to improve cardiac insulin-stimulated glucose oxidation in the setting of heart failure, obesity and diabetes.
Title
Predictive model development for preschool BMIz trajectory using infant microbiota features and modifiable predictors

Authors/Co-authors:
Zhao DX, Reyna Vargas M, Mandhane PJ, Moraes TJ, Turvey SE, Subbarao P, Scott JA, Kozyrskyj AL

Introduction:
Children living with obesity are not referred to weight management services until their tweens or teens. Yet if clinicians could determine obesity risk sooner, they would more effectively improve weight trajectories and prevent metabolic disease. This prevention issue challenges us to derive a predictive tool to help clinicians and parents predict weight trajectories for young children and hence, identify future disease risk. According to infant gut microbial composition, we employed advanced statistical learning techniques to develop predictive models for preschool obesity.

Methods:
In this CHILD cohort (N=2114) study, BMIz (body-mass index) trajectory membership was based on height-weight measurements from birth to 5 years of age. Modifiable predictors of pre-postnatal BMIz were selected from the literature. Using gut microbiota profiles of fecal samples from infants at 3 months of age, we tested a suite of machine learning algorithms to predict BMIz trajectories, such as linear algorithms (e.g., LDA), non-linear algorithms (e.g., Naïve Bayes), and ensemble algorithms (e.g., Random Forest). Stratified 5-fold repeated cross-validation was used for selecting the best model, with AUC of the ROC (and Precision-Recall) curve as the performance metrics. We employed a One-vs-Rest strategy to build multiple classifiers other than building one classifier.

Results:
The BMIz trajectory 1, 2, 3, 4 have 206, 1261, 541, and 106 subjects, accounting for 9.3%, 60.1%, 25.4%, and 5.2%, respectively. Out of ~200 features for down-stream model building, 28 predictive microbial features were chosen. Random Forest (average AUC = 0.929) and tree bagging algorithms (average AUC = 0.928) showed better performance for infant gut microbial composition at the internal validation stage than LDA and Naïve Bayes algorithms. Further, Naïve Bayes algorithms had a high performance as One-vs-Rest classifiers, with the mean AUC (of the Precision-Recall curve) of 0.81, 0.91, 0.93, and 0.78 for BMIz trajectory 1, 2, 3, and 4, respectively. Notably, we identified 3 predictive gut microbial features from the Random Forest algorithm, namely Veillonellaceae, Lachnospiraceae, and Ruminococcus

Conclusion:
Inclusion of infant gut microbiota features yields functional prediction ability for BMIz trajectory. In particular, certain families within the Clostridia may play an essential role in preschool weight development. In the future, we will integrate other selective modifiable predictors and microbial features to predict BMIz trajectory in childhood better.
Title:
Associations Between Social Determinants of Health and Preschool Children’s Weight Status in Alberta: A Population-based Study

Authors/Co-authors:
Ms. Jessica Wijesundera¹, Dr. Anamaria Savu², Sunjdatul Islam³, Douglas C. Dover³,⁴, Dr. Linn Moore², Dr. Andrea Haqq⁵, Dr. Padma Kaul⁶, Dr. Geoff Ball¹
¹Department of Pediatrics, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Alberta, Canada; ²Canadian VIGOUR Centre, University of Alberta, Edmonton, Alberta, Canada; ³Alberta Health, Government of Alberta, Edmonton, Alberta, Canada; ⁴Concordia University of Edmonton, Edmonton, Alberta, Canada; ⁵Division of Pediatric Endocrinology, University of Alberta, Edmonton, Alberta, Canada; ⁶Division of Cardiology, Mazankowski Alberta Heart Institute, University of Alberta, Edmonton, Canada.

Introduction:
Unhealthy child weights, including underweight, overweight and obesity, can lead to serious chronic conditions. Social determinants of health (SDH; e.g., ethnicity, income) reflect health inequalities and may influence children’s weight status. Our objective was to examine relationships between key SDH, including ethnicity, immigrant status, household income, material and social deprivation, and weight status in preschoolers in Alberta.

Methods:
This was a retrospective, population-based cohort study. Children’s anthropometric measurements were taken during preschool (4-6 years old) immunization visits in Edmonton and Calgary (Alberta) between 2009-2017. Ethnicity was determined using algorithms run on maternal surnames. Maternal data were linked to child data. Postal code data were used to determine annual household income; material and social deprivation measures were calculated using the Pampalon Index. Children were categorized into the following weight status categories based on body mass index z-score (zBMI) and World Health Organization criteria: < -2 (underweight), -2 to ≤1 (normal weight), >1 to ≤3 (at risk of overweight or overweight), and >3 (obesity). We applied three separate multinomial logistic regression models to assess independent SDH variable associations with child weight status. The first model estimated the association of maternal ethnicity (General population, Chinese, South Asian), maternal immigrant status, annual neighborhood-level household income, residence at birth (urban/rural), and weight-for-gestational-age at birth. The second and third models estimated material and social deprivation indices, respectively, with child weight category at preschool age. All models were adjusted for child sex and age at anthropometric measurement.

Results:
In total, data from 169,465 children were analyzed. Overall, Chinese ethnicity was associated with lower risk of having elevated weight status (0.65 [0.62, 0.7] for zBMI>1 to ≤3 and 0.49 [0.4, 0.59] for zBMI>3) whereas South Asian ethnicity was associated with greater risk of having zBMI< -2, (3.58 [3.08, 4.16]), lower risk of having zBMI>1 to ≤3 (0.88 [0.82, 0.93]), and greater risk of having zBMI>3 (1.45 [1.27, 1.66]) (all p<0.0001). Maternal immigrant status and increased household income were both associated with lower risk of having zBMI< -2 and zBMI>3 (p<0.0001). In general, increased material deprivation was associated with increased
risk of having zBMI< -2, zBMI >1 to ≤3, and zBMI>3 (p<0.0001). Increased social deprivation was associated with increased risk of having BMI >1 (p<0.0001).

**Conclusion:**
Associations between SDH and preschoolers’ weight status varied depending on the measure of SDH and weight status category. Future research will examine the relationships between neighbourhood characteristics (e.g., walkability) on preschoolers’ weight status.

Jessica Wijesundera  
Graduate Student – General & Community Pediatrics  
Supervisor: Dr. Geoff Ball  
Oral Session #1; Graduate Students Stream (3:15 p.m.)
Title:
The Diagnostic Yield of Fetal Echo Indications: A Population Study

Authors/Co-authors:
Cleighton Boehme, Deborah Fruitman, Luke Eckersley, Robert Low, Jeffrey Bennett, Angela McBrien, Silvia Alvarez and Lisa K Hornberger

Introduction:
Fetal echocardiography (FE) permits the prenatal diagnosis of a large spectrum of structural, functional and rhythm related fetal heart disease (FHD) before birth. To further optimize strategies to improve FE referrals and reduce unnecessary resource use, we sought to examine the diagnostic yield of current FE indications.

Methods:
We examined the FE reports of all pregnancies referred to the 2 centralized Alberta FE programs in 2009-2018 to identify the indication for FE (14 major categories) and gestational age at referral, and categorized fetal heart findings as no FHD, mild or possible FHD (e.g., simple VSD, possible coarctation), or moderate to severe FHD.

Results:
In this period, we identified 19,310 unique referrals (23.3±5.4 weeks gestational age), of whom 1907 had moderate to severe FHD and 654 had mild or possible CHD. Of all pregnancies extracardiac pathology (29.7%), maternal diabetes (18.3%), suspected FHD (17.7%) and family history of structural CHD (17.7%) were the most common indications for referral. Of the 14 categories, the indication with the highest yield for moderate to severe FHD was a suspected FHD (41.1% of referred; 95% Confidence Interval (CI): 39.4 to 42.7%). Five categories had moderate yields (5 to 20%) including a suspected/confirmed genetic disorder (15.4%; 12.6 to 18.2%), twins/multiples (10.6%; 8.7 to 12.5%), oligohydramnios (8.0%; 4.1 to 11.9%), extracardiac pathology/markers (6.4%; 5.8 to 7.1%) and heart not well seen (5.8%; 4.0 to 7.6%). Five categories had low to moderate yield (3 to 5%): high output states (4.5%; 0.7 to 8.4%), arrhythmia (4.2%; 2.7 to 5.7%), assisted reproduction (4.0%; 2.5 to 5.6%), family history of cardiomyopathy or arrhythmia (3.6%; 1.4 to 5.8%) and family history of genetic or extracardiac structural abnormality (3.4%; 1.5 to 5.2%). The lowest yield categories (1 to 3%) were other maternal exposures (2.9%; 1.7 to 4.1%), maternal diabetes (2.2%; 1.7 to 2.7%) and family history of structural CHD (1.7%; 1.3 to 2.2%).

Conclusion:
Suspected FHD provided the highest diagnostic yield of moderate to severe FHD. In contrast, maternal diabetes and family history of structural CHD which were among the most common indications for referral, had much lower diagnostic yields. These data should be factored into FE guidelines to inform recommended referral indications and FE timing

Cleighton Boehme
Graduate Student – Cardiology
Supervisor: Dr. Lisa Hornberger
Oral Session #1; Graduate Students Stream (2:45 p.m.)
Title:
Location of residence but not socioeconomic status impacts fetal detection of congenital heart disease despite universal health coverage.

Authors/Co-authors: Kaur, Amanpreet, Eckesley, Luke, Hornbeger Lisa

Introduction:
Socioeconomic status (SES) and residence remote from tertiary care may impact fetal detection of congenital heart disease (CHD) in part via reduced access to and utilization of obstetric screening ultrasound. These risk factors may affect outcomes and inform health system design. There is a paucity of data exploring the effect of SES and location of residence on fetal detection of CHD, particularly in the setting of universal health coverage. In the current study we examined the impact of SES and location of residence on the rate and timing of prenatal detection of major CHD.

Methods:
We retrospectively identified all fetal and infant cases of major CHD in Alberta from 2008-2018 who underwent cardiac surgical intervention at < 1 year, died pre-operatively or were stillborn. Using maternal postal code of residence and geocoding, geographic distance from fetal tertiary care and SES quintiles (Pampalon & Chan Indices) were calculated and compared for pre / postnatal diagnosis and by gestation at diagnosis. Odds Ratios were calculated using logistic regression adjusting for year of birth and ease of obstetric ultrasound screening views (Group 1 Four chamber, Group 2 Outflow tracts, Group 3 Three vessels / non-standard).

Results:
Fetal diagnoses occurred in 709/1429 (49%). Remote residence from tertiary care was associated with reduced fetal diagnosis: >200km 248/679 (37%), 50-200km 90/679 (49%), <50km 341/679 (63%) (p<0.001). Of CHD cases with a fetal diagnosis, remote residence was associated with diagnosis later than 24 weeks gestation: >200km 246/668(54%), 50-200km 38/668(43%), <50km 89/668(27%). The proportion with a fetal diagnosis and gestational age at fetal diagnosis of major CHD did not differ by SES index quintiles. Year of birth (OR 1.1 (CI 1.07-1.16), obstetric ultrasound view required to detect defect (OR 0.57 (0.52 – 0.63) and distance from tertiary care (/10km) (OR 0.968 (OR 0.961 – 0.976) were associated with prenatal detection.

Conclusion:
Despite universal health care, residents remote from tertiary fetal cardiac centres had reduced prenatal diagnosis of major CHD and received a later diagnosis when it occurred. In contrast, SES may be less impacted in this healthcare system.
Title: Ketones Provide an Extra Source of Fuel for the Failing Heart Without Impairing Glucose Oxidation

Authors/Co-authors: Simran Pherwani, David Connolly, Qutuba Karwi, Michael Carr, Kim Ho, Cory S. Wagg, Liyan Zhang, Jody Levasseur, Heidi Silver, Jason R. Dyck, Gary D. Lopaschuk

Introduction: Over 600,000 people are living with heart failure in Canada. The failing heart is energy starved due to an impairment and reduction in cardiac glucose oxidation. Increasing cardiac ketone oxidation is a potential approach to increasing energy production in the failing heart. However, any potential beneficial effects of increasing ketone oxidation could be countered by potentially detrimental effects on glucose oxidation rates. Therefore, we determined what effect increasing ketone concentration has on overall energy production in the failing heart.

Methods: 8-wk old male C57BL6/N mice underwent sham or transverse aortic constriction (TAC) surgery to induce pressure overload heart failure over a 7-wk period. Echocardiography was performed at 3 wk and 6 wk to assess cardiac function. Cardiac energy metabolism was measured in isolated working hearts perfused at the end of the 7-wk study period. Hearts were perfused with 5 mM glucose, 0.8 mM palmitate, and either physiological levels of β-hydroxybutyrate (βOHB, 0.2 mM), or increased levels of βOHB (0.6 mM).

Results: At the end of the 7-wk period, the failing hearts showed a significant decrease in ejection fraction compared to sham hearts (28.24 ± 11.23 vs 55.66 ± 3.74 %). At physiological levels of ketones, the failing hearts exhibited a marked decrease in glucose oxidation rates compared to sham hearts (532.8 ± 221.4 vs 1351.6 ± 495.8 nmol g dry wt\(^{-1}\) min\(^{-1}\), respectively). At higher ketone levels, glucose oxidation rates did not decrease further in the failing hearts (838.6 ± 328.9 nmol g dry wt\(^{-1}\) min\(^{-1}\)), despite the fact that ketone oxidation rates increased compared to failing hearts perfused with lower ketones (78.0 ± 25.9 vs 24.8 ± 14.2 nmol g dry wt\(^{-1}\) min\(^{-1}\), respectively).

Conclusion: Increasing ketone concentration can increase energy supply and energetic fuel production in the energy starved failing heart without further impairing glucose oxidation. This suggests that increasing ketone supply to the heart may be a therapeutic approach to treating heart failure.

Simran Pherwani
Graduate Student – Cardiology
Supervisor: Dr. Gary Lopaschuk
Oral Session #1; Graduate Students Stream (2:15 p.m.)
Title: Does treating underlying paradoxical vocal fold motion improve quality of life in pediatric asthma patients?

Authors/Co-authors:
Caseng Zhang¹, Vishnu Martha², Liz Dennett³, Matt Hicks³, Maria Ospina³, Ghiath Alnouri², Robert Sataloff², Anne Hicks³

¹ Faculty of Health Sciences, McMaster University
² Department of Otolaryngology – Head and Neck Surgery, Drexel University College of Medicine
³ Department of Pediatrics, University of Alberta

Introduction:
Asthma is a multifactorial chronic inflammatory lung disease and is the most common chronic disease in childhood. Pediatric asthma management, particularly with inhaled corticosteroids, can have long term systemic effects. Diagnosis and treatment of comorbidities like paradoxical vocal fold motion (PVFM) can decrease unnecessary asthma therapy and improve respiratory symptoms and associated quality of life. Diagnosis and treatment improves asthma outcomes in adults with both PVFM and asthma. Similar results have not been conclusively reported in the pediatric population. This systematic review evaluated the effects of diagnosis and treatment of PVFM on asthma treatment and respiratory symptoms among pediatric patients.

Methods:
Electronic biomedical databases (Medline, Embase, CINAHL and Web of Science Core Collection) were searched from database inception through October 31, 2020 to identify randomized controlled trials (RCTs), cohort and case studies evaluating the effect of PVFM diagnosis (by symptoms and/or visualization of the vocal cords) and treatment (counseling regarding the diagnosis, speech language therapy, surgery, anticholinergic inhalers or hypnosis) administered to pediatric patients age 7-19 years being treated with bronchodilator +/- inhaled corticosteroids for asthma. Study selection, Cochrane risk of bias appraisal and data extraction were independently performed by four reviewers. Pooled estimates with 95% confidence intervals were calculated in two pooled data sets for the outcomes of interest.

Results:
From 1,099 studies identified through the search strategy, 0 RCTs and 8 cohort studies were included in the review; 8 case studies were identified but excluded. A total of 227 patients (median age 15 years) with a provisional diagnosis of asthma based on medication use were identified as having a clinician diagnosis of PVFM; most confirmed by laryngoscopy. After PVFM therapy, 173/227 patients demonstrated an improvement in respiratory symptoms, of whom 138 decreased or stopped asthma therapy. Of those who did not respond to PVFM therapy 36 continued with the same or increased asthma treatment. Outcomes for the remaining 18 subjects were not reported.

Conclusion:
In pediatric asthma, consideration and treatment of PVFM may reduce asthma misdiagnosis, resulting in improved symptoms and decreased medication use. The alternate and/or comorbid diagnosis of PVFM should be considered in pediatric asthma patients, particularly if symptoms and medication response are inconsistent with an asthma diagnosis.

Caseng Zhang
Undergraduate – Respiratory Medicine
Supervisor: Dr. Anne Hicks
Oral Session #1; Undergraduate Students Stream (3:00 p.m.)
Title: Improving overdose education and naloxone distribution for local youth: A quality improvement project.

Authors/Co-authors: Erin Auld, MD, Sarah Tougas, Dawn Hartfield, MD

Introduction: There is a growing burden of opioid misuse in developed countries, with youth age 15-24 experiencing the fastest growing rate of hospitalizations due to opioid poisonings in Canada (Hospital Morbidity Database, CIHI). As part of a quality improvement initiative to decrease harm from opioid overdoses in youth, we developed a program at a youth emergency shelter to increase knowledge of overdose identification and management best practices.

We aimed to evaluate the efficacy of our initiative on improving knowledge of overdose identification and naloxone administration as an effective harm reduction strategy for opioid misuse.

Methods: Youth and staff at a youth emergency shelter received overdose education, practice with naloxone administration, and naloxone kits. Participants completed pre/post-intervention surveys evaluating knowledge of overdoses and naloxone, received teaching on signs of overdose, and practiced with naloxone kits on a simulator leg. These sessions were performed in six separate “Plan Do Study Act” cycles. Data obtained on knowledge attainment and rates of youth receiving kits was evaluated. The intervention was altered after each PDSA cycle to optimize efficacy.

Results: 17 youth and 3 staff received overdose education, and 18 youth and 4 staff received naloxone kits during the intervention over a 1-year period. There was an estimated 50% increase in youth and staff exposed to overdose education and naloxone distribution. After initial cycles, we altered the delivery mode and offered assistance with reading surveys, with a subsequent 66% increase in youth participation. Youth confidence in overdose identification and naloxone administration increased from 18% to 88% and 24% to 94%, respectively. There was a statistically significant increase of 50% in mean knowledge of overdose best practices following our intervention. This was also found to be a cost-effective initiative, using a recycled simulator, volunteer educators, and government-provided naloxone kits.

Conclusion: Overdose education and naloxone distribution remains an important harm-reduction strategy in the midst of an opioid crisis. We were successfully able to develop a sustainable education model that increased rates of overdose education and naloxone distribution, and showed a statistically significant improvement in understanding of key overdose factors. Efforts to build capacity by training non-healthcare staff to provide sessions are underway, thus increasing sustainability of the initiative. Future steps will include spreading it to other populations and cities and implementation in the inpatient pediatric setting. Formal naloxone education sessions should be considered by policy-makers as a cost-effective method of managing opioid-related deaths.

Erin Auld
Resident – General & Community Pediatrics
Supervisor: Dr. Dawn Hartfield
Oral Session #1; Residents Stream (2:15 p.m.)
Title:
Indigenous mothers’ perceptions of small children’s oral health: Results from the Maternal and Infant Health Project in Northwest Territories, Canada

Authors/Co-authors:
Rebekah Baumanna, Kate Kerberb, Fariba Kolahdoozb, Tyler Verhaeghec, Sarah Deckb, Moutasem A. Zakkarb, Jennifer McKeena, Danielle Weissb, David Moonb, Sangita Sharma

a Resident Physician, Department of Pediatrics, Faculty of Medicine & Dentistry, University of Alberta
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Acknowledgements:
The Maternal and Infant Health Project is funded by the Canadian Institutes of Health Research. The authors are also very grateful for the support of Hotıì ts’ee daa Northwest Territories SPOR Unit and the Department of Health and Social Services, Government of Northwest Territories for this work. Rebekah Baumann’s research activities have been funded by the generous support of the Stollery Children’s Hospital Foundation through the Women and Children’s Health Research Institute.

Introduction:
Oral health is an important component of systemic health, yet early childhood caries (ECC) is a major pediatric chronic disease. Oral disease is considered a large public health concern for Indigenous children in Canada. Many remote and isolated communities in the North are particularly affected by limited dental health care services. As part of the comprehensive “Maternal and Infant Health Project”, conducted in Northwest Territories (NT), this paper explores Indigenous mothers’ oral hygiene practices to support the oral health of infants and seeking of oral healthcare services for personal and infant care.

Methods:
The “Maternal and Infant Health Project”, explored access to and experience with maternal and infant care services by 161 Indigenous women who are currently pregnant or who have given birth in the last three years across three different communities in NT. An exploratory sequential mixed-method design was used to collect quantitative and qualitative data using a questionnaire instrument.

Results:
Our results demonstrate that significant efforts are being made by mothers to help promote good oral hygiene for infants. Factors influencing infant oral hygiene include the mother’s health literacy, availability of dental care in the community, and ability to allocate enough time for infant oral hygiene. Respondents identified health care providers’ advice and personal experiences, such as seeing other children in the communities with poor dentition, as encouragement to practice positive infant oral health measures. We found that 62.9% of respondents had started brushing the teeth or gums of infants prior to age 6 months old, though 57.1% of respondents had children who did not meet the recommendations for a dental visit prior to 12 months of age. Factors influencing maternal oral hygiene included the availability of dental care, as some communities had dental clinics only twice per year, family obligations which did not allow time for maternal health practices, and fear of dental care. We also found low rates of maternal dental visitations during pregnancy (38%).
Conclusion:
This mixed-methods study with Indigenous women regarding maternal and infant oral health practices demonstrated a continued limited ability for infants and mothers to meet the recommendations for oral health hygiene. Long-term solutions to ECC and oral health.

Rebekah Baumann
Resident – General & Community Pediatrics
Supervisor: Dr. Sangita Sharma
Oral Session #1; Residents Stream (2:45 p.m.)
Title:
Reduction in mortality among children with hypoxemia after introduction of solar-powered oxygen delivery in Eastern Democratic Republic of the Congo
Reduced child mortality with solar powered oxygen

Authors/Co-authors:
Nicholas Conradi¹, Kasereka Masumbuko Claude², Michael Hawkes*¹,³,⁶
¹ Department of Pediatrics, University of Alberta, Edmonton, Canada; ² Université Catholique du Graben, Butembo, Democratic Republic of Congo; ³ Department of Medical Microbiology and Immunology, University of Alberta, Edmonton, Canada; ⁴ School of Public Health, University of Alberta, Edmonton, Canada ⁵ Distinguished Researcher, Stollery Science Lab, University of Alberta, Edmonton, AB, Canada, ⁶ Member, Women and Children's Research Institute, University of Alberta, Edmonton, AB, Canada

Background
Pneumonia is a leading cause of childhood mortality globally. Children with severe pneumonia associated with hypoxemia require oxygen therapy, which is scarce across low- and middle-income countries. Solar-powered oxygen (SPO2) is a novel technology developed for delivering therapeutic oxygen in low-resource environments.

Research Question. Is the introduction of SPO2 associated with a reduction in mortality, relative to the existing standard?

Study Design
This was a pragmatic, quasi-experimental study comparing mortality amongst children < 5 years with hypoxemic respiratory illness before and after installation of SPO2 in two resource-limited hospitals.

Methods
Participants were children < 5 years of age admitted with acute hypoxemic respiratory illness. The intervention was SPO2, installed at two resource-limited hospitals. The primary outcome was 30-day mortality. Secondary outcomes included in-hospital mortality (time to death), length of hospital stay among survivors, duration of oxygen therapy (time to wean O2), and O2 delivery system failure(s).

Results
Mortality amongst infants and children admitted with acute hypoxemic respiratory illness decreased from 30/50 (60%) pre-SPO2 to 15/50 (30%) post-SPO2 (relative risk reduction 50%, 95%CI 19 – 69). The post-SPO2 period was consistently associated with decreased mortality in statistical models adjusting for potential confounding effects. Likewise, survival curves pre- and post- SPO2 differed significantly (hazard ratio [HR] 0.39, 95% CI 0.2 – 0.74). A reduction in the frequency of oxygen delivery interruptions due to fuel shortages and multiple patients needing the concentrator at once was observed, explaining the mortality reduction.

Interpretation. SPO2 installation was associated with decreased mortality in low-resource settings.

Nicholas Conradi
Resident – Infectious Diseases
Supervisor: Dr. Michael Hawkes
Oral Session #1; Residents Stream (3:15 p.m.)
Title:
Virus kinetics and biochemical derangements in children with Ebolavirus disease

Authors/Co-authors:
Lindsey Kjaldgaard1,2, Kasereka Masumbuko Claude3, Devika Dixit4, Michael T. Hawkes2,5,6,7,8
1Department of Pediatrics, University of Alberta, Edmonton, AB, Canada, 2Member, Women and Children's Research Institute, University of Alberta, Edmonton, AB, Canada,
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Introduction:
In the second largest outbreak of Ebolavirus disease (EVD, Democratic Republic of Congo, (Aug 2018 to June 2020) 3470 cases were confirmed, 29% of them among children under 18 years of age. Virologic and biochemical profile of pediatric EVD, relative to adult EVD, have not previously been reported.

Methods:
Retrospective medical record review of children < 16 years old from two treatment centres in North Kivu, DRC. A control group of patients 16-44 years old was included as a reference comparator group. Patient demographics, serial measurements of EBOV viral load, serial biochemistry panel, and frequent point-of-care glucose test results were abstracted from the chart record.

Results:
73 children and 234 adults were included, admitted from April 24 to October 14, 2019. Pediatric patients demonstrated Electrolyte imbalances (36% hypokalemia, 52% hyperkalemia, and 74% hyponatremia), AKI (51%), elevated liver enzymes (median peak ALT 380 IU/L and AST 570 IU/L), and rhabdomyolysis (48%). Viral load (measured in log_{10} copies/mL) at admission (7.2 versus 6.5, p=0.0001), peak viral load (7.5 versus 6.7, p=<0.0001), and time to clearance of viremia (16 days versus 12 days p=<0.0001) were significantly different in the under 16 group. Duration of hospital stay (20 versus 16 days, p=<0.0001) was prolonged in children, a direct consequence of slower clearance of viremia. There was no significant difference between groups in other laboratory values. Factors including ALT >525 U/L, viral load (VL) >7.6 log_{10} copies/mL, BUN >7.5 mmol/L, and CRP >100 mg/L were associated with mortality in children, as in adults. In a multivariable logistic regression model, ALT and VL remained statistically significant independent predictors of mortality.

Conclusion:
Pediatric patients with EVD, like adults, experience multiorgan involvement with life-threatening kidney and liver injury, rhabdomyolysis, and electrolyte imbalances. Pediatric patients have significantly higher viral loads throughout the course of EVD than adults.

Lindsey Kjaldgaard
Resident – General & Community Pediatrics
Supervisor: Dr. Michael Hawkes
Oral Session #1; Residents Stream (2:30 p.m.)
Title: Association between pharmacogenomic profile and both pain relief and adverse events in children treated with oxycodone and ibuprofen

Authors/Co-authors: Aran Yukseloglu MD, Bruce Carleton PharmD, Colin Ross PhD, Robin Manaloor MD, Rhonda J. Rosychuk PhD, Amy L. Drendel DO, MS, David W. Johnson MD, Sylvie LeMay RN, PhD, Samina Ali MD

Introduction: Ibuprofen and opioids are two of the most commonly used pain medications for children, worldwide. In order to personalize and best treat pain, we must understand how CYP2D6, CYP3A4, and CYP2C9 polymorphisms influence clinical effectiveness and safety. Our primary objectives were to explore how allelic variations of CYP2D6, CYP3A4, and CYP2C9 affected both pain relief and adverse events for ibuprofen and oxycodone. We further explored the degree to which genomic and clinical factors were influenced analgesic effectiveness and safety.

Methods: This prospective, observational cohort included children aged 4-16 years who were treated at the Stollery Children’s Hospital emergency department (between June 2010 - July 2014) with an acute fracture and were prescribed ibuprofen OR oxycodone for at-home pain management. Saliva samples were obtained, and telephone follow-up collected self-reported pain scores, medication use, adverse events, and functional limitations for 3 consecutive days. Pain was measured using the Faces Pain Scale-Revised. Genotyping identified allelic variants of CYP2D6, CYP3A4, and CYP2C9. Regression analyses were employed to determine relationships between clinical and genomic patient characteristics, pain relief, and adverse events.

Results: We included 210 children (n=140 ibuprofen, n=70 oxycodone); mean age was 11.1 (±3.5) years, 66.2% were male, and 79.5% self-identified as Caucasian. 97.1% of individuals used non-pharmacologic adjuncts on Day 1. The median pain reduction was 4 (±2.0) in the ibuprofen group and 4 (±3.5) in the oxycodone group on Day 1 (p = 0.69). Adverse events were experienced by 53.2% of the ibuprofen group and 78.3% of the oxycodone group (p < 0.001). Classifying CYP2D6 phenotypes, 7.5% were Poor Metabolizers, 26.4% Intermediate Metabolizers, and 66.0% Extensive Metabolizers. The Intermediate Metabolizers reported less pain relief when oxycodone was used compared to the Extensive Metabolizers (p = 0.04). CYP3A4 variants were not associated with differential pain relief or adverse events. For ibuprofen, the decreased functioning CYP2C9*2 allele was associated with fewer adverse events compared to the normal functioning allele CYP2C9*1 (p = 0.003). Male sex (p = 0.035) and use of non-pharmacological adjuncts (p = 0.02) was associated with less pain relief for the oxycodone group.

Conclusion: Oxycodone and ibuprofen provided similar pain relief with significantly more adverse events with oxycodone use. Male sex and use of non-pharmacologic adjuncts were associated with less pain relief with oxycodone, warranting further study. Decreased metabolism phenotype for CYP2D6 was associated with decreased analgesic effectiveness for oxycodone, while CYP2C9 hypofunction was associated with fewer ibuprofen-related adverse events.
Diabetic Ketoacidosis at Type 1 Diabetes Diagnosis in Children during the COVID-19 Pandemic

Authors/Co-authors:
Nicole Brockman, BSc; Josephine Ho, MD; Elizabeth Rosolowsky, MD; Daniele Pacaud, MD; Carol Huang, MD; Julie-Anne Lemay, BSc; Mitchell Rath, BSc; Manpreet Doulla, MD

Introduction:
The Alberta Government declared COVID-19 a public health emergency on March 17, 2020, sparking a wave of public health measures that resulted in decreased utilization of acute pediatric health care. Delayed diagnosis of type 1 diabetes (T1D) can result in severe consequences such as diabetic ketoacidosis (DKA), which is associated with significant morbidity and mortality. The purpose of this study was to determine if the COVID-19 pandemic impacted the rate of DKA at presentation of new onset T1D in children in Alberta compared to pre-pandemic times.

Methods:
We conducted a retrospective chart review of children less than 18 years of age presenting with a new diagnosis of T1D to the Stollery Children’s Hospital (Edmonton) and Alberta Children’s Hospital (Calgary) from March 17, 2020 to August 31, 2020. The rates of DKA and severe DKA at first presentation of T1D were compared to the same time period one year prior in 2019.

Results:
The number of children with newly diagnosed T1D was similar in the pre-pandemic and pandemic period (114 vs 107 respectively). The rate of DKA at presentation of new onset T1D was significantly higher in the pandemic period compared to the pre-pandemic period (68.2% vs 45.6%, p<0.001). Additionally, the proportion of children presenting in severe DKA at onset of T1D during the COVID-19 pandemic was also significantly higher than during pre-pandemic times (27.1% in 2020 vs 13.2% in 2019, p<0.01).

Conclusion:
Our study found a significant increase in presentations of DKA and severe DKA in children with new onset T1D during the COVID-19 pandemic period compared to pre-pandemic times. This increase may be associated with the public health measures enacted in 2020 resulting in delayed diagnoses and requires further study. Importantly, our study highlights the importance of timely access to healthcare, as well as the need for targeted awareness campaigns aimed at improving early detection of T1D in children and preventing severe complications.

Nicole Brockman
Undergraduate – Endocrinology
Supervisor: Dr. Manpreet Doulla
Oral Session #1; Undergraduate Students Stream (2:15 p.m.)
Title: Comparing NIV Adherence in Children with Neuromuscular Disease Presenting Early or Advanced Stage Sleep Disordered Breathing

Authors/Co-authors: Guillermo Hasbun, Prabhjot Bedi, Halima Abuoun, and Maria Castro-Codesal
Department of Pediatrics, Faculty of Medicine, University of Alberta, Edmonton, AB Canada

Introduction:
Children with neuromuscular diseases (NMDs) often develop sleep-disordered breathing (SDB) due to loss of upper airway muscle tone and weakness of respiratory muscles. Commonly, children with NMD initially develop SDB exclusively during Rapid Eye Movement (REM) sleep due to associated physiological muscle atonia. With disease progression, SDB affects both REM and non-REM sleep stages. While non-invasive ventilation (NIV) is the standard treatment for advanced SDB in children with NMDs, the use of NIV in earlier stages of SDB (REM-SDB) is less demonstrated and therapy adherence is unclear. This study aims to compare NIV adherence between children with early SDB (REM-SDB) and advanced SDB (NREM-SDB).

Methods:
A dataset of children 0-18 years with a diagnosed NMD receiving NIV in Edmonton was used. An apnea-Hypopnea Index (AHI) ratio between REM and NREM sleep ≥ 2 was used to define the cases (REM-SDB). Conversely, an AHI ratio between REM and NREM sleep < 2 was used to define the controls (NREM-SDB). An independent sample t-test was used to determine differences in mean percentage of days with NIV use ≥ 4 hrs and mean nightly NIV hours in a 4-week period.

Results:
Nine cases and 5 controls with 16 and 8 adherence reports, respectively, were included in the analysis. Case and control groups were homogenous in age, sex, underlying condition, cardiorespiratory parameters, and technology-related characteristics. There was a significant difference in the percentage of days with NIV usage ≥ 4 hours between cases (69% ± 9.6) and controls (93% ± 2.7). However, the average daily hours of NIV used was not significantly different between cases (9.2 ± 1.3) and controls (9 ± 0.4).

Conclusion:
Children with REM-SDB and NREM-SDB both had high rates of NIV adherence, with no differences in mean nightly NIV hours. However, children with REM-SDB had lower days with sufficient NIV use (>4 hrs) suggesting less willingness to use the therapy compared with children with NREM-SDB.

Funding Acknowledgements:
Northern Alberta Clinical Trials and Research Centre (NACTRC) Summer Student Award and the Emergency Medicine Research Group (EMeRG).
Title: 
Accuracy of Fetal Echocardiography in the Antenatal Diagnosis of Three Common Conotruncal Defects

Authors/Co-authors:
Rose He, Kim Haberer, Jayani Abeysekera, Aisling Young, Luke Eckersley, Angela McBrien, Isabella Adatia, Rashiv Sharma, Michelle Rushfeldt, Lisa K Hornberger

Introduction:
The prenatal diagnosis of conotruncal defects (CTDs) has improved over the past decade, particularly with inclusion of outflow tract imaging at routine ultrasound. Appropriate prenatal counseling for CTDs demands an accurate diagnosis, as even more subtle cardiac pathology could complicate clinical outcomes. We sought to determine the anatomical accuracy of fetal echocardiography in evaluating common CTDs and factors that contribute to accuracy.

Methods:
All cases of tetralogy of Fallot (TOF), double outlet right ventricle (DORV) and truncus arteriosus (TA) encountered in our institution from 2007-2018 were reviewed. Discrepancies in anatomical findings between prenatal (most accurate exam) and postnatal (echo/surgery) or autopsy exams were categorized as: C1) no difference C2) minor difference with no impact on outcome (e.g. aberrant right subclavian artery), C3) minor difference that could make a minor difference to the delivery plan or surgery (e.g. branch pulmonary artery stenosis), C4) major difference that changes the course of the pregnancy, delivery or surgical planning (e.g. ductal dependency).

Results:
Of the 255 CTD cases, 162 had prenatal and postnatal and/or autopsy data available. Of the 162, 107 (65.6%) fit C1, 35 (21.5%) C2, 12 (7.4%) C3, and 8 (5.5%) C4. The greatest accuracy was observed in TOF, with 69/71 (97.2%) in C1 and C2 versus 56/69 (81.2%) in DORV and 16/22 (72.7%) in TA (p=0.003). Excluding 5 cases at 10-16 weeks, there was a tendency towards a greater proportion in C1 and C2 when examined at 17-23 weeks (60/64, 93.4%) versus 24-32 weeks (50/57, 87.7%) and >32 weeks (28/36, 77.8%) (p=0.06). Era of assessment also revealed a difference with 43/55 (78.2%) of studies performed from 2007-2011 in C1 and C2 versus 99/107 (92.5%) from 2012-2018 (p=0.01). When we compared pregnancies with one versus serial exams, we observed a lower proportion of C4 cases from 9.6% to 2.7%, respectively. In those with serial exams, 20% had achieved C1 or C2 only at serial exam.

Conclusion:
In those with serial exams, 20% had achieved C1 or C2 only at serial exam.
Conclusions: The diagnostic accuracy of fetal echocardiography in CTDs is generally high, especially for TOF and when performed at 17-24 weeks. There has been significant improvement in accuracy since 2011. Serial exams potentially improve diagnostic accuracy

Rose He
Undergraduate – Cardiology
Supervisor: Dr. Lisa Hornberger
Oral Session #1; Undergraduate Students Stream (3:15 p.m.)
Title: Does treating underlying paradoxical vocal fold motion improve quality of life in pediatric asthma patients?

Authors/Co-authors:
Caseng Zhang1, Vishnu Martha2, Liz Dennett3, Matt Hicks3, Maria Ospina3, Ghiath Alnouri2, Robert Sataloff2, Anne Hicks3
1 Faculty of Health Sciences, McMaster University
2 Department of Otolaryngology – Head and Neck Surgery, Drexel University College of Medicine
3 Department of Pediatrics, University of Alberta

Introduction:
Asthma is a multifactorial chronic inflammatory lung disease and is the most common chronic disease in childhood. Pediatric asthma management, particularly with inhaled corticosteroids, can have long term systemic effects. Diagnosis and treatment of comorbidities like paradoxical vocal fold motion (PVFM) can decrease unnecessary asthma therapy and improve respiratory symptoms and associated quality of life. Diagnosis and treatment improves asthma outcomes in adults with both PVFM and asthma. Similar results have not been conclusively reported in the pediatric population. This systematic review evaluated the effects of diagnosis and treatment of PVFM on asthma treatment and respiratory symptoms among pediatric patients.

Methods:
Electronic biomedical databases (Medline, Embase, CINAHL and Web of Science Core Collection) were searched from database inception through October 31, 2020 to identify randomized controlled trials (RCTs), cohort and case studies evaluating the effect of PVFM diagnosis (by symptoms and/or visualization of the vocal cords) and treatment (counseling regarding the diagnosis, speech language therapy, surgery, anticholinergic inhalers or hypnosis) administered to pediatric patients age 7-19 years being treated with bronchodilator +/- inhaled corticosteroids for asthma. Study selection, Cochrane risk of bias appraisal and data extraction were independently performed by four reviewers. Pooled estimates with 95% confidence intervals were calculated in two pooled data sets for the outcomes of interest.

Results:
From 1,099 studies identified through the search strategy, 0 RCTs and 8 cohort studies were included in the review; 8 case studies were identified but excluded. A total of 227 patients (median age 15 years) with a provisional diagnosis of asthma based on medication use were identified as having a clinician diagnosis of PVFM; most confirmed by laryngoscopy. After PVFM therapy, 173/227 patients demonstrated an improvement in respiratory symptoms, of whom 138 decreased or stopped asthma therapy. Of those who did not respond to PVFM therapy 36 continued with the same or increased asthma treatment. Outcomes for the remaining 18 subjects were not reported.

Conclusion:
In pediatric asthma, consideration and treatment of PVFM may reduce asthma misdiagnosis, resulting in improved symptoms and decreased medication use. The alternate and/or comorbid diagnosis of PVFM should be considered in pediatric asthma patients, particularly if symptoms and medication response are inconsistent with an asthma diagnosis.

Caseng Zhang
Undergraduate – Respiratory Medicine
Supervisor: Dr. Anne Hicks
Oral Session #1; Undergraduate Students Stream (3:00 p.m.)
Title:
Understanding Cultural Perspectives for Knowledge Translation Tools about Child Health Conditions

Authors/Co-authors:
Lisa Hartling, Sarah Elliott, Kelsey Wright, Shannon D. Scott

Introduction:
Our research groups have developed several evidence-based knowledge translation (KT) tools for parents of children with acute health conditions. These tools were created with parent input, and pilot-tested with and disseminated to groups proficient in English. However, it is unclear if they are useful for different populations. To enhance the reach of our KT tools, exploring cultural considerations for adaption and development may promote relevance for previously underserved knowledge users.

Objective:
To explore and understand considerations for cultural adaption of KT tools for diverse populations in Alberta.

Methods:
Four distinct studies with similar methods were conducted to assess the relevance of pre-existing KT tools about acute childhood illness for use with French, Filipino, Indigenous and Somali communities.

French and Tagalog speaking parents were asked to review a whiteboard animation video on croup that was translated and adapted for French and Tagalog parents, respectively. Interviews were then conducted to explore their perspectives of general cultural considerations as well as specific feedback for the adapted video. Healthcare providers (HCPs) and Knowledge Brokers serving Indigenous and Somali communities were asked to review several KT tools developed in English, utilizing various formats (e.g. whiteboard animations, ebook, infographic). Interviews were then conducted to understand if and/or how the tools could be adapted for use with their respective communities.

Audio recordings from the interviews were transcribed, translated to English (from French and Tagalog), and analyzed for relevant themes using thematic analysis.

Results:
Twenty six parents (13 French, 13 Filipino) and 31 HCPs (18 Indigenous, 13 Somali) were interviewed. Though analyzed separately, several themes were present across all four groups relating to best practices regarding cultural adaptions. While the KT tools were well received in the current form, all groups suggested that audio in the native languages would be useful. Participants cautioned using verbatim vocabulary and suggested that cultural competency and understanding of health language was essential for high quality translations. Additionally, participants emphasized the importance of assessing access to services and resources in the target audience and matching visuals in KT products to more broadly represent the individual communities.

Conclusion:
Participants suggested that translated KT tools improved relatability and communication of health messages, which is an important consideration for the development and adaption of future KT products.

Continued next page,
Dr. Lisa Hartling
Department of Pediatrics, Division of Emergency Medicine
Supervisor: n/a
Oral Session No. 2; Faculty, Clinical Academic Colleagues, Non-faculty Staff Stream (4:15 p.m.)
Title: Evaluating centre-, physician-, patient-level characteristics associated with variation in corticosteroid exposure in nephrotic syndrome: results from a Canadian longitudinal study.

Authors/Co-authors: Sara Rodriguez Lopez; Rahul Chanchlani; Allison Dart; Catherine Morgan; Anne-Laure Laeyraque; James Tee; Anita Brobbey; Maneka A. Perinpanayagam; Alberto Nettel-Aguirre; Susan Samuel.

Introduction: Although corticosteroids are universally accepted as the main therapy for childhood-onset steroid-sensitive nephrotic syndrome, variation in dose and duration of treatment occurs worldwide, likely reflecting the evolving evidence on optimal dosing as well as variable severity of the disease observed between patients. We conducted a multicentre longitudinal study to determine the associations between centre, physician, and patient factors and average daily corticosteroid dose and duration of therapy per episode of proteinuria.

Methods: Data were derived from the Canadian Childhood Nephrotic Syndrome (CHILDNEPH) Project, an observational longitudinal study from 2013 to 2019 of children with childhood-onset nephrotic syndrome involving pediatric nephrologists in 11 sites across Canada. Primary outcome was average daily corticosteroid dose per episode of proteinuria (a measure of intensity of treatment) reported as mg/m² prednisone equivalents. Secondary outcome was duration of treatment for each episode of proteinuria. Exposure variables were categorized into site-, physician- and patient-level variables. We used linear mixed effects models with fixed effects for site-, physician-, and patient-level variables and random effects to account for clustering of physicians within site, and patients clustering within physicians.

Results: 328 children, with a median age at enrollment of 4.3 years old, participated and were followed for a median time of 2.62 years. Average dose and duration of corticosteroid prescriptions were observed for both first presentation and relapses. The observed variability in average daily corticosteroid dose was mostly due to the site where the patient was treated, followed by patient and physician characteristics. Accounting for between patient, physician and site differences, average daily corticosteroid dose (in 10 mg/m² increments) decreased with increasing age (beta coefficient: -0.07 [95% CI -0.09, -0.05], p<0.001), and African and Indigenous ethnicity was associated with longer treatment duration (in days) for each episode compared to Caucasian (beta coefficient: African 42.29 [95% CI 7.85, 76.73 p 0.016], Indigenous 29.65 [95% CI 2.79, 56.52 p 0.03]).

Conclusion: We found practice variation with respect to corticosteroid prescriptions across 11 Canadian centres, and that variation is mostly explained at the site level. Age and ethnicity are important factors to be considered, as they are significantly associated with average corticosteroid dose and duration of therapy. Future studies on optimal corticosteroid dosing in childhood-onset steroid-sensitive nephrotic syndrome should target their efforts to investigate if more personalized treatment approaches are possible and beneficial to patients.
Residency training experiences of residents with children: a phenomenology study

Authors/Co-authors: Erin Boschee, Zoya Zaeem, Aditi Amin, Karen Moniz, Marghalara Rashid

University of Alberta, Department of Pediatrics
University of Alberta, Department of Medicine
Alberta Health Services Calgary Zone, Rural Medicine and Internal Medicine
University of Alberta, Department of Family Medicine

Introduction:
Parenthood during post-graduate medical training has become an increasingly relevant topic in recent years. For many residents, the timing of residency training coincides with childrearing years. Numerous challenges have been reported in the literature for residents who have children during their residency training. In contrast, positive effects of parenting on the residency training experience have also been reported. While previous research has attempted to explore the experiences of residents in a parenting role through surveys and limited qualitative studies, the essence of the post-graduate training experience has not been clearly described. The optimal means of supporting trainees completing residency while parenting remains unclear.

Methods:
We conducted 15 semi-structured telephone interviews to develop a rich understanding of the residency training experience of residents in a parenting role. Transcendental phenomenology was used as a methodology. Our study population included post-graduate trainees at the University of Alberta who were parents upon entry to residency or who became parents during residency training. Residents from a diverse range of training programs and stages of training were interviewed.

Results:
Thematic analysis of residents’ training experiences revealed the following themes: 1) work-life balance; 2) challenges of being a parent with residency responsibilities; 3) availability of support systems; 4) impact on patient interactions; 5) impact on other interactions; and 6) hidden curriculum. Participants suggested actionable solutions to improve the training experience for residents in a parenting role, which included: 1) family-inclusive events; 2) scheduling flexibility; 3) supports for fathers; and 4) optimizing supports for breastfeeding mothers.

Conclusion:
Residents in a parenting role represent a unique post-graduate trainee population. Despite focus on resident wellness, challenges remain for individuals trying to navigate parenthood and residency. This data may be utilized to inform supports and strategies to optimize the training experiences of these residents.
Title:
Use of rituximab for pediatric central nervous system inflammatory disorders in Alberta

Authors/Co-authors:
Jeremy Slobodan, Ihor Pecuh, Jennifer McCombe, Francois-Dominique Morneau-Jacob, Penelope Smyth, Colin Wilbur

Introduction:
The early and effective treatment of inflammatory disorders of the central nervous system (CNS) is vital to reduce neurologic morbidity and improve long-term outcomes in affected children. Rituximab is a B-cell-depleting monoclonal antibody whose off-label use in these disorders is funded in Alberta by the Short-Term Exceptional Drug Therapy (STEDT) program. The goal of this study was to describe the use of rituximab for pediatric CNS inflammatory disorders in Alberta.

Methods:
Rituximab applications for CNS inflammatory indications in patients < 18 years of age were identified from the STEDT database for the period January 1, 2012 – December 31, 2019. Data obtained from the STEDT database included patient demographics, diagnosis, previous therapies, rituximab dosing, and physician-reported outcome (including adverse events). Patient information was then linked to other provincial datasets, including the Discharge Abstract Database (for hospital admission information), Pharmaceutical Information Network (to identify outpatient prescriptions for immunomodulatory agents), and provincial laboratory data (to identify results of CD19 counts and immunoglobulin levels). Analysis was descriptive.

Results: 51 unique rituximab applications were identified during the study period, of which 50 were approved. The median patient age at application was 13.9 (range 0.8-17.9) years and 33 (65%) were female. New applications increased from one in 2012 to a high of twelve in 2018, with the greatest number (n=32, 63%) from the Edmonton Zone. The most common indication was autoimmune encephalitis (other than anti-NMDA receptor encephalitis; n=20, 39%) and in the final two years of the study this indication accounted for more applications (n=13) than all other indications combined (n=10). Most patients were approved for a two-dose (n=33, 66%) or four-dose (n=16, 32%) induction regimen and 20 (40%) were approved for repeat dosing. Physician-reported outcomes were available for 24 patients, of whom 14 (58%) were felt to have fully met outcome targets at last report. Only a minority of patients had a CD19 count of 0 (n=17) or immunoglobulin levels (n=14) documented following initial approval. An adverse event leading to rituximab discontinuation was reported in one child.

Conclusion:
The use of rituximab for pediatric CNS inflammatory disorders has increased, particularly for the indication of autoimmune encephalitis. This study identified significant heterogeneity in dosing practices and laboratory monitoring, as well as regional disparities in use. Standardized protocols for the use of rituximab in these disorders and more robust outcome reporting will help better define the safety and efficacy of rituximab in this population.
Title:
Contributors to Fluid accumulation in Critically Ill Children

Authors/Co-authors:
Shannon Mohoric MD, Tegan McGraw RN, Rashid Alobaidi MD MSc
Division of Pediatric Critical Care, Department of Pediatrics, University of Alberta

Introduction:
fluid accumulation is commonly encountered in critically ill children and it has a strong association with increased mortality and morbidity. The aim of this study is to elucidate the sources of fluid that contribute to fluid accumulation in this population

Methods:
We conducted a prospective cohort study of patients admitted to the Stollery Children’s Pediatric Intensive Care Unit (birth to <18 years), October 2020 to January 2021. We collected fluid data, that included total daily intake and output from all sources, starting from 6 hours prior to admission to PICU up to PICU discharge or day 7 of PICU admission. We categorized fluid intake as resuscitative fluid, maintenance fluid, medications, blood products, nutrition, or “drives” used for medication infusions or to maintain line patency

Results:
A total of 120 patients were admitted to the PICU during the study period, 99 of which met the inclusion criteria. The median (IQR) total fluid intake was 47.3 ml/kg/day (30.3-72.6) and total fluid output was 27.3 ml/kg/day (15.5-49.9). Of the total fluid intake, the percentage of maintenance fluid accounted for (37.4%; 20.0-57.3), nutrition (23.2%; 6.8-58.1), medications (7.8%; 2.9-21.8), and resuscitative fluid (4.2%; 0-18). Blood products and drives contribution to fluid intake was minimal. Comparisons were performed between children with FO >5% (n=50, 50.5%) and those with FO <5%. Total fluid intake (ml/kg/day) [67.8 vs. 30.3; OR 1.09 (1.06-1.14)] and total fluid output (ml/kg/day) [36.9 vs. 19.5; OR 1.04 (1.02-1.06)] were both higher in children with FO >5%. Children with FO >5% received higher volume (ml/kg/day) of maintenance fluid [22.7 vs. 15.6; OR 1.01 (1.02-1.09)], nutrition [21.6 vs. 4.8; OR 1.06 (1.03-1.09)], and medications [9.4 vs. 1.7; OR 1.32 (1.17-1.50)]. There was no difference in the volume of resuscitative fluid between the two groups. Children with FO >5% required, on average, 1.58 more days (95% CI, 0.18-2.99) of mechanical ventilation, and remained in the PICU 1.85 days (95% CI, 1.22-2.47) longer.

Conclusion:
Fluid accumulation is common in critically ill children and is associated with worse outcomes. Higher fluid intake, rather than decreased fluid output, appears to be the main contributing factor to fluid accumulation. The largest sources of fluid intake in this cohort of critically ill children were maintenance fluid, nutrition, and medications. Future studies evaluating interventional strategies to mitigate fluid accumulation in critically ill children should assess if limiting avoidable fluid from these sources could improve outcomes.

Shannon Mohoric
Clinical Fellow – Critical Care (PCICU & PICU)
Supervisor: Dr. Rashid Alobaidi
Oral Session #2; Fellows – Clinical & Postdoctoral Stream (4 p.m.)
Title: Role of ATM and DDX1 in cellular response to oxidative stress in Ataxia telangiectasia

Authors/Co-authors: Mansi Garg, Lei Li and Roseline Godbout

Introduction:
Ataxia telangiectasia (A-T) is a group of inherited multisystem disorders that often become apparent during early childhood, usually before 5 years of age. The disease is characterized by oculocutaneous telangiectasia, uncoordinated body movements, cancer predisposition, immunodeficiency and increased sensitivity to ionizing radiation. The disease is caused by mutation in the ATM gene (A-T mutated). ATM protects our cells from various stresses by assisting in DNA damage repair, releasing cytotoxic stress, gene regulation and cell growth.

Earlier reports have shown that DEAD Box 1 (DDX1) is part of the MRN-ATM complex that plays a role in DNA double strand break (DSB) repair. DDX1 is phosphorylated and recruited by ATM. DDX1 is an RNA helicase that is essential for early embryonic development and stress regulation. We are investigating the role of DDX1 and ATM in cellular response to stress in A-T patients.

Methods:
We used fibroblasts from healthy (GM38) and A-T patients (AT2BE and AT5BI). To determine the role of DDX1 and ATM in the formation and resolution of stress, the cells were treated with 0.5 mM arsenite for 45 min and immunostained with anti-DDX1 and anti-TIAR (a marker of stress granules (SG)) antibodies. For DDX1-RNA binding, the cells were UV-crosslinked and whole cell lysates were used to pull down RNA bound to DDX1 using anti-DDX1 antibody. The RNA was extracted, reverse transcribed and enrichment of target RNAs was evaluated by qPCR.

Results:
DDX1 is co-localized to SGs with other stress granule markers like TIAR as observed by immunostaining. Depletion of ATM or DDX1 did not affect the formation of SGs but a slower recovery from stress was observed in DDX1-knockdown and A-T fibroblasts.

DDX1’s role in stress recovery may be linked to its RNA binding property. We observed enrichment of 12 previously identified target RNAs in DDX1-immunoprecipitated fraction under stress conditions. Interestingly, when A-T fibroblasts were exposed to arsenite-induced stress, there was a decrease in the RNAs bound to DDX1, suggesting that loss of ATM affects the RNA binding properties of DDX1.

Conclusion:
These results provide mechanistic insight into the role of ATM and DDX1 in stress recovery pathway in A-T patients, and suggest that DDX1 plays an important role in stress regulation which may be affected by its interaction with ATM. We propose that the effect that ATM has on DDX1’s role in stress resolution is a contributing factor to neurodegeneration in A-T patients.

