

Department of Pediatrics
University of Saskatchewan
presents

Child Health Research Trainee Day

Thursday April 26th, 2018

12:00-6:30pm

Louis Loft

Book of Abstracts



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Child Health Research Trainee Day
Thursday, April 26th, 2018
12:00-6:30pm
Louis Loft

Agenda

12:00pm	LUNCH
12:25-12:30pm	WELCOME & OPENING REMARKS
12:30-12:45pm	JOSHUA HOCHMAN (Resident, Pediatrics). <i>High flow nasal cannula in pediatric ward patients with respiratory distress.</i>
12:45-1:00pm	BREANN KOZUN (Resident, Pediatrics). <i>The impact of methicillin resistant staphylococcus aureus (MRSA) on the epidemiology and outcomes of osteomyelitis in children at the Royal University Hospital, Saskatoon.</i>
1:00-1:15pm	TRACY EVERITT (PhD Student, Community Health and Epidemiology). <i>Characterizing children's lunches at school in urban and rural locations in SK.</i>
1:15-1:30pm	EMILIANA BOMFIM (PhD Student, Health Sciences). <i>Correlation between hematological parameters, cytokines, fatigue and sleep in children with cancer.</i>
1:30-1:45pm	SARAH FINCH (PhD Student, Nutrition). <i>Environmental, biochemical, and genetic factors of the vitamin D pathway are associated with disease activity in Canadian children with juvenile idiopathic arthritis.</i>
1:45-2:00pm	BREAK
2:00-2:15pm	MONA HAMADA (PhD Student, Pharmacy). <i>The integration of three analytical platforms for the targeted urine metabolomics of respiratory illnesses.</i>
2:15-2:30pm	ANTHONY KEHRIG (Masters Student, Kinesiology). <i>Daily minutes of physical exercise and impact counts are positively associated with 1-year change in trabecular and cortical bone micro-architecture at the distal radius and tibia in children.</i>
2:30-2:45pm	LARISA LOTOSKI (PhD Student, Community Health and Epidemiology). <i>Precipitation, demographics, and built environment features are associated with sedentary behavior in 9-14 year old children – the longitudinal study on seasonality and Saskatoon kids (SASK).</i>
2:45-3:00pm	BETHANY HASE (Undergraduate Student, Kinesiology). <i>Animal-assisted intervention: the impact of green exercise on the physical activity of children with autism spectrum disorder (ASD).</i>
3:00-3:15pm	NICOLE PENDLETON (Undergraduate Student, Medicine). <i>Retrospective review of the early clinical course of childhood-onset diabetes mellitus type 2 in Saskatchewan.</i>
3:15-3:30pm	BREAK
3:30-5:30pm	POSTER PRESENTATION JUDGING SESSIONS
5:30-6:30pm	PRIZES, APPETIZERS, AND MINGLING



ORAL PRESENTATIONS

12:30pm - 12:45pm

High flow nasal cannula in pediatric ward patients with respiratory distress

**JOSH HOCHMAN, GREG HANSEN, TANYA HOLT, MEGHAN GARNER,
JEFF DMYTROWICH**

Background: High flow nasal cannula (HFNC) oxygen delivery is a relatively new therapy in pediatric care. Recent evidence has shown HFNC to be effective in pediatric patients with bronchiolitis and other forms of respiratory distress. Very few published studies have assessed the implementation and effectiveness of a hospital ward HFNC protocol in pediatric patients.

Methods: We conducted a retrospective, nonrandomized single centre study of pediatric patients in the 12 months after initiation of our HFNC hospital protocol. A total of 240 patients were admitted to the pediatric ward for respiratory diagnoses, but only 18 met our study criteria. Inclusion criteria included those admitted first to our pediatric ward, either from our emergency department or peripheral centers. Exclusion criteria included those who had HFNC initiated in the periphery, or those patients discharged from the PICU to the pediatric ward. Primary outcomes of the study included length of hospital stay, requirement of PICU admission and duration of HFNC therapy. Pre-HFNC outcomes were O₂ support, blood gas metrics, respiratory distress assessment instrument (RDAI) and vital signs. Post-HFNC outcomes included HFNC flow rate, blood gas metrics, RDