

Department of Pediatrics  
University of Saskatchewan  
presents



Thursday April 18th, 2019  
12:00-5:30pm  
Louis' Loft



UNIVERSITY OF SASKATCHEWAN  
College of Medicine  
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Child Health Research Trainee Day  
Thursday, April 18, 2019  
12:00-5:30pm  
Louis' Loft

12:00pm	<b>Lunch</b>
12:25-12:30pm	<b>Welcome and Open Remarks</b>
12:30-12:45pm	<b>Mays Al-Dulaymi</b> (Post-Doctoral Fellow, Pediatrics). <i>Targeted mass spectrometric metabolomic analysis of urine: a promising approach for asthma diagnosis and management in children</i>
12:45-1:00pm	<b>Mehrieh Rahimi</b> (Resident, Pediatrics). <i>Inspissated Bile Syndrome secondary to hemolytic disease of newborn</i>
1:00-1:15pm	<b>Mahdi Rostami Haji Abadi</b> (PhD Student, Kinesiology). <i>Children with autism spectrum disorder have sustained bone deficits in the radius and tibia shaft: 1-year follow-up</i>
1:15-1:30pm	<b>Natasha Boyes</b> (PhD Student, Kinesiology). <i>Waist circumference determination in children with congenital heart disease: a CHAMPS cohort study</i>
1:30-1:45pm	<b>Natalie Houser</b> (PhD Student, Kinesiology). <i>Physical Literacy of Children with Congenital Heart Disease: Comparison to Healthy Population References - A CHAMPS Cohort Study.</i>
1:45-2:00pm	<b>Break</b>
2:00-2:15pm	<b>Shatabdi Goon</b> (Masters Student, Community Health and Epidemiology). <i>Environmental determinants of physical activity and sedentary behavior in children.</i>
2:15-2:30pm	<b>Yuwen Zheng</b> (Masters Student, Kinesiology). <i>Grip strength helps differentiate boys with lower distal radius bone strength</i>
2:30-2:45pm	<b>Trevor Krysak</b> (Undergraduate Student, Anesthesiology). <i>Pediatric sedation outside the OR: How are we doing?</i>
2:45-3:00pm	<b>Sandi Yao</b> (Undergraduate Student, Medicine). <i>Retrospective review: an evaluation of screening tools for growth hormone deficiency in pediatrics</i>
3:00-3:15pm	<b>Taylor Kobussen</b> (Undergraduate Student, Medicine). <i>Complex chronic patients in the pediatric intensive care unit: perspectives from their healthcare providers</i>
3:15-3:30pm	<b>Break</b>
3:30-5:30pm	<b>POSTER PRESENTATION JUDGING SESSIONS</b>
4:00pm	<b>Poster Viewing</b>
5:00-5:30pm	<b>Prizes Announced</b>



## ORAL PRESENTATIONS

12:30pm-12:45pm

### *Targeted mass spectrometric metabolomic analysis of urine: a promising approach for asthma diagnosis and management in children*

**Mays Al-Dulaymi, Chun Che, Joan Dietz, Anas El-Aneed, Darryl Adamko**

**Background:** Pediatric asthma management can be a challenge in a typical primary care setting where we often lack objective tests for asthma diagnosis and severity. Metabolomics is the study of small molecules created by cellular metabolic activity. We have demonstrated that asthma has a different metabolomic profile compared to healthy children. We have identified 50 urinary metabolites as potential diagnostic biomarkers for asthma. Recently, we developed targeted mass spectrometry (MS)-based methods to accurately quantify these biomarkers in urine. For this project, we hypothesize that our novel MS-based method will differentiate healthy children from those with asthma. We also expect that we will see changes in the urine of children with asthma depending on whether they have well controlled asthma versus uncontrolled asthma.

**Methods:** To diagnose asthma in young children, we obtained urine samples from healthy children or those with asthma (n=100 each) diagnosed at 5 years of age from the CHILD birth cohort. To determine asthma severity, we recruited children with atopic asthma (n=18) and followed them monthly from July to November (Seasonal Study). An Asthma Control Questionnaire, Mini Pediatric Asthma Quality of Life Questionnaire and Asthma Control Test were filled at each visit. Pulmonary function tests were performed on all children 6 years of age or older. Urine samples were collected from all children during their appointments. The urine samples were analyzed using our targeted liquid chromatography tandem mass spectrometric platform and value were normalized to creatinine. Partial least squares discriminant analysis (PLS-DA, SIMCA) was used on these data to create models of separation.

**Results:** Urine samples from the CHILD study generated a model of separation between healthy and asthmatic children with an R2 value of 0.74 and a Q2 value of 0.68. The model included 21 metabolites attained from the variables of importance plot. The separation model correctly classified the validation test set with 78% accuracy. In the seasonal cohort, there were 21 instances where patients' asthma control worsened and 30 instances where their asthma control improved. PLS-DA modelling generated a separation model of controlled and uncontrolled asthma with an R2 value of 0.72 and a Q2 value of 0.592. Blinded analysis could not be done as we lacked a test set of children. We will do this in the near future with a separate cohort of children that we have acquired.

**Conclusions:** Urine metabolomic analysis attained positive results in the differentiation of asthma from healthy control children. It also suggests there is a metabolome of asthma severity. This work requires validation using larger test sets, which is underway using current funds.

12:45pm-1:00pm

### *Inspissated Bile Syndrome secondary to hemolytic disease of newborn*

**Mehrieh Rahimi Veronica Samedi, Kaarthigeyan Kalaniti; Iram Musharaf; Martha Lyon; Roona Sinha; William Bingham**

**Introduction:**

The clinical experience with hemolytic disease of the newborn (HDN) and its post-icteric sequelae is limited among high-income countries because of nearly four decades of effective prevention care<sup>1</sup>. Inspissated bile syndrome (IBS) is a rare but serious complication of HDN<sup>2</sup>. In this case report, we present a case of IBS in a term infant with HDN and describe parallel serum dynamics.

**Case:**

The mother of our patient is a 33-year-old O-negative woman. Her past obstetrical history was remarkable for two spontaneous abortions due to alloimmunizations and hydrops. Among her seven living children, one required exchange transfusion therapy as a newborn. During her most recent pregnancy, she had no prenatal care. The first prenatal ultrasound was done on admission to the obstetric ward and signs of progressing hydrops (cardiomegaly, pericardial and pleural effusion, and ascites) were noted, thus, an emergency caesarean section was performed. A male infant, approximately 34 weeks of gestation, was delivered with Apgar scores of 2, 5 and 6 at the first, fifth and tenth minutes, respectively.

The infant was markedly pale and mottled, his cord hemoglobin and bilirubin were 16 g/L and 79  $\mu\text{mol/L}$ , respectively. He required a double volume exchange transfusion, two doses of IVIG, and intensive phototherapy for the management of ongoing HDN. In spite of these interventions, the jaundice persisted, and after first week of life the direct bilirubin surpassed the indirect. An unusual color of serum was noted simultaneously with progression of cholestasis (image 1), and these findings correlated with degree of haemolysis and levels of direct bilirubin (table 1). A liver sonogram showed a dilated common hepatic duct and a dilated common bile duct with a fluid-debris level (biliary sludge). These findings supported the diagnosis of IBS. After initiation of ursodeoxycholic acid, jaundice improved, and total and direct bilirubin levels were normalized.

**Discussion:**

Exaggerated haemolysis secondary to HDN leads to bilirubin overload and triggers cholestasis. The excess of bilirubin densifies as calcium bilirubinate sludge in bile ducts and causes inspissated bile duct syndrome. Possible predisposing factors for the IBS in neonates usually include prematurity, sepsis, parenteral nutrition, and use of diuretics. In our case few predisposing factors (haemolysis, prematurity, suspected sepsis) were present.

1:00pm-1:15pm

### *Children with autism spectrum disorder have sustained bone deficits in the radius and tibia shaft: 1-year follow-up*

**Mahdi Rostami Haji Abadi, J.D. Johnston, Saija Kontulainen**

**Introduction:** Poor bone development during childhood may explain an elevated risk of fracture in individuals with ASD. Previous studies reported 13-30% lower aBMD z-scores for total body, lumbar spine, hip and femoral neck measures in children with ASD when compared to TD children while aBMD changes were comparable. One study also indicated 10-20% deficit in bone microstructure and strength at the distal radius and tibia in children with ASD. The literature has limited prospective evidence of bone mass, structure and estimated strength development in children with ASD. Our objective was to compare radius and tibia bone mass, structure and estimated strength between children with ASD and their TD controls at baseline and after 1-year follow-up.

**Methods:** We followed 13 children with ASD (12 boys) (mean age at baseline: 10.2, SD 2.8 yrs) and 32 TD children (15 boys) (mean age 10.7, 1.7 yrs). We used our standard protocols to obtain radius and tibia peripheral quantitative computed tomography (pQCT) scans at the distal and shaft sites of the radius and tibia at baseline and after one year. Outcomes included total area, and cortical content as well as density-weighted polar section modulus, a strength measure assessing resistance to torsional loading. As there were no between-group differences in age, body size or maturity (age from peak height velocity), we used MANOVA to compare bone outcomes between the groups at baseline. We normalized follow-up bone outcomes to 1-year change. We used repeated measures MANOVA to compare 1-year changes between the groups.

**Results:** There was a significant main effect of the group (Wilks' Lambda = 0.413, F (1, 35) = 2.233, p=0.044) but no interaction between group x time (Wilks' Lambda = 0.643, F (1, 35) = 0.871, p>0.05). At baseline, radius shaft total area, cortical area, cortical content and estimated bone strength were 22-37% lower in children with ASD when compared to TD children. Tibia shaft cortical area and cortical content were 19-22% lower.

**Conclusions:** Observed 19-37% deficits in bone mass, structure and strength at radius and tibia shafts in children with ASD were sustained over 1-year follow-up.

1:15pm-1:30pm

### *Waist circumference determination in children with congenital heart disease: a CHAMPS cohort study*

**NG Boyes; E Barbour-tuck, CR Tomczak; DS Lahti; CL Baril; C Pockett; S**

**Runalls; A Kakadekar; S Pharis; TJ Bradley; KD Wright; M Erlandson**

**Background:** Children with congenital heart disease are at an elevated risk of future cardiovascular disease. Abdominal obesity (measured as waist circumference) is a risk factor for adult onset of cardiovascular disease and is correlated with low physical activity levels, commonly found in children with congenital heart disease.

Elevated waist circumference may be a mechanism by which cardiovascular disease risk is elevated in children with congenital heart disease, but there is a paucity of data on body composition in this population. Objective: The purpose of this study was to investigate differences in waist circumference in children with and without congenital heart disease and predictors of waist circumference. We hypothesized that children with congenital heart disease would have higher measures of waist circumference when accounting for relevant confounders (i.e., physical activity level, birthweight, lean mass, and sex).

Patients: Thirty-two children with congenital heart disease ( $10.9 \pm 2.6$  years; 12 female) from the Children's Healthy-Heart Activity Monitoring Program in Saskatchewan, and 23 healthy controls ( $11.7 \pm 2.5$  years; 10 female) were studied.

Outcome Measures: Waist circumference, physical activity (children/adolescent physical activity questionnaire), body composition (lean mass; dual x-ray absorptiometry), and birthweight were measured.

Analysis of covariance and independent samples t-tests were used to assess differences between groups ( $p < 0.05$ ).

Results: Children with congenital heart disease had greater waist circumference than controls when controlling for lean mass, physical activity, birthweight, and sex ( $F = 4.488$ ,  $p = 0.039$ ). Physical activity scores, lean mass, and birthweight were not significantly different between groups (all  $p > 0.05$ ).

Conclusion: Waist circumference, a surrogate for abdominal adiposity, is higher in children with congenital heart disease compared to age-matched controls, when accounting for relevant covariates. Abdominal adiposity may be a key factor in disease development and progression in this population, thus studies exploring the role of waist circumference in the etiology of cardiovascular disease in the CHD population are clearly warranted.

**1:30pm-1:45pm**

### ***Physical Literacy of Children with Congenital Heart Disease: Comparison to Healthy Population References - A CHAMPS Cohort Study.***

**Houser, N.E.**, Chapelski, M., Lahti, D., Tomczak, C.R., Wright, K.D., Pocket, C., Bradley, T.J., Pharis, S., Kakadekar, A., Erlandson, M.C.

BACKGROUND: It is well known that regular physical activity (PA) participation can have a positive influence on the healthy growth and development of children, affecting various physical, psychosocial, and cognitive aspects. Although PA programming is safe and recommended for children with congenital heart disease (CHD), physical inactivity levels and development of mental health disorders such as anxiety are much greater in this population. Fundamental movement skills (competence) and movement confidence (two components of physical literacy) play important roles in physical activity participation, yet there currently exists little evidence on the development of these components in children with CHD, or how movement competence and confidence compares to the healthy population. As such, this research seeks to determine how physical competence and self-confidence of children with CHD compares to healthy controls.

METHODS: A sample of children with CHD, and healthy age matches from across Saskatchewan had components of their physical literacy assessed according to the PLAYfun and PLAYself protocols. These tools measure physical competence and self-confidence, respectively, two components that make up the concept of physical literacy. One sample t-tests were run to determine how the scores of children with CHD differ from those in the healthy groups. For the purpose of this comparison, age ranges were created as follows: 8-9 years, 10-11 years, and 12-14 years.

RESULTS: PLAYfun analyses in a sample of children with CHD ( $n=18$ ) and healthy match averages from a sample of  $n=300$ , demonstrated that overall children with CHD had statistically significant lower PLAYfun scores than the healthy control group ( $t(17) = -3.44$ ,  $p=0.003$ ). When grouped by age ranges, a significant difference was found only in the children with CHD and healthy control group aged 12-14 years ( $t(8) = -3.95$ ,  $p=0.004$ ). PLAYself analyses in a sample of  $n=13$  children with CHD and  $n=328$  of healthy age match averages demonstrated that there was overall no significant difference in PLAYself scores between the groups ( $t(12) = -1.01$ ,  $p=0.33$ ). When grouped by age ranges, a significant difference was found only in the children with CHD and healthy control group aged 12-14 years ( $t(6) = -4.13$ ,  $p=0.006$ ).

CONCLUSION: There exist differences in movement competence and self-confidence between children with CHD and healthy controls. These findings suggest that there is an opportunity to enhance the physical literacy opportunities for children with CHD, in an attempt to merge the gap between this population and healthy children their age.

**2:00pm-2:15pm**

### ***Environmental determinants of physical activity and sedentary behavior in children***

**Shatabdi Goon, Dr. Nazeem Muhajarine**

Background: Physical activity is critical to the health and well-being of children. The evidence based on the associations between neighborhood environments and children's physical activity is still developing, compared to that among adults. A better understanding whether and how neighborhood environments influence children's physical activity is therefore necessary to promote health and wellbeing in children.

Objectives: This study aimed to estimate the associations between children's perceived, or objectively measured, neighborhood environments with accelerometer-assessed physical activity, specifically: light physical activity (LPA), moderate to vigorous physical activity (MVPA), and sedentary time (ST) among children aged 10 to 14 years.

Methods: This longitudinal study builds on Smart Cities Healthy Kid's study conducted in Saskatoon during the 2009-2015 school years. The perceived and objective measures of neighborhood environments were collected by both children using surveys and independent trained assessors using two validated, replicable tools (Neighborhood Active Living Potential, NALP, and Irvine Minnesota Inventory, IMI). Linear mixed-effect models estimated the associations between neighborhood environments and children's activity over time.

Results: Data were analyzed from 800 participants ( $10.97 \pm .014$  years; 44.5% female children). Participants accumulated mean of 78.74 min/day of moderate-to-vigorous PA (MVPA), 338.87 min/day of LPA and 273.32 min/day of ST during accelerometer wear-time (769.68 min/day). After adjusting for potential confounder, we found that, children residing in neighborhoods perceived as safe, with good services/facilities, and sidewalks/parks were significantly more likely to be physically active and to engage in less of sedentary behavior. Objectively measured neighborhood safety showed a strong, positive association with MVPA (estimate: 8.19 (95% confidence interval (CI): 5.86, 10.52),  $p=0.001$ ), however, had no impact on ST.

Conclusion: Safe, walkable, and aesthetically pleasing neighborhoods, with access to overall and specific destinations and services were found to influence children's physical activity and sedentary time. Further context-specific studies are required.

**2:15pm-2:30pm**

### ***Grip strength helps differentiate boys with lower distal radius bone strength***

**Yuwen Zheng, James Johnston, Saija Kontulainen**

Introduction

Grip strength has been associated with bone size and strength at the radius shaft in children. However, the role of grip strength in predicting variance in distal radius bone strength, specifically bone failure load and stiffness obtained from high-resolution imaging and finite element (FE) analysis, has not yet been reported. Our objectives were to test following hypotheses: (1) grip strength would independently predict distal radius bone failure load and stiffness at the distal radius in children; and (2) children with grip strength below the 50th percentile would have lower failure load and stiffness at the distal radius when compared to those with grip strength equal or above the 50th percentile.

Methods

We recruited 160 typically developing children (ages 7-14yrs) from local schools. We included 137 (75 girls) participants (mean age 10.5yrs, SD 1.8) with valid maximal grip strength (kg) measurement and high-resolution peripheral quantitative computed tomography (HR-pQCT) scans at the distal radius of dominant limb. We analyzed scans with manufacturer-provided FE software to obtain bone failure load (N) and stiffness (kN/mm).

We tested Hypothesis #1 using hierarchical regression analyses to predict variance in failure load or stiffness by entering grip strength in the (base) model with forearm muscle area. We report change in model fit ( $\Delta R^2$ ) and standardized beta coefficient (std. $\beta$ ) for predictors. To address Hypothesis #2, participants were first categorized as having a grip strength <50th or  $\geq$ 50th percentile groups, based on Canadian grip strength reference values. We compared bone failure load and stiffness between groups using MANCOVA, adjusting for maturity in boys and body mass and forearm muscle area in girls.

#### Results

Grip strength improved model fit when included with muscle area to predict variance in failure load and stiffness in both boys and girls ( $\Delta R^2$ :0.03-0.15, std. $\beta$ : 0.29-0.48,  $p < 0.05$ ). Boys with a grip strength <50th percentile had 18% and 19% lower distal radius failure load and stiffness, respectively, than boys with the grip strength  $\geq$ 50th percentile group ( $p < 0.01$ ). In girls, there were no differences in failure load and stiffness between the groups.

#### Conclusions

Grip strength independently predicted distal radius failure load and stiffness in both boys and girls. Boys with grip strengths below the 50th percentile had, on average, 18-19% lower failure load and stiffness than their peers with grip strengths equal or above the 50th percentile of Canadian grip strength reference data.

### 2:30pm-2:45pm

#### *Pediatric sedation outside the OR: How are we doing?*

**Trevor M. Krysak BSc**, Jonathon Gamble MD FRCPC

**Introduction:** Historically, pediatric sedation was largely provided in the operating room (OR). This care has become common in other settings such as the emergency department (ED). Common indications for sedation include fracture reduction, laceration repair, and dressing changes in addition to many others. When the procedure cannot be completed in the ED a second sedation usually occurs in the operating room, exposing the child to additional risk. This study evaluated: 1) reasons for ED procedure failure 2) adherence to guidelines for pediatric procedural sedation.

**Methods:** A guideline checklist tool was developed to evaluate guideline adherence and record reasons for procedure failure. This tool was applied to evaluate electronic charts of pediatric procedural sedations at Royal University Hospital from Jan 2017 to April 2018. The same tool was used to prospectively observe pediatric procedural sedations in the ED from May 2018 to August 2018. Data sets were analyzed using Microsoft Excel to provide summary statistics. At the completion of this data collection a focus group of pediatric emergency physicians was convened to elicit responses to the data and our study questions.

**Results:** A total of 114 retrospective charts were reviewed and 8 prospective cases were observed. The retrospective chart review found a procedure failure rate of 4.4% with the most common reason being inadequate fracture reduction needing open reduction and internal fixation. The most common deviations from guideline practice recommendations included: failure to follow minimal fasting (25%) and a lack of immediately available rescue drugs (51.0%). Other guideline deviations included a lack of: blood pressure monitoring, application of monitors prior to initiation of sedation, vital sign and level of consciousness monitoring during recovery.

**Conclusions:** These results highlight gaps in practice. Our group is planning further data collection to enrich our data set in efforts to draw stronger conclusions.

### 2:45pm-3:00pm

#### *Retrospective review: an evaluation of screening tools for growth hormone deficiency in pediatrics*

**Sandi Yao**, Mark Inman, Martha Lyon, Prosanta Mondal, Munier Nour  
Growth hormone deficiency (GHD) is a rare cause of growth failure in children that results from an inadequate production of growth hormone (GH) by the pituitary gland. In the past couple decades, the success of treating GHD with synthetic recombinant human GH (rhGH) has subsequently directed more focus towards making an accurate diagnosis, which has proven to be challenging for a number of reasons. While GH stimulation testing is the gold standard for diagnosing GHD, its results are best interpreted within the context of an integrated auxologic, radiological, biochemical, and neuroimaging assessment. It is well-recognized that an accurate diagnosis of GHD is restricted by laboratory assay limitations.

Screening tests such as the serum insulin-like growth factor 1 (IGF-1) assay are often employed to select pediatric candidates who would subsequently undergo confirmatory GH stimulation testing. However, concerns have emerged over the reliability of the IGF-1 assay in serving as a screening tool for identifying patients for further GH stimulation testing. In this retrospective review, we analyzed data from 57 patients who underwent GH stimulation testing by the Pediatric Endocrine Division from March 2014- June 2019. The purpose was to assess the way pre-test criteria are associated with GH stimulation testing results in order to provide quality assurance in regards to IGF-1 assay employment. We found that while the IGF-1 assay is associated with GH stimulation testing results ( $p < 0.05$ ), it has poor sensitivity (75%). Furthermore, other auxologic criteria and elements in medical history are also predictors of GHD. Our findings indicate that the IGF-1 assay on its own is insufficient for a screening test. In selecting pediatric candidates for GH stimulation testing, the screening process is strengthened by an evaluation of other pre-test criteria. Future directions involve creating a combined scoring system to better identify ideal candidates for GH stimulation testing.

### 3:00pm-3:15pm

#### *Complex chronic patients in the pediatric intensive care unit: perspectives from their healthcare providers*

**Taylor Kobussen**, Gregory Hansen, Rebecca Brochman, Tanya Holt

#### Objective:

Pediatric complex chronic care patients (PCCPs) present unique challenges to the pediatric intensive care unit (PICU) such as prolonged length of stay, complex medical regimes, and complicated family dynamics. The objective of this study was to examine perspectives of PICU providers regarding PCCPs, while exploring potential opportunities to enhance care provided to PCCPs.

#### Design:

Prospective mixed-methods sequential explanatory study. conducted by administering REDCap surveys and semi-structured interviews to PICU healthcare providers.

#### Setting:

Canadian medical-surgical PICU.

#### Subjects:

PICU healthcare providers including intensivists, nurses, respiratory therapists, social workers, dietitians, pharmacists, and rehabilitation therapists who resided in their position for at least 6 months.

#### Interventions:

109 REDCap surveys and 10 semi-structured interviews were administered to PICU healthcare providers.

#### Measurements and Main Results:

Quantitative survey response rate was 70.6%. Perspectives did not vary with duration of work experience in health care providers. Eight overarching themes emerged from the interviews, revealing a number of potential opportunities to refine care of PCCPs in the PICU. They included: 1) the desire for increased formal education specific to PCCPs; 2) designation of a primary intensivist; 3) modifying delivery of care to include discrete location for care provision; 4) establishing daily-, short-, and long-term goals; 5) monitoring and documenting of care milestones; 6) strengthening patient/family communications with the healthcare team; 7) optimizing discharge coordination and planning, and; 8) integrating families into care responsibilities.

#### Conclusion:

PICU healthcare provider's perspectives of PCCPs demonstrated opportunities to refine the care provided in the PICU by establishing daily goals, coordinating discharge planning, and creating occasions for close patient/family/provider communication.

## POSTER PRESENTATIONS

### #1

### Masters Category

#### *Lower baroreflex sensitivity during muscle metaboreflex activation in children and adolescents with the fontan circulation and single ventricle physiology*

**R M Iqbal**, N G Boyes, S Fusnik, D S Lahti, M C Erlandson, K D Wright, A Kakadekar, T J Bradley, S Pharis, C Pockett, T D Oliver, C R Tomczak  
Individuals with the Fontan circulation and single ventricle physiology have elevated sympathetic nerve activity at rest and during muscle metaboreflex activation that is consistent with autonomic dysfunction.



Adults with the Fontan circulation also show reduced baroreflex sensitivity (BRS); however, there is limited understanding of BRS in children or adolescents with the Fontan circulation. In healthy adults, BRS decreases with increased sympathetic nerve activity during isometric handgrip exercise, but not during isolated muscle metaboreflex activation. The effect of handgrip exercise and muscle metaboreflex activation on BRS in children and adolescents with the Fontan circulation is currently unknown. **PURPOSE:** We tested the hypothesis that BRS is lower at rest and less responsive during handgrip exercise and post-exercise circulatory occlusion (PECO) in children/adolescents with the Fontan circulation compared to healthy controls. **METHODS:** Eight children/adolescents with the Fontan circulation (12 ± 2 yrs; 3 males) and 8 healthy controls (13 ± 4 yrs; 5 males) were studied. Continuous heart rate (ECG) and non-invasive blood pressure (Finometer® MIDI) were recorded during 3-min of resting baseline, 2-min of isometric handgrip exercise at 30% of maximal voluntary contraction, and 3-min of PECO. Continuous heart rate, systolic blood pressure, and diastolic blood pressure signals were analyzed using the BRS Analysis software (Nevrokard, Slovenia, 2018) to yield average BRS values during rest, handgrip, and PECO for each group. Differences between groups and across conditions were assessed using two-way repeated measures (2 × 3, group × condition) ANOVA. P<0.05 was considered significant. **RESULTS:** There was a significant group × condition interaction for BRS (P<0.001). BRS was lower in children/adolescents with the Fontan circulation vs. healthy controls at rest (13 ± 8 vs. 38 ± 10 ms/mmHg; P<0.001) and during PECO (18 ± 17 vs. 37 ± 18 ms/mmHg; P=0.044), but not during handgrip (13 ± 10 vs. 14 ± 6 ms/mmHg; P=0.843). BRS in children/adolescents with the Fontan circulation did not change across conditions (P=0.188). **CONCLUSION:** Our findings suggest that BRS is lower at rest and has a blunted response during sympatho-excitation in children/adolescents with the Fontan circulation compared to healthy controls. Collectively, our findings indicate potential autonomic dysfunction in children/adolescents with the Fontan circulation.

## #2 Masters Category

### *Effects of home-based exercise training on post-exercise peripheral muscle oxygenation in children with congenital heart disease*

**Dana S Lahti**, Corey R Blushke, Charissa Pockett, Timothy J Bradley, Scott Pharis, Scotty J Butcher, Kylee Kosokowsky, Natasha G Boyes, Kristi D Wright, Marta C Erlandson, Corey R Tomczak

A hallmark feature of children with congenital heart disease (CHD) is exercise intolerance, along with slow post-exercise muscle oxygenation recovery. Exercise rehabilitation programs have been shown to improve peak  $\dot{V}O_2$  in children with CHD; however, exercise tolerance is still limited compared to healthy matched controls. Whether exercise training improves post-exercise recovery of muscle oxygenation (as measured by tissue oxygenation index, TOI) in children with CHD compared to healthy children is unknown. **PURPOSE:** To determine whether a 12-week home-based exercise intervention can improve post-exercise TOI response after peak exercise in children with CHD compared to controls. **METHODS:** Eight children with CHD ( $f/m = 4/4$ ; mean ± SD age: 12 ± 2 yrs) with simple and complex lesions and seven healthy controls ( $f/m = 3/4$ ; age: 12 ± 3 yrs) were studied. Children with CHD completed a home-based exercise program 3 times/week for 12 weeks, in addition to 6 biweekly in-person sessions. Exercise tolerance was assessed with peak  $\dot{V}O_2$  testing to volitional fatigue on a cycle ergometer, followed by 4 minutes of 20-W recovery. Vastus lateralis TOI was continuously sampled during exercise and recovery via near-infrared spectroscopy. Post-exercise TOI recovery data was normalized from 0% (end-exercise) to 100% (4 min post-exercise) and data analyzed at set time points to characterize TOI time course changes (0s, 15s, 30s, 60s, 90s, 120s, 180s and 240s). Pre vs. post training changes in TOI were analyzed using paired t-tests. Significance was accepted when P<0.05. **RESULTS:** Post-exercise TOI was significantly lower in CHD pre-training compared to controls at 15s (9 ± 9 vs. 27 ± 16%; P=0.018) and 30s (32 ± 17 vs. 72 ± 35%; P=0.012). Similarly, post-exercise TOI in CHD after exercise training was significantly lower than controls at 15s (9 ± 7 vs. 27 ± 16%; P=0.014) and 30s (36 ± 22 vs. 72 ± 35%; P=0.030). **CONCLUSION:** Excessive post-exercise impairment in TOI recovery persists after home-based exercise in children with CHD compared to controls.

#3

Masters Category

### *Is arterial stiffness augmented in pediatric heart transplant recipients?*

**S. Singh**, C. Blushke, N. Boyes, D. Lahti, K. Kosokowsky, D. Marciniuk, S. Butcher, M. Erlandson, K. Wright, S. Pharis, C. Pockett, C. Tomczak  
Adult heart transplant recipients (HTR) have greater arterial stiffness, despite resolution of the underlying pre-transplant diagnosis. The impaired vascular function may also contribute to the reported impaired exercise tolerance in these patients. Patient age and the duration and sequela of the pre-transplant cardiovascular disorder significantly contribute to the augmented arterial stiffness observed in adult HTR, while the direct role of immunosuppressive therapies is less understood. We tested the hypothesis that despite young age, pediatric HTR will display increased arterial stiffness owing to their significant pre-transplant cardiovascular disease and post-transplant physical inactivity. We also tested the hypothesis that arterial stiffness would be related to exercise tolerance (peak oxygen uptake,  $\dot{V}O_2$ ). **METHODS:** Six pediatric HTR (3 females and 3 males; 10 ± 3 years) and 12 age- and sex-matched healthy controls (6 females and 6 males; 10 ± 2 years) were studied. Carotid-radial pulse-wave velocity by ECG-gated sequential applanation tonometry was used to determine arterial stiffness. HTR subjects also completed a peak  $\dot{V}O_2$  test by cycle ergometry. Data were analyzed through an independent samples t-test with significance differences being accepted at p< 0.05. **RESULTS:** Pulse wave velocity was not different between HTR (8.50 ± 1.93 m/s) and the healthy controls (8.55 ± 1.52 m/s, P = 0.951). In addition, pulse wave velocity was not related to peak  $\dot{V}O_2$  in HTR (r = -.529, P = 0.140). **CONCLUSION:** Unlike in adult HTR, pediatric HTR have normal arterial stiffness compared to healthy-matched controls, and arterial stiffness was not related to peak  $\dot{V}O_2$  in this pediatric population. These findings suggests that the pre-transplant diagnosis sequela do not unfavorably alter arterial stiffness in young pediatric HTR and that reduced peak  $\dot{V}O_2$  in pediatric HTR is not related to arterial stiffness.

#4

Masters Category

### *Development of a dried blood spot assay for detecting prenatal cannabis exposure in newborns*

**Stephanie Vuong**, Deborah Michel, Richard Huntsman, Andrew W Lyon, and Jane Alcorn

Legalization of recreational Cannabis in October 2018 resulted in increased concerns about potential increase of Cannabis use in pregnant women. Many women mistakenly believe that Cannabis may help to ease their nausea and morning sickness. Due to their high lipophilicity, cannabinoids have the tendency to cross the blood placental barrier, exposing the fetus to the cannabinoids. Cannabinoids, such as tetrahydrocannabinol (THC), act upon type 1 cannabinoid receptors, which are located in the central nervous system. In the fetal stage, the brain is still undergoing development, therefore, exposure to Cannabis can lead to long-term neurological impairments. All newborns in Saskatchewan are required to have a heel prick test/dried blood spot test to detect for any congenital metabolic disorders. The requirement of a dried blood spot test from newborns makes it easily accessible to detect for prenatal exposure to Cannabis. Liquid chromatography-tandem mass spectrometry will be used for the quantitative analysis of cannabinoids in the dried blood spots for its sensitivity and selectivity. Mass spectrometry can be affected by major endogenous components found in blood matrices, such as plasma proteins, phospholipids, and red blood cells. These endogenous components can potentially interfere with the quantitative analysis of cannabinoids, leading to inaccurate measurements. It is crucial to remove these endogenous components from the sample. Typical blood sample cleanup includes liquid-liquid extraction or solid phase extraction, however, these techniques are expensive, time-consuming and require method development. A recent technique has been developed that is efficient yet as effective as solid phase extraction for the removal of plasma proteins, phospholipids, and red blood cells. The Agilent Captiva EMR-Lipid device is a 96-well plate containing a filter and lipid sorbent that has the ability to capture high molecular weight components (plasma proteins and red blood cells) and selectively bind to phospholipids, allowing the filtrate to be free of these endogenous components. Avoidance of these potential interferences will lead to better sensitivity and selectivity of the analytes.

An LC-MS/MS method has been established and will be used to detect for cannabinoids in the newborn dried blood spots and to compare the prevalence of prenatal Cannabis exposure in Saskatchewan pre-legalization and post legalization of recreational Cannabis. We are at the final stages of developing the LC-MS/MS method and will subsequently follow with method validation.

## **#5 Undergrad-Health Sciences Category**

### *Cardiovascular responses to the exercise pressor reflex in pediatric heart transplant recipients*

**Corey R Blushke**, Natasha G Boyes, Dana S Lahti, Kylee Kosokowsky, Darcy Marciniuk, Scotty J Butcher, Marta C Erlandson, Kristi D Wright, Scott Pharis, Charissa Pockett, Corey R Tomczak

Pediatric heart transplant recipients (HTR) have reduced exercise tolerance despite normal systolic ventricular function. A slower heart rate adaptation to exercise in HTR due to cardiac denervation is commonly observed in HTR patients, which explains, in part, the exercise intolerance. We tested the hypothesis that the cardiovascular response to exercise pressor reflex activation from handgrip exercise would be blunted in HTR. Methods: Six pediatric HTR (3f/3m; mean±SD, 10±3 yrs) and five healthy-matched controls (CTL; 3f/2m; 10±2 yrs) were studied. After 3 min of resting baseline, subjects performed 2 min of isometric handgrip (HG) exercise at 40% maximal voluntary contraction, followed by 3 min post-exercise circulatory occlusion (PECO). Beat-by-beat mean arterial pressure, heart rate, and model flow stroke volume and cardiac output were recorded. Data were analysed as the change ( $\Delta$ ) from rest using two-way repeated measures ANOVA (2 x 3; group x condition) and Holm-Sidak multiple comparisons analysis. Significance was accepted at  $P < 0.05$ . Results: Mean arterial pressure increased in HTR ( $\Delta 17 \pm 15$  mmHg) and CTL ( $\Delta 13 \pm 16$  mL) during HG ( $P < 0.001$ ) and remained elevated above baseline during PECO (HTR:  $\Delta 10 \pm 10$  mmHg; CTL:  $\Delta 11 \pm 9$  mmHg;  $P < 0.05$ ), with no between group differences. Heart rate did not significantly increase during HG in HTR ( $\Delta 4 \pm 5$  bpm,  $P = 0.235$ ) but did in CTL ( $\Delta 14 \pm 11$  bpm,  $P < 0.001$ ), and was 9 bpm lower in HTR vs CTL ( $P = 0.005$ ). Heart rate was not different during PECO from rest in HTR and CTL. Stroke volume increased in HTR ( $\Delta 3 \pm 1$  mL) and CTL ( $\Delta 3 \pm 3$  mL) during HG ( $P < 0.001$ ) and remained elevated above baseline during PECO (HTR:  $\Delta 3 \pm 2$  mL; CTL:  $\Delta 4 \pm 3$  mL;  $P < 0.001$ ), with no between group differences. Cardiac output did not significantly increase during HG in HTR ( $\Delta 0.34 \pm 0.21$  L/min,  $P = 0.074$ ) but did in CTL ( $\Delta 0.71 \pm 0.54$  L/min,  $P < 0.001$ ), and was 0.37 L/min lower in HTR vs CTL ( $P = 0.035$ ). Cardiac output was not different during PECO from rest in HTR and CTL. Conclusions: Owing to the impaired heart rate response during handgrip exercise, cardiac output was lower in pediatric HTR compared to healthy-matched controls in response to exercise pressor reflex activation.

## **#6 Undergrad-Health Sciences Category**

### *Understanding the physical activity experiences of girls who are newcomers to Canada*

**Sami Leung**, Dr. Louise Humbert

Introduction. The number of newcomers coming to Canada has increased in the last few years. In Canada, 60% of newcomers come from China and India and many of these newcomers are families with children. Newcomers to Canada tend to have lower physical activity levels when compared to their non-newcomer counterparts. Physical activity has numerous benefits for people of all ages and for newcomers, participation in physical activity has been shown to, ease the stress associated with settlement issues. Participating in physical activity allows newcomer children to develop friendships both within and outside of their cultural group. While the benefits of physical activity are widely known what is unknowns are the physical activity experiences of children who are newcomers to Canada and in particular the experiences of girls.

Purpose. This study sought to investigate the barriers and facilitators that newcomer girls in Canada face when engaging or attempting to engage in physical activity. Two research questions guided this study: (1) what barriers to physical activity do newcomer girls aged six to ten experience and (2) what facilitators to physical activity do newcomer girls aged six to ten experience.

Methods. A multiple case study approach was used in this study. Participants ( $n = 3$ ) were recruited from an after-school program run by the Saskatchewan Intercultural Association (SIA) organization in Saskatoon. Data was collected using one-on-one semi-structured interviews, coded by hand, analyzed for themes, and transcribed into infographics.

Results. Three themes emerged after data analysis. The first theme, "Parents", described how different family structures could facilitate and/or inhibit the physical activity experience of the participants. The second theme, "Weather, discussed how various weather conditions can be both a facilitator and/or inhibitor to a participant's physical activity experience. The third theme, "School Environment: Curricular Activities and Non-Curricular Activities," described the role that the neighborhood school played in both facilitating and/or inhibiting the physical activity experiences of newcomer children. Conclusion. The findings indicated that newcomer girls between the ages of six to ten are influenced by three barriers and facilitators: their parents, weather conditions and their school environment which includes non-curricular and curricular activities. These are similar to findings of the barriers and facilitators experienced by their non-newcomer counterparts. Because the voices of the participants were used the results from this study may help future organizations and researchers develop appropriate physical activity programs for these newcomer youth and children.

## **#7 Undergrad-Health Sciences Category**

### *Exploring the development of fundamental motor skills in a child with autism*

**Hailey Brown**, Dr. L. Humbert

Introduction: Autism Spectrum Disorders affect approximately 1 in 66 Canadian children, more commonly males (Public Health Agency of Canada, 2018). Children with ASD experience deficits in three main domains: social, communication, and behavior; however, an emerging body of literature supports that they also experience deficits in motor skills (Staples & Reid, 2010; Lloyd, Macdonald, & Lord, 2011; Berkely, Zittel, Pitney, and Nichols, 2001). The motor skill deficits children with autism experience are apparent in their performance of fundamental motor skills (FMS) (i.e., running, jumping, throwing). Deficits in FMS proficiency are concerning as FMS are often considered as a prerequisite to participation in physical activity in children and youth, and having the necessary skills to participate with others in physical activity is an important component of physical activity participation (Stodden et al., 2008; Department of Education, 1996).

Purpose: To explore the impact of an intervention designed to increase the development of FMS in a child with autism.

Methods: The student researcher designed and delivered a home-based program to develop FMS in a single participant (Kyle). Trained research assistants used Ulrich's (2000) Test of Gross Motor Development 2nd Edition (TGMD-2) to assess Kyle's FMS proficiency pre and post-program. Semi-structured interviews were conducted before and after the intervention with Kyle's physical education teacher and educational assistant. Field notes were also used as part of the qualitative data.

Results: The quantitative results suggest minimal changes in Kyle's FMS proficiency after the program's completion; however some changes were observed in the raw scores. Three themes emerged from the qualitative data.

"Recognizing and supporting individuality" describes the importance for educators to learn each child's unique challenges, abilities, and motivators within a physical activity environment. "Rethinking visual self-stimulation" supports the use of integrating sensory stimulation into physical activity programs. "FMS development: a road to inclusion" emphasizes the importance of FMS development for children with autism to become integrated in social settings.

Conclusion: More research is needed to investigate the efficacy of developing FMS in children with autism using home-based programs. Designing individual programs that reinforce a child's specific areas of interests as well as including activities that integrate a child's preferred sensory stimulations may increase engagement in both the home based program and physical activity in general. Developing FMS is important for all children, however, for children with autism it may be a critical strategy to promote social inclusion; particularly in boys with autism.