Mansi Garg
Postdoctoral Fellow – Oncology
Supervisor: Dr. Roseline Godbout
Oral Session #2; Fellows (Clinical & Postdoctoral) Stream (3:30 p.m.)
Title:
Right ventricular dysfunction by echocardiography is an early predictor of evolving Coronary Allograft Vasculopathy in heart transplanted children

Authors/Co-authors:
Judith Namuyonga1, Simon Urschel1, Nassiba Alami-Laroussi1, David Youssef1, Jennifer Conway1, Lily Lin1, Luke Eckersley1, Nee Scze Khoo1.
1. Pediatric Cardiology, University of Alberta

Introduction:
Coronary Allograft Vasculopathy (CAV), is the leading cause of graft loss late after cardiac transplant. Cardiac angiography is the gold standard for diagnosis however, it is invasive, mostly requires general anesthesia and can result in adverse events, limiting its applicability in children. While non-invasive echocardiographic methods to reliably identify early rejection predictors of evolving CAV are lacking.

Methods:
In this ethics approved study we included children age 1–18 years old who developed CAV between 2005 and 2020, analyzing prospectively collected protocolized functional echocardiograms. CAV diagnosis was based on the International Society of Heart and Lung Transplant definition. We compared echocardiograms of transplanted controls (CON) that are matched for age, underlying diagnosis and time post-transplant with confirmed CAV cases 6-12 months prior to diagnosis (PRE) and at time of CAV diagnosis. Conventional and endocardial strain parameters of left (LV) and right ventricle (RV) function was performed using TomTec 2D CPA software. Statistics performed were non-parametric tests, data reported as median [interquartile range] and strain parameters as positive values for ease of interpretation.

Results:
There were 10 CAV and 10 CON patients, median age 8.5 years [3.6, 15.3] vs. 8.0 years [4.5-15.3], p= 0.99. Findings are summarized in table. Comparisons between CON vs. PRE showed reduced RV longitudinal strain (RVLS 21.5% [18.2, 25.7] vs. 17.3% [10.8, 20.2], p=0.018) and strain rate (RVLSR 1.35%/s [0.95, 1.50] vs. 0.95%/s [0.80, 1.10], p=0.045) with a trend to reduced RV fractional area change (RV FAC 36% [34,42] vs. 31% [22,36], p=0.09), while there was no difference for all LV parameters. Comparison between CON vs. CAV showed similarly reduced RVLS (12.1% [9.2,16.1], p=0.003), RVLSR (0.75%/s [0.48, 0.98], p=0.002) with a trend to reduced RVFAC (27% [18, 37], p=0.051) with the addition of increased LV medial E/e' (p=0.019).

Conclusion:
RV dysfunction documented by depressed RV GL strain and strain rate is present at least 6 months prior to CAV diagnosis, while LV systolic and diastolic parameters were normal. Reduced RV deformation may potentially be a useful early echocardiographic marker of evolving CAV in transplanted pediatric hearts. The inclusion of RV deformation assessment in routine clinical monitoring may provide early identification and therapy modification in patients at risk.
Title:
Low birth weight and failure to thrive were associated with neurodevelopmental delay in HIV-exposed uninfected infants in Uganda

Authors/Co-authors:
Reshma Sirajee¹, Andrea L. Conroy²; Sophie Namasopo³; Robert O. Opoka⁴, Stephanie Lavoie⁵, Sarah Forgie¹, ⁹, Bukola Oladunni-Salam⁹,¹⁰, Michael T. Hawkes*¹,⁶,⁷,⁸,⁹. ¹Department of Pediatrics, University of Alberta, Edmonton, Canada; ²Ryan White Center for Pediatric Infectious Diseases and Global Health, Indiana University School of Medicine, Indianapolis, USA; ³Department of Paediatrics, Jinja Regional Referral Hospital, Jinja, Uganda; ⁴Department of Paediatrics and Child Health, Mulago Hospital and Makerere University, Kampala, Uganda; ⁵National Microbiology Laboratory, Public Health Agency of Canada, Winnipeg, Canada, ⁶Department of Medical Microbiology and Immunology, University of Alberta, Edmonton, Canada; ⁷School of Public Health, University of Alberta, Edmonton, Canada; ⁸Distinguished Researcher, Stollery Science Lab; Member, ⁹Women and Children’s Health Research Institute; ¹⁰Faculty of Nursing, University of Alberta, Edmonton, Canada;

Introduction:
HIV exposed but uninfected infants (HEU) are at increased risk of impaired early linear growth and cognitive development. We examined associations between pre and postnatal growth and subsequent neurodevelopment in Ugandan HEUs, hypothesizing that early insults may explain alterations in both somatic growth and brain development.

Methods:
We prospectively followed a cohort of HEUs from birth to 18 months of age, and measured length/height, weight, head and arm circumference longitudinally. The Malawi Development Assessment Tool (MDAT, 12 and 18 months) and the Color Object Association Test (COAT, 18 months) were used for developmental assessments.

Results:
375 mother-child pairs were enrolled. Mothers were median 28 years old and 32% had a known diagnosis of HIV prior to pregnancy. The cohort included HEUs who were female (53%), premature (11%) and had low birth weight (LBW) (7.6%). Follow up was completed at 6 weeks (n=147 HEUs), 12 months (n=109 HEUs), and 18 months (n=170 HEUs) of age. Eight infants tested positive for HIV and were excluded from the study. 197 HEUs were lost to follow-up at 18 months of age. The final cohort consisted of 170 HEUs who completed the MDAT at 18 months of age. The number of HEUs stunted (32%, 43%, and 58%) and underweight (7.4%, 15% and 15%) increased at 6 weeks, 12 months and 18 months of age respectively. HEUs had behavioral scores on the MDAT that were similar to the reference children population. The mean score on the COAT was 5.5 compared to 6.9 in the reference children population. The MDAT score at 18 months of age showed cross-sectional correlation with weight- (ρ=0.36, p<0.0001), height- (ρ=0.41, p<0.0001), head circumference- (ρ=0.26, p=0.0011), and MUAC-for-age (ρ=0.34, p=0.0014). Failure to thrive (FTT), defined as crossing two major percentile lines downward on the weight-for-age growth chart, was observed in 21% HEUs during the first 18 months of life. Failure to thrive (FTT) was associated with lower MDAT scores (p=0.042) at 18 months of age. Lower weight-for-height z-scores were associated with lower COAT scores (p=0.32, p=0.0017). LBW (<2500g) predicted lower MDAT score (p=0.0010) at 18 months of age.
Conclusion:
Growth faltering in HEUs was associated with lower attainment of developmental milestones at 18 months of age. Our findings point to a screening method for identifying HEUs at risk for developmental intervention.

Reshma Sirajee
Graduate Student – Infectious Diseases
Supervisor: Dr. Michael Hawkes
Oral Session #2; Graduate Students Stream (4 p.m.)
Title: 
Role of the Appendiceal Microbiota in the Pathogenesis of Pediatric IBD

Authors/Co-authors: Nazanin Arjomand Fard¹,², Heather Armstrong¹,³, Matthew W Carroll³, Hien Q Huynh³, Troy Perry⁴, Eytan Wine¹,²,³
¹ CEGIIR, University of Alberta
² Department of Physiology, University of Alberta
³ Department of Pediatrics, University of Alberta
⁴ Department of Surgery, University of Alberta

Introduction:
Recent studies suggest that the appendix has a role in the pathogenesis of inflammatory bowel diseases (IBD). Specifically, appendectomy may be protective from the development and progression of ulcerative colitis (UC). Additionally, about a third of UC cases have peri-appendicular inflammation, and some cases of Crohn disease have shown appendiceal involvement; however, mechanisms of this involvement remain unclear. We aim to examine the microbes associated with the appendix of pediatric IBD patients by identifying changes in microbe abundance and interactions with the host in patient cecum luminal washes, collected from close to the neck of the appendix during colonoscopy. We hypothesized that microbes originating in the appendix of IBD patients could contribute to the pathogenesis of this disease.

Methods:
Shotgun metagenomics was performed on cecal luminal washes (non-inflamed section) of IBD patients and non-IBD controls. Co-culturing identified bacteria with human host cells in vitro are underway to identify relevant disease-related factors secreted by microbes and/or host cells using disease models and multi-omic approaches.

Results:
Cecal wash shotgun metagenomics were performed on the two groups. We found that several bacterial taxa demonstrated differences in abundance between IBD and non-IBD patients: Flavonifractor, Bacteroides fragilis, and Alistipes represented 8%, 10%, and 21% abundance, respectively, in non-IBD patients, while in IBD patients they were present below 0.1%. In contrast, Bacteroides vulgatus and Escherichia coli represented 9% and 69% of microbes in IBD patients, respectively, whilst they were present at 1.7% and 1.2% in non-IBD patients, respectively. These are pilot data from an ongoing study, aimed to guide a larger prospective study. Mechanistic experiments, aimed at identifying factors impacting invasion, are in progress (delayed due to COVID).

Conclusion:
These preliminary results demonstrate a clear difference in peri-appendiceal microbial populations in IBD patients in comparison to controls. Studies are in progress to localize this phenomenon to the appendix and determine how host interactions originating at the appendix may drive distal colonic inflammation. With plans in place to increase our patient cohort, we will validate these findings and define how this relates to the pathogenesis of IBD. Identifying and profiling these microbes in IBD patients can help improve the understanding of mechanisms underlying microenvironment changes within the appendix and the gut,
which could shed light on the role of the appendix in IBD pathogenesis and clarify how microbes drive inflammation in IBD.

Nazanin Arjomand Fard
Graduate Student – Gastroenterology & Nutrition
Supervisor: Dr. Eytan Wine
Oral Session #2; Graduate Students Stream (3:30 p.m.)
Title:
The Ketogenic Diet Blunts Insulin-Stimulated Glucose Oxidation in the Failing Heart

Authors/Co-authors: Kim L. Ho¹, Qutuba G. Karwi¹, Faqi Wang¹, Sai Panidarapu¹, Simran Pherwani¹, Amanda Greenwell², Cory S. Wagg¹, Liyan Zhang¹, Gavin Y. Oudit¹, John R. Ussher², Gary D. Lopaschuk¹

¹Faculty of Medicine and Dentistry, University of Alberta, Edmonton, Alberta, Canada
²Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta, Edmonton, Alberta, Canada

Introduction:
Cardiac energy metabolism is perturbed in heart failure and is characterized by a shift from oxidative metabolism to glycolysis. Notably, the failing heart relies more on ketones for energy than a healthy heart, an adaptive mechanism that improves the energy-starved status of the failing heart. However, whether this can be implemented therapeutically remains unknown. Therefore, our aim was to determine if increasing ketone delivery to the heart via a ketogenic diet can improve the outcomes of heart failure.

Methods:
C57BL/6J mice underwent either a sham surgery or permanent left anterior descending (LAD) coronary artery ligation surgery to induce heart failure. After 2 weeks, mice were fed either a control diet or a ketogenic diet for 3 weeks and echocardiography was employed to assess in vivo cardiac function. Isolated working hearts from these mice were perfused with appropriately 3H or 14C labelled glucose (5 mM), palmitate (0.8 mM), and β-hydroxybutyrate (0.6 mM) to assess mitochondrial oxidative metabolism and glycolysis.

Results:
Mice with heart failure exhibited a 56% drop in ejection fraction which was not improved with a ketogenic diet. Similarly, cardiac work was decreased by 53% in isolated working hearts from heart failure mice and not affected by the ketogenic diet. Interestingly, mice fed a ketogenic diet had increased myocardial fatty acid oxidation and decreased glucose oxidation and ketone oxidation rates. Despite increases in myocardial fatty acid oxidation, overall TCA cycle activity was not increased with the ketogenic diet. Furthermore, insulin-stimulated glucose oxidation was markedly blunted in the mice fed a ketogenic diet regardless of whether they had heart failure or not. The ketogenic diet did not affect cardiac oxygen consumption or cardiac work, thus not improving cardiac efficiency.