## #8 Undergrad-Health Sciences Category

### *Effect of a 12-week fundamental skill intervention on the physical literacy levels of children with congenital heart disease*

**Matthew Chapelski**, Ashley Libke, Dana Lahti, Corey R. Tomczak, Kristi Wright, Charissa Pocket, Tim Bradley, Scott Pharis, Marta C Erlandson

**Introduction:** Children with congenital heart disease can struggle to reach the recommended daily physical activity levels in part because they lack the confidence and competence to be physically active. Not reaching these guidelines can be detrimental to both their short- and long-term health. Physical literacy assesses how competent and confident an individual is in their physical function. Improving a child's physical literacy may give them the competence, confidence, and motivation to live an active lifestyle thus impacting their health and well-being.

**Purpose:** The purpose of this study was to assess if a 12-week intervention is effective in increasing the physical literacy of children with congenital heart disease.

**Methods:** Seven participants, 8-16 years of age, had their physical literacy assessed pre and post intervention. The battery of PLAY Tools were used to assess the participants' physical literacy. The PLAYself was used to assess the child's perception of their physical literacy. The PLAYparent was given to their parents to assess the parents' perception of their child's physical literacy levels. The PLAYfun was used to test 18 fundamental skills divided into five movement domains (running, locomotion, upper body object control, lower body object control and balance) which provides an overall physical literacy score. A higher physical literacy score relates to greater competence and confidence. The intervention involved six bi-weekly sessions that consisted of fundamental movement skill practice such as: object control, locomotion and balance activities. Percent change and paired t-tests were run to compare pre and post values.

**Results:** All PLAYfun domain scores increased. A significant increase ( $p < 0.05$ ) was seen in the PLAYfun locomotor, upper body object control, and their overall physical literacy score. There was also a significant increase in confidence and comprehension of the balance domain. All other domains' confidence and comprehension increased; however, none were significant. The PLAYself and PLAYparent results all increased; however, none were significant.

**Conclusion:** Our findings show that a 12-week intervention improved the physical literacy levels of the participants. These findings are similar to other physical literacy interventions in health individuals that have found increases in physical literacy levels after an intervention. As children with congenital heart disease are at an increased risk of physical inactivity, physical literacy development provides an exciting opportunity to increase physical activity and potential health benefits in this at-risk population.

## #9 Undergrad-Health Sciences Category

### *Post-exercise oxygenation uptake and muscle oxygenation in pediatric heart transplant recipients and healthy matched children*

**Kylee Kosokowsky**, Natasha G. Boyes, Dana S. Lahti, Corey Blushke, Darcy Marciniuk, Scotty J. Butcher, Marta C. Erlandson, Corey R. Tomczak

**Background:** Pediatric heart transplant recipients (HTR) have reduced exercise tolerance and peak oxygen uptake (VO<sub>2</sub>) values are 57-73% of age-predicted norms. Slow post-exercise VO<sub>2</sub> and muscle oxygenation recovery are related to exercise intolerance. However, despite clear exercise tolerance limitations and post-exercise fatigue, VO<sub>2</sub> and muscle oxygenation during recovery responses are unknown in this population.

**Purpose:** We tested the hypothesis that both post-exercise VO<sub>2</sub> recovery and muscle oxygenation recovery would be slower after peak exercise in pediatric HTR compared to controls.

**Methods:** Five pediatric HTR (age =  $10.6 \pm 3.0$  years) and six healthy controls (age =  $11.7 \pm 2.7$  years) performed cycle ergometry to peak exercise followed by 5 minutes of 20-W cycle recovery. Pulmonary VO<sub>2</sub> and muscle oxygenation (vastus lateralis tissue oxygenation index, TOI using near infrared spectroscopy) were sampled continuously during exercise and recovery. Data were linearly interpolated to 1-s intervals, and both VO<sub>2</sub> and TOI data were averaged into 5-s and 10-s time bins, respectively. VO<sub>2</sub> recovery data were mono-exponentially curve-fitted to yield a recovery time constant (tau). TOI recovery was normalized from 0% (end exercise) to 100% (5 min post-exercise) and data analyzed at set time points to characterize TOI time course changes (0s, 15s, 30s, 60s, 90s, 120s, 180s, 240s, and 300s).

Statistical analyses included independent t-tests for VO<sub>2</sub> data and a between-within ( $2 \times 9$ , group  $\times$  time) factorial ANOVA for TOI time course changes. Significance was accepted at  $p < 0.05$ .

**Results:** Recovery VO<sub>2</sub> tau was significantly slower in pediatric HTR compared to healthy controls (mean  $\pm$  SD;  $68 \pm 17$  vs.  $47 \pm 12$  s, respectively;  $p=0.044$ ). There was a significant group  $\times$  time interaction for TOI recovery ( $p=0.003$ ) where TOI in HTR was significantly lower compared to controls at 15s ( $8 \pm 8$  vs.  $46 \pm 19\%$ ;  $p=0.003$ ), 30s ( $22 \pm 13$  vs.  $91 \pm 31\%$ ;  $p=0.001$ ), and 60s ( $47 \pm 23$  vs.  $117 \pm 36\%$ ;  $p=0.005$ ).

TOI was not statistically different between groups by 90s onwards (all  $p > 0.05$ ).

**Conclusions:** Post-exercise VO<sub>2</sub> and TOI recovery are blunted in pediatric HTR compared to healthy controls. These findings suggest that non-cardiac factors may contribute to the excessive recovery time following peak exercise in pediatric HTR.

## #10 Undergrad-Health Sciences Category

### *Positive allosteric modulation of type 1 cannabinoid receptor in a rat model of childhood absence of epilepsy*

**Anna Maria Smolyakova**, Mariam Alaverdashvili, Quentin Greba, Michael Anderson, Andrew Roebuck, Wendie Marks, Sumanta Garai, Terrance Snutch, Ganesh Thakur, John Howland, Robert Laprairie

Dysregulation of the endocannabinoid system is involved in the pathophysiology of many forms of epilepsy including absence epilepsy. Absence epilepsy is characterized by generalized thalamo-cortical seizures with short lapses of impaired consciousness, co-morbid anxiety, and an EEG hallmark of  $>2.5$  Hz spike-and-wave discharges (SWD).

The type 1 cannabinoid receptor (CB1R) is a recognized target for anti-seizure drugs. In some models of absence epilepsy, CB1R receptor agonists such as WIN55,212-2 are effective in reducing the frequency of SWD for a period of time, however the efficacy is short lived and followed by a late increase in SWD duration. The high doses required for efficacy of CB1R agonists carry negative adverse effects and lead to desensitization of CB1R. In contrast, CB1R positive allosteric modulators (PAM) enhance the efficacy of endogenous cannabinoids without adverse effects. In this study, we chose to use the Genetic Absence Epilepsy Rats from Strasbourg (GAERS) model. Our goals were (1) to characterize the endocannabinoid system in this model and (2) determine whether the CB1R PAMs GAT211 and GAT229 effected the epileptic phenotype of this model.

CB1R protein levels and radioligand binding were lower in the motor cortex – but unaffected in the thalamus and hippocampus – of GAERS compared to non-epileptic controls. Similarly, levels of the GABA-synthesizing enzyme GAD67 were lower in the motor cortex of GAERS compared to non-epileptic controls. Seizure occurrence, seizure duration, and anxiety were reduced in GAERS following single i.p injection of the CB1R PAMs GAT211 or GAT229 (1, 3, or 10mg/kg). Therefore, CB1R deficits in the motor cortex may contribute to the propagation of seizures in absence epilepsy and CB1R PAMs may alleviate seizures through normalization of synaptic transmission.

## #11 Undergrad-Health Sciences Category

### *Pediatric cancer: an exploration of the family illness experience through online narratives*

**Aliya Abbasi**, Meredith Burles, Jill Bally

Childhood cancer refers to cancers that occur between birth and 15 years of age and are typically more aggressive and invasive than cancers common to adulthood. Approximately 910 children are diagnosed with cancer in Canada each year, and 139 children die of the disease. Leukemias, lymphomas and central nervous system cancers represent the largest diagnostic groups. Childhood cancer diagnosis has devastating effects on families due to its life-threatening nature, and the shifts in familial roles it brings about. Existing research has revealed that childhood cancer has impacts multiple dimensions of family well-being, including persistent feelings of uncertainty, grief, loss of control, and anxiety.