Conclusion:
The ketogenic diet results in decreased ketone oxidation, glucose oxidation and increased fatty acid oxidation rates. The ketogenic diet does not increase energy production but rather, causes a shift in reliance to fatty acids for energy. The ketogenic diet does not improve cardiac efficiency and blunts insulin-stimulated glucose oxidation. The latter observation suggests that the ketogenic diet causes cardiac insulin resistance.

Kim Ho
Graduate Student – Cardiology
Supervisor: Drs. Gary Lopaschuk, John Ussher
Oral Session #2; Graduate Students Stream (3:45 p.m.)
Title:
Ketone Therapy Reduces Systemic and Organ Inflammation in Sepsis

Authors/Co-authors:
Shubham Soni, Zaid H. Maayah, Mourad Ferdaoussi, Shingo Takahara, Jason RB Dyck

Introduction:
Sepsis is the body's reaction to an infection that often causes lasting organ injury due to an extreme inflammatory response. Sepsis accounts for approximately 20% of all global causes of death, with almost half of the cases occurring in children under the age of five. Currently, there are no effective treatments to reduce inflammation during sepsis and thus assist in preventing the lasting inflammation-mediated damage. As a result, many patients who don’t die from sepsis endure many physical (e.g. muscle weakness) and psychological (e.g. memory loss) symptoms. Thus, therapeutic strategies to reduce the inflammatory response in sepsis are needed to save lives and improve the quality of life of those who survive sepsis. Herein, we tested the efficacy of ketone therapy that increases circulating ketones via supplementation. Ketones are small molecules that are normally produced by the liver and are elevated during carbohydrate-deprived states. While ketones are classically known to be a metabolic source of energy, they also have non-metabolic effects, such as inhibiting inflammation, which can be of therapeutic importance.

Methods:
To determine whether ketones may reduce inflammation in sepsis, we treated adolescent male mice with vehicle or a clinically tested ketone ester (KE) by oral administration for 3 days. On day 3, we injected mice with saline or lipopolysaccharide (LPS) to induce sepsis. Mice were euthanized 24 hours post-injection and the effects on systemic inflammation and organ were analyzes from the 3 groups (control, LPS, LPS+KE).

Results:
Mice with sepsis had a lower body weight relative to the controls, which was not altered by KE-treatment. Interestingly, mice with sepsis had higher blood ketones compared to controls, suggesting that ketones may be important for an innate defense mechanism. Additionally, this elevation in circulating ketones was further augmented in KE-treated mice. While mice with sepsis had an induction of systemic pro-inflammatory cytokines, these cytokines were lower in KE-treated septic mice. Similarly, sepsis induced numerous inflammatory markers in the kidney, heart, liver, and lungs, a large majority of which were reduced in the KE-treated septic mice. Finally, there was either no change or a reduction of ketolytic enzymes, suggesting that these protective and anti-inflammatory effects occur independent of ketone catabolism for energy production.

Conclusion:
Together, these data are the first to show that ketone therapy may be a novel approach to reducing inflammation and subsequent organ damage in adolescent sepsis, and that these effects are seemingly independent of ketone catabolism.
Title:
Emergency Department Use in Children and Youth Facing Death Secondary to Self-Harm: A Population-Based Cohort Study in Alberta, Canada

Authors/Co-authors:
Rajesh Alphonse and Rhonda J. Rosychuk

Introduction:
In Canada, death by self harm (SH) is the second highest cause of mortality in people aged 15-24 years and the emergency department (ED) is one way individuals with SH behaviour enter the healthcare system. Studying the demographic/clinical characteristics of this high-risk population in the context of SH-associated ED presentations is critical to developing efficient and evidence-based SH prevention/treatment services.

Methods:
Using linked population based databases, we examine visits made by children/youth aged 10-24 yrs for SH reasons to EDs from 2010/11 to 2014/15, in Alberta. The case definition is any youth in this population who presented to an Alberta ED for injury secondary to intentional SH and who either died in the ED or died within 30 days of an ED visit (due to SH or otherwise). Multivariable logistic regression model was used to determine the independent association of age, sex, fiscal year, occurrence of death when still being managed in the ED and number of ED visits for SH before dying with increased likelihood of death due to SH

Results:
Among 118 individuals who matched the case definition, 64.4% died due to SH and 35.6% died for reasons other than SH. Both groups were similar in sex distribution with the former having a lower mean age. No major difference was noted in the proportion of SH vs non-SH deaths in the fiscal years studied. 67.1 % of the individuals in the SH group presented with a level-1 triage code ("resuscitation") compared to only 29% of level-1 triage presentations in the non-SH group. Via multivariable logistic regression, we show that age is independently associated with increased likelihood of death due to SH (Odds ratio [OR] 0.85 per year of age, 95% confidence interval [CI] 0.74 to 0.96, P = 0.01). Occurrence of death in the ED, in contrast to death in the community after discharge, was also independently associated with SH death (OR=2.92, 95%CI 1.14 to 8.25, P = 0.031).

Conclusion:
Our study indicates that being younger increases the odds of SH death among those presenting to EDs for SH and these deaths are more likely to happen in the ED during presentation for SH. Future assessments which include non-fatal SH ED presentations and deaths resulting from SH that did not have an ED component can better predict fatal outcome in high-risk youth.

Anthuvan Rajesh Stanislaus Alphonse
Resident – General & Community Pediatrics
Supervisor: Dr. Rhonda Rosychuk
Oral Session #2; Residents Stream (3:30 p.m.)
Title: Medical Students’ Experiences with Indigenous Patient Care

Authors/Co-authors: N. Arseneau¹, M. Rashid¹, T Kemble, Karen Forbes¹
¹University of Alberta

Introduction: Indigenous Peoples in Canada bear a disproportionate burden of disease and experience poorer health outcomes as compared to non-Indigenous populations within Canada; these conditions are said to be mediated and exacerbated by pervasive and uninterrupted anti-Indigenous racism enacted by health professionals. In this qualitative study, third and fourth year medical students at the University of Alberta were asked to reflect on their clinical experiences working with Indigenous patients, and how the newly introduced Indigenous Health curriculum impacted these experiences.

Methods: A phenomenology framework was used, guided by Goffman’s theory of social stigma. Data collection and analysis in phenomenology are iterative; hence, an ongoing process will reflect the integrated and ongoing nature of data analysis and data collection. Eleven undergraduate medical students were recruited using purposeful sampling. Using a semi-structured interview guide, phone interviews were conducted to gain in-depth understanding of the participants’ experiences. Seven follow up interviews were conducted to clarify and further explore and understand discrepant data. Interviews were recorded and transcribed verbatim and thematic analysis was conducted.

Results: Three main themes emerged from students’ descriptions of clinical experiences involving Indigenous patients: 1) Medical students’ perception of Indigenous identity - discrimination against Indigenous patients was seen directly by medical students and described by their patients; 2) Students had difficulty identifying, or naming racism, in specific situational clinical encounters, especially if patients presented with substance use concerns; 3) Discrimination impacts patients care - discrimination would sometimes be seen to affect patient care in the moment and sometimes would not; however, students noted that the long-term effects of discrimination were predictable and impactful. Finally, a fourth theme emerged regarding pre-clinical education: 4) Preclerkship education would benefit from being more practical - students valued the new Indigenous Health curriculum, but thought it would benefit from being more practical and having more individual Indigenous perspectives shared.

Conclusion: Several important themes emerged from medical students’ interviews related to their experiences working with Indigenous patients during their clinical years. These highlight the importance of enhancing the undergraduate medical curriculum to allow students to better understand the unique experiences and perspectives of Indigenous patients. The results support the need for ongoing curriculum development in Indigenous health, in order to foster culturally sensitive student experiences while learning about Indigenous patient population.

Keywords: Phenomenology, Indigenous health curriculum, undergraduate medical education

Nicole Arseneau
Resident – General & Community Pediatrics
Supervisor: Dr. Karen Forbes
Oral Session #2; Residents Stream (3:45 p.m.)
Title
Mealtime Support: A pilot cohort study of an Effective, Cost-saving Outpatient Hunger-Based Feeding Program for Tube Dependency

Authors/Co-authors
Geraldine Huynh MD, Alysha Vishram OT, Carol Graham-Parker RD, Debbie Blatz RN, Matthew Carroll MD, Justine Turner MD

Department of Pediatrics, University of Alberta
Funding: Women and Children’s Health Research Institute and Stollery Children’s Foundation

Introduction:
Tube feeding is essential for children who cannot meet nutritional requirements orally. Over time this can lead to tube dependency with negative impacts on the quality of life of children and families.

Objective:
We aimed to examine the efficacy of a multidisciplinary child-led, hunger-based approach called “Mealtime Support” at the Stollery Children’s Hospital in Edmonton. Nutritional outcomes, parental satisfaction and cost implications were evaluated over 9 months per child.

Methods:
The ambulatory meal program was delivered 2-3 times a day, for 2 weeks, by an occupational therapist and dietitian, under medical supervision. Hunger was promoted by reducing tube fed calories by 80% prior to commencement. Caregivers completed 12-question subjective surveys pre and post intervention. Micro-costing methods compared costs between the program and ongoing tube feeding.

Results:
From 2016 - 2017, 6 children were enrolled and 5 completed the program. At 1-month post intervention, 4/5 of the children were 100% orally fed. Parents reported improvement in mealtime struggles (p-value = 0.005), reduction in worry about their child’s eating (p-value = 0.005) and improvement in their child’s appetite/variety foods eaten (p-value = 0.004). Over 2 years, the potential cost savings were estimated at $43,471.00. By 6-months, all feeding tubes were removed.

Conclusion:
Mealtime Support was safe and successful in reducing tube dependency and cost-effective compared to no intervention or hospital based programs, which suggests that there is a need to develop and fund Canadian outpatient feeding programs.

Keywords:
Feeding program, Tube feeding, Tube dependency, Tube weaning, Clinical hunger provocation

Huynh, Geraldine
Resident – General & Community Pediatrics
Supervisor: Dr. Justine Turner
Oral Session #2; Residents Stream (4:00 p.m.)
Title:
Rituximab Use for the treatment of Nephrotic Syndrome by Canadian Pediatric Nephrologists: A National Survey

Authors/Co-authors:
Cory Meeuwisse, MD, CJ Morgan MD, S Samuel MD, RT Alexander MD PhD, S Rodriguez-Lopez MD

Introduction:
There is known practice variation in the treatment of frequently relapsing (FR), steroid-resistant (SR) and steroid-dependent (SD) nephrotic syndrome. Rituximab is an emerging therapy for these difficult to treat nephrotic syndromes, however, there are no clear treatment guidelines. We therefore hypothesized that a wide variety of approaches to this therapy exist.