Parents and other family members adopt various strategies for coping with these emotions, including seeking information and support. Many parents of children with cancer use the Internet to share narratives about family life with childhood cancer and solicit support from others. However, little research has explored the nature of parents' online narratives of childhood cancer. The objective of this research study is to improve understanding of parent's experiences of caring for a child with cancer, and explore how sharing personal narratives on the Internet supports coping and meaning making. A qualitative approach was used to explore the content of online narratives shared by Canadian parents. Qualitative research promotes improved understanding of a social phenomenon by exploring it naturalistically from the perspective of those who have lived it. The aim is to examine in-depth how a small number of people have experienced and made sense of certain circumstances, with attention to psychosocial processes and context.

## #12 **Medicine Category**

### *Same day discharge of children less than 3 years of age undergoing tonsillectomy: a combined retrospective review and patient-reported outcomes study*

**Simranjeet Singh, Farrukh Munshay**

Tonsillectomy is one of the most common pediatric surgical procedures performed in Canada. Consensus otolaryngology guidelines from 2011 state that it is highly encouraged to keep children less than or equal to 3 years of age in hospital overnight in light of increased risk of respiratory complications. At the Royal University Hospital in Saskatoon, post-tonsillectomy patients in this age group are occasionally being discharged on the same day of surgery. There is a documented complication rate of 8.8% and an unplanned admission rate of 8% in the literature in such patients. The goal of this study is to perform a retrospective chart review to evaluate local 30-day complication rates, readmission to hospital rates and caregiver satisfaction score amongst patients having tonsillectomy less than or equal to 3 years who are discharged on the same day of surgery.

Measuring our institutional 30-day complication rates, readmission rates and caregiver satisfaction score for this patient population will provide health care providers a marker for the quality of care for these patients. Expected outcomes will include presentations to local anesthesiologists, a national meeting, and publication in a peer-reviewed journal. This knowledge translation is expected to reduce complication rates and lead to improved perioperative management of these children.

We plan a retrospective chart review of all electronic Health Records (eHR) for pediatric tonsillectomies performed in Saskatoon hospitals on children aged 0 to 3 years between June 2017 and December 2018. Follow up phone calls will be made to parents/guardians to inquire about early or late complications and overall satisfaction. Health Records tracks unplanned admissions to hospital, but patient-reported post-procedure complications such as excessive bleeding or respiratory events not leading to readmission, nausea and vomiting, uncontrolled pain, dehydration, or recurrent infection are not coded for easy extraction. Limitations to health records reporting necessitates a telephone follow up to validate the rates of patient-reported complications. The sample size is expected to be around 200. Cases where a telephone follow up is not achieved will be discarded.

The statistical analysis of post-operative complications and unplanned admissions will be used to compare it to those of other institutions in Canada that have different practice profiles for pediatric tonsillectomies.

## #13 **Medicine Category**

### *Optic Nerve Sheath Diameter for Preterm Infants: A Pilot Study*

**Sarah Ardell, Sibasis Dispal, Tanya Holt, Gregory Hansen**

Objective: Evaluating intracranial pressure (ICP) in neurocritical care is often necessary to provide prompt, essential treatment. In pre-term infants, early diagnosis and management of raised ICP is important to improve neurodevelopmental outcomes. In this population, invasive ICP monitoring is not recommended, and normative optic nerve sheath diameter (ONSD) data through ultrasonography has yet to be established. Due to decreased gestation, these infants may be at high risk for raised ICP.

Therefore, the aim of this study was to establish normative ranges of ONSD in this population, so that ultrasonography can be used as a clinically relevant monitoring tool for pre-term infants at risk of raised ICP as a rapid, non-invasive tool of assessment.

Methods: Twelve pre-term infants took part in this study (5 female, 7 male). 114 scans were performed on both eyes. The average age was 33(2) weeks gestational age with a range of 29 to 36 weeks and the average weight was 1624(520) grams. A linear array transducer was used, measuring the ONSD 3 mm behind the optic nerve sheath head. The procedure was well tolerated by participants.

Results: Linear regression was used to investigate the relationship between gestational age, weight, head circumference and ONSD. A strong linear relationship was found between gestational age and ONSD, and preliminary normative measurements at each gestational age was established. Interrater reliability demonstrated substantial agreement.

Conclusion: Preliminary results suggest the ONSD increases with gestational age.

## #14 **Medicine Category**

### *Pediatric Pain Audit: What's Not in the Chart*

**Alex Senger, Casey McMahon, Krista Baerg**

Although pain is a cause of increased morbidity and mortality in children, pain is typically undermanaged in pediatrics. This cross-sectional study aimed to evaluate pain prevalence, intensity, assessment and treatment in pediatric patients presenting in one of three settings at a Canadian Tertiary Care Centre. Surveys were implemented on three days in the pediatric ward (PW), four in the emergency department (ED) and two in maternal services (MS). Participants were asked to report their pain experiences and management in the preceding 24 hours. The medical record of subjects was reviewed to ascertain knowledge about the child's treatment. Of the 210 children available, 84 completed the survey. Forty-eight percent of the sample was female. Of the PW patients (n=41), 87.8% of age, with 24 patients <10 years of age and 17 patients 10 years of age. Pain was most frequently caused by a needle poke (27.8%), with an average pain scale rating of 6.1/10 (SD=2.1). In the ED (n=23), 78.3% of patients experienced pain, and was most frequently caused by patients' acute illness, with an average pain scale rating of 7.5/10 (SD=1.9). Participants presenting in the ED ranged in age from <1-18 years of age, with 13 patients <10 years of age and 8 patients 10 years of age. On MS (n=20), 75% of parents indicated that their child experienced pain in the past 24 hours. Ninety-three percent of these painful experiences were caused by needle pokes, which caused an average of 5.4/10 pain (SD=2.7). All patients in MS were less than 1 year of age. Overall, pain medicine was indicated to be the most helpful pain management strategy, with a mean effectiveness of 8.4/10 (SD=2.1). The most commonly prescribed analgesics were acetaminophen, ibuprofen and morphine. Prior to needle pokes, topical lidocaine was used in only 9 of the 41 participants on the PW, despite children rating the cream a 7.4/10 (SD=2.7) for helpfulness. The study results demonstrate considerable pain management deficits, despite a hospital pain policy. It is recommended that the Health Authority update their pain policy and make topical lidocaine cream available to all pediatric patients for needle pokes.

## #15 **Medicine Category**

### *Assessment of a job aid for pain management at pediatric blood collection*

**Madeline E. Parker, Casey McMahon, Krista Baerg**

Pain arising from venipuncture is a source of significant distress for children and their families. Although commonly regarded as benign, its lasting effects include the development of needle-fear and sensitization to future painful stimuli through long-term alterations in nociceptive neural processing. Despite its documented impact on child health, needle-pain remains undertreated. This has been attributed to healthcare professionals' biases, such as the misconception that analgesia interferes with occupational efficiency, as opposed to a lack of safety or cost-effectiveness of available methods of pain control.

This study examines the impact of the Job Aid Form (JAF), a quality improvement initiative implemented at the Selective Test Center at Royal University Hospital in December 2017. To increase the use of validated methods of pain control by phlebotomists, JAF mandates that they offer all pediatric outpatients (<18 years) developmentally appropriate positions of comfort, distractions, and 4% topical lidocaine prior to venipuncture. All procedures are documented by the phlebotomists on a JAF, which also contains a script for procedure standardization. A secure, online survey system was used to assess the impact of the JAF on 65 patients/caregivers and 26 phlebotomists. Patients ranged from <1-18 years and were subdivided into the following age groups on the basis of developmentally-appropriate pain management strategies: <1 (n=16), 1-6 (n=24), >6 (n=25). Patients with lower pain scores (≤ 4) reported more frequent use of positions of comfort and topical lidocaine. Patient/caregivers were satisfied with blood draw, with 96% providing positive feedback. Similarly, implementation of the JAF was associated with a positive shift in phlebotomist job satisfaction (p=0.02). These data support existing research demonstrating that both pediatric patients and healthcare providers benefit from pain control, while providing evidence in support of the JAF as a novel framework by which this can be achieved. Future research should address the expansion of the JAF to include other validated methods of pain control, such as oral sucrose.