Methods:
A cross-sectional survey was distributed across Canada through the Canadian Association of Pediatric Nephrologists (CAPN) to evaluate rituximab treatment practices

Results:
Out of a total of 20 responses, 19 (95%) use Rituximab in treatment of nephrotic syndrome, and 18 (90%) measure B-cells when using this medication. No provider uses Rituximab as the initial steroid-sparing agent. Providers would consider Rituximab therapy when previous medications failed (58%), medication compliance is a concern (26%), other therapies contribute side effects (32%), or when funding requirements are met (10%). For number of Rituximab doses, 5 (26%), 13 (68%) and 1(5%) participants use one, 2 or 4 doses respectively. B-cell measurement frequency varied from weekly (5.5%), monthly (50%), every 3 months (39%), to yearly (5.5%). Respondents administered additional doses of Rituximab prophylactically (74%), or earlier at first relapse (47%). Drug funding and long-term safety were identified as significant barriers to use

Conclusion:
Rituximab is rarely used as a second line therapy for SDNS, FRNS and SRNS. When used, there exists variation in the dosing and dose frequency of Rituximab, along with monitoring of B-cells and the use of B-cell levels in therapeutic decisions. The use of Rituximab for difficult to treat nephrotic syndromes should be harmonized to facilitate future studies into its application in pediatric nephrology.

Cory Meeuwisse
Resident – Nephrology
Supervisor: Dr. Todd Alexander
Oral Session #2; Residents Stream (4:15 p.m.)
Title:
Early infliximab clearance predicts remission in children with Crohn’s Disease

Authors/Co-authors:
A. Chung¹, M. Carroll¹, P. Almeida¹, A. Petrova¹, D. Mould², E. Wine¹, H. Huynh³.
¹University of Alberta, Faculty of Medicine and Dentistry, Edmonton, Canada.
²Projections Research Inc, Pharmacology, Phoenixville, United States.

Introduction:
Infliximab is an effective treatment for inducing and maintaining remission in refractory Crohn’s Disease (CD). Recent studies suggest pediatric CD patients have higher infliximab clearance (IFX CL) for body weight and lower serum IFX when dosing by weight. Our aim was to determine if IFX CL calculated based on therapeutic drug monitoring (TDM) data predicts long term outcome.

Methods:
Retrospective study of CD patients seen at the Stollery Children’s hospital from Jan 2013-Jul 2019. Anthropometric, lab, IFX TDM & disease data were collected for those having ≥2 serum IFX levels. IFX CL was calculated using non-linear mixed effects modelling. The data was fit to a 2-compartment model with linear elimination. Outcomes were defined at 4, 9 & 15 months. Remission is defined as wPCDAI<12.5, CRP<4 & steroid-free for 4 months. Subjects that underwent intestinal surgery or ceased IFX due to refractory CD are non-responders. Logistic regression was used to determine early predictors (at baseline or end of induction) associated with remission at 4, 9 & 15 months. The variables evaluated were: IFX CL, IFX trough level, sex, age, PARIS classification, CRP, ESR, Alb, Hgb, weight, BSA, BMI, previous anti-TNF & immunomodulator use.

Results:
85 subjects were included, with a median follow up of 670 days (IQR: 304,1105). Regression analysis showed early IFX CL was the only significant early predictor of remission for every timepoint. Baseline IFX CL and end of induction IFX CL, measured in L/h, were associated with 15-month remission with an OR of 0.606 (95%CI: 0.394,0.931; p=0.022) and 0.373 (95%CI: 0.207,0.669; p=0.001) respectively. Similar results obtained at 4 & 9 months. ROC analysis of remission was done using only early IFX CL. A baseline IFX CL of 5.83 L/h predicted 15-month remission with a sensitivity & specificity of 0.649 & 0.667 (AUC=0.701). End of induction IFX CL of 6.06 L/h predicted 15-month remission with a sensitivity & specificity of 0.676 & 0.611 (AUC=0.709). Similar results obtained at 4 & 9 months.

Conclusion:
In all timepoints, early IFX CL was a strong predictor of later remission compared to dose intensity, frequency, IFX levels and wPCDAI & CRP at end of induction. This suggests early IFX CL is a marker of early biological response to IFX. Early dose optimization is required in those with high IFX CL to ensure optimal response with adequate drug exposure. This will facilitate early change in treatment for those with inadequate response.

Aaron Chung
Undergraduate – Gastroenterology & Nutrition
Supervisor: Dr. Hien Huynh
Oral Session #2 (Undergraduate Steam) (3:45 p.m.)
Title: “Volucation” experiential learning in pediatric clinical research: a triple win

Authors/Co-authors: Patrick Hicks, Caseng Zhang, Kaden Lam, Lesley Brennan, Anne Hicks

Introduction: Students interested in clinical research need opportunities to increase their experience. As well as formal research projects leading to peer-reviewed publications, volunteer opportunities to participate in a variety of research projects through non-traditional linkages are an opportunity for preceptors to guide students through the research process while providing meaningful research contributions.

Methods: This descriptive project evaluates an undergraduate experience developing and leading a team to complete peer-reviewed research projects through non-traditional routes.

Results: This undergraduate experience with several health organizations taught research skills while successfully generating peer-reviewed non-traditional publications. With the Children’s Environmental Health Clinic the student built a team that extensively revised a “train the trainer” educational module (e.g. https://www.who.int/ceh/capacity/training_modules/en/) for the World Health Organization (WHO). This “Mycotoxin” module passed the first round of peer review and is currently under final review before being posted to the website. As well, the team completed systematic review updates and developed a media search strategy for pediatric COVID and helped write a rapid review for the Alberta Health Services Scientific Advisory Group (https://www.albertahealthservices.ca/assets/info/ppih/if-ppih-covid-19-sag-role-of-children-in-community-transmission-rapid-review.pdf). Most recently the student led group wrote a knowledge translation blog for the Canadian Pediatric Society using the systematic review and rapid knowledge synthesis strategy learned through their other projects (https://www.cps.ca/en/blog-blogue/cleaning-agents-covid-and-child-health).

Conclusion: In this case, a University of Alberta student built a multi-university, interdisciplinary undergraduate student team to complete several service projects involving literature-based research and knowledge translation at academic, clinical and public levels. The project quality was sufficient that they have been invited to develop and train new teams to update WHO modules, write an entirely new module and do additional knowledge translation for the Pan-American Health Organization. The team developed research training and connections with multiple pediatric associations through their volunteer work.

Undergraduate students interested in clinical research benefit from additional opportunities to summer studentships and traditional research course options; these can be adapted to student interest and timelines. Many organizations depend on volunteerism to complete critical tasks; an example is the WHO. University-based preceptors can use this unique combination of needs to provide experiential learning opportunities that benefit both students and organizations while providing high-quality peer reviewed knowledge translation.

Patrick Hicks
Undergraduate Student– Respiratory Medicine
Supervisor: Lesley Brennan
Oral Session #2; Undergraduate Students Stream (3:30 p.m.)
Title: Antibody Kinetics in RT-PCR Positive Children for SARS-CoV-2

Authors/Co-authors: Emilie Manny, Carmen Charlton, Joan Robinson, Joyce Chikuma, Ehsan Misaghi, Roman Chabba, Piush J. Mandhane

Introduction: Most studies on antibody kinetics have focused on adults and only one in children. SARS-CoV-2 IgG antibodies were reported to stay at least 62 days in children, and for at least 4 months and up to 6 months in most mildly symptomatic or asymptomatic adults. Higher antibody titers were observed in severe illnesses compared to milder diseases in adults. The association between symptoms and antibody kinetics in children has not been reported yet.

Methods: Eligible 1-19-year-old participants (n=56) were recruited through Alberta Health Services from October 2020 through February 2021, as part of an 18-months longitudinal study. All participants (n=56) had a previous PCR-positive result for SARS-CoV-2. Participants received a baseline questionnaire at the time of recruitment, and venous samples were drawn 13 to 218 days post-PCR testing using chemiluminescent immunoassays: Abbott (targeting the Nucleocapsid) and DiaSorin (targeting Spike proteins).

Results: Most participants (86%) answered the baseline questionnaire. The mean age was 9.8 years (range: 1.2-19.0), 45% were females, 58% were Caucasians, and 77% reported one or more symptoms since March 15, 2020. Most participants (43/56; 77%) had positive results for both assays, 16% were positive for either Abbot or DiaSorin, and 7% negative for both assays. DiaSorin had a higher positivity rate (91%) compared with Abbott (79%). SARS-CoV-2 IgG could be detected from 13 to 171 days. The survival analysis revealed a significant difference ($p=0.017$; Hazard ratio [HR]$=0.14$) between participants who had respiratory or SARS-CoV-2-specific symptoms and those who were asymptomatic or had symptoms other than respiratory or SARS-CoV-2-specific. The difference between symptoms was still significant when controlling for age, sex, and ethnicity ($p=0.035$; HR$=0.08$).

Conclusion: SARS-CoV-2 IgG antibodies can be detected as soon as 13 days post-PCR testing and stay up to 171 days (5.6 months) in children serum by both assays, but the Nucleocapsid IgG seem to decay faster, compared with the spike proteins.

Emilie Manny
Postdoctoral Fellow – Respiratory Pediatrics
Supervisor: Dr. Piush Mandhane
Oral Session #1; Fellows (Clinical & Postdoctoral) Stream (2:15 p.m.)
Title
Perinatal Changes in Myocardial Deformation and Performance in Hypoplastic Left Heart Syndrome: Longitudinal Follow-up Study from Term Fetuses to Neonates

Authors/Co-authors:
Olga V Patey MD PhD, Lisa K Hornberger MD, Nee S Khoo MD, Angela McBrien MD and Luke G Eckersley MBBS PhD

Introduction:
Late gestation fetal and neonatal right ventricular (RV) function in hypoplastic left heart syndrome (HLHS) may affect the optimal preoperative management and surgical strategy chosen. However, there is a paucity of data on the typical cardiac functional findings of HLHS late gestation fetuses and newborns. This data is required to understand which cases of HLHS have atypical functional findings and is likely best assessed using advanced functional imaging with speckle-tracking (STE) and tissue-Doppler imaging (TDI) to avoid invalid geometric assumptions.

Methods:
Prospective longitudinal study of 30 women delivering at term including 16 uncomplicated pregnancies with normal outcome and 14 pregnancies affected by fetal HLHS. Pulsed wave TDI and STE parameters were obtained at mean gestational age 38±1 weeks, and then at 6, 24 and 48 hours after birth. RV cardiac indices in HLHS groups were compared with both RV and left ventricular (LV) parameters in healthy controls.

Results:
HLHS term fetuses and neonates exhibited prolonged RV isovolumetric contraction and relaxation time-intervals resulting in elevated myocardial performance index and lower ventricular apical circumferential, radial and rotational myocardial deformation than the control LV. HLHS neonates revealed progressive increases in heart rate, longitudinal systolic strain rate and TDI longitudinal systolic velocity S'. Comparison of fetal and neonatal cardiac indices in the HLHS group showed a progressive increase in RV longitudinal systolic functional parameters and ejection time. The most pronounced postnatal cardiac alterations were observed at 48 hours after birth.

Conclusion:
HLHS fetuses exhibit markedly altered RV systolic and diastolic TDI parameters at term and lack of resemblance of circumferential function to the control LV. Further profound alterations in these cardiac parameters after birth may suggest adaptation to increased RV pre- and afterload with increased systemic resistance and widely patent fetal shunts. The comprehensive evaluation of perinatal cardiac changes in HLHS term fetuses with advanced functional analysis may aid in identification of at-risk cases with cardiac dysfunction.

Olga Patey
Clinical Fellow – Cardiology
Supervisor: Dr. Luke Eckersley
Oral Session #2; Fellows (Clinical & Postdoctoral) Steam (3:45 p.m.)