**#16**

### Medicine Category

#### *Neonatal sulfhemoglobinemia treated with an exchange transfusion: a case report*

Sivapatham G, Stammers D

This case describes the diagnosis in a neonate with an underlying diagnosis of cystic fibrosis. Sulfhemoglobinemia develops from the binding of a sulfur atom to hemoglobin, thus reducing the oxygen carrying capacity and therefore leading to hypoxia. In this case, the underlying cause was thought to be related to bacterial overgrowth secondary to meconium ileus and/or the use of N-acetylcysteine for bowel irrigation. Sulfur-producing gastrointestinal bacteria as well as medication interactions with drugs such as N-acetylcysteine and metoclopramide have been implicated in several cases of sulfhemoglobinemia in children. In this case, the patient was successfully treated with a red blood cell exchange transfusion. It is essential to consider a broad differential diagnosis that includes dyshemoglobinemias in the setting of reduced oxygen saturation by pulse oximeter that is unresponsive to supplemental oxygen. Furthermore, treatment with a red blood cell exchange transfusion appears to be an effective treatment for sulfhemoglobinemia.

**#17**

### Medicine Category

#### *A Clinical Audit of Fetal ECHO in Saskatchewan*

Jennifer Wong, Jocelyne Martel, Kristine Mytopher, Lara Wesson, Adewumi Adenlawo, George Carson, Ashok Kakadekar, Kandice Mah, Gitanjali Mansukhani, Tim Bradley.

BACKGROUND: Congenital heart disease (CHD) is the leading cause of infant mortality due to birth defects. Prenatal diagnosis of CHD by fetal echocardiography (ECHO), is associated with better outcomes and decreased healthcare costs, while low socioeconomic status and rural living is associated with worse outcomes of CHD and lower rates of prenatal diagnosis. Fetal ECHO also provides early access to prenatal counseling regarding further pregnancy management, assists with decision-making on the mode, timing and location of delivery and allows for the optimization of postnatal management. In Saskatchewan, there are only two centres in Saskatoon and Regina that offer fetal ECHO. The aim of this study was to determine if geographical location and other social determinants affect accessibility to fetal ECHO in Saskatchewan. METHODS: All the fetal ECHO that have been performed in Saskatchewan were identified from our existing ECHO databases and electronic medical records. Data was collated on: indication for fetal ECHO; maternal age, place of residence and postal code; other maternal factors such as gravidity and parity, obstetrical history, medical history and medications, cigarette, alcohol and drug use during pregnancy; gestation at the time of fetal ECHO; fetal ECHO diagnosis; and the fetal management plan and recommendations after delivery.

RESULTS: Between 1Jan2011-27Jun2018, 872 in Saskatoon and 314 fetal ECHO were completed. The indications for fetal ECHO were most frequently suspected fetal cardiac abnormality on obstetric ultrasound (313; 26%), or screening due to a family history of CHD in a first-degree relative (263; 22%), but screening due to maternal pre-existing diabetes with poor control (160; 13%) was also a common indication in Saskatchewan. Mean maternal age was 30±5 years and gestation 28±4 weeks at the time of fetal ECHO. Over one third (444; 37%) had cardiac anatomical abnormalities or arrhythmia detected, often in association with extracardiac diagnoses or genetic syndromes (176; 15%). Most women referred for fetal ECHO lived outside of Saskatoon (332; 28%) or Regina (128; 11%). Cardiac abnormalities appear to be more frequently detected by fetal ECHO in Regina compared with Saskatoon, but this may reflect historical referral patterns with previously the indication for fetal ECHO more frequently due to a suspected fetal cardiac abnormality on obstetric ultrasound in Regina compared with routine screening due to maternal or fetal risk factors in Saskatoon.

CONCLUSION: The creation of a provincial database will enable a better understanding of barriers to accessibility to fetal ECHO in Saskatchewan.

**#18**

### Medicine Category

#### *Determining accessibility for the Children's Healthy-Heart and Activity Monitoring Program in Saskatchewan (CHAMPS)*

Megan Gallagher, Corey Tomczak, Marta Erlandson, Kristi Wright, Charissa Pockett, Scott Pharis, Tim Bradley.

BACKGROUND: With advances in medical and surgical therapy, long-term survival has steadily increased such that now 65% of all patients living with congenital heart disease (CHD) are adults. However, these children with CHD are growing up to be adults at-risk of early-onset acquired cardiovascular diseases, like hypertension and coronary artery disease. The Children's Healthy-Heart and Activity Monitoring Program in Saskatchewan (CHAMPS) brings together a multidisciplinary research team with specific expertise in monitoring cardiovascular health, cardiac rehabilitation and exercise physiology, and in assessing growth and body composition and psychological well-being. The purpose of the CHAMPS program is to design and implement a comprehensive long-term monitoring program of the cardiovascular, physical and psychological health needs of children growing up with CHD. The aim of the current study was to determine, for eligible children with CHD and their families, what are the current barriers and the potential incentives that might affect their willingness to participate in the CHAMPS Program. METHODS: Eligible families, defined as those with a 7-15 year old child with moderate-to-severe CHD currently living in Saskatchewan, were identified from a previous retrospective chart study. A prospective 19-question survey was then created through the SurveyMonkey platform to identify any current barriers and potential incentives to participating in the CHAMPS Program. Children and families were then invited to participate by phone and surveys were emailed for families to complete online.

RESULTS: Sixty-five eligible families were contacted, 8 declined and 57 agreed to be involved, of which 42 (65%) completed the survey. The majority (61%) of parents were unaware that children with CHD are at increased risk of early onset acquired cardiovascular problems. A slim minority (46%) thought their child exercises enough, a majority (78%) thought their child eats a healthy diet, and a slim majority (54%) thought their child receives enough psychological support. Parents identified many barriers to their child's participation in the CHAMPS Program, such as distance to travel, transportation and accommodation costs, plus other responsibilities and childcare. Potential incentives to participate included financial assistance with transport and accommodation costs, plus combining research with clinical visits. Most parents (90%) were willing to be re-contacted about their child participating in the CHAMPS Program.

CONCLUSION: Many families are willing for their child to participate in the CHAMPS Program, but identify distance to travel, financial costs, plus other responsibilities as current barriers, and financial assistance, plus combining research with clinical visits as potential incentives.

#19

## Medicine Category

### *Determining clinical phenotype of children with congenital heart disease eligible for the CHAMPS program*

**Sophie McBean, Corey Tomczak, Marta Erlandson, Kristi Wright, Charissa Pockett, Scott Pharis, Tim Bradley.**

**BACKGROUND:** Congenital Heart Disease (CHD) is one of most common birth abnormalities worldwide with an incidence approximately 1% of all live births. Advances in medical and surgical therapy have increased long-term survival for children with CHD, where 65% of all patients living with CHD are now adults. Certain CHD subtypes predispose children with CHD to obesity, early onset hypertension and coronary artery disease, so it is important that we proactively recognize and manage these comorbidities in these at-risk patients. The purpose of the CHAMPS program is to design and implement a comprehensive long-term monitoring program of the cardiovascular, physical and psychological health needs of children growing up with CHD. The aim of the current study was to identify children aged 7-15 years old child with moderate-to-severe CHD currently living in Saskatchewan who would be eligible to participate in the CHAMPS program.

**METHODS:** Eligible participants were identified from a previous retrospective chart study of all children currently followed by the Pediatric Cardiology Clinics in Saskatoon and Regina. Data was collated on: age; sex; date of last clinic; planned follow-up; place of residence, severity of CHD diagnosis and extra-cardiac diagnoses.

**RESULTS:** Of children with mild CHD, the majority have subtypes such as atrial septal defects, ventricular septal defects, patent ductus arteriosus, or isolated aortic or pulmonary stenosis. Of children with moderate to severe CHD, the majority have subtypes such as complex CHD requiring biventricular repair or single ventricular palliation, coarctation of the aorta, tetralogy of Fallot, or transposition of the great arteries. One hundred and thirteen patients were identified as eligible for the CHAMPS program with moderate to severe types of CHD. The mean age was  $11.5 \pm 2.0$  years and 68% were males. The mean distance from their place of residence to the Royal University Hospital was  $204 \pm 157$  km, so the majority live over 2 hours' drive away from the Royal University Hospital where their long-term monitoring is mostly provided.

**CONCLUSION:** Future design and implementation of the CHAMPS Program needs to cater for the large number of children with moderate to severe CHD living outside of Saskatoon. Funding will be needed to assist families with transport, accommodation and other costs as an incentive to recruitment and ongoing participation.



# Thank you

Our Presenters

Our Judges

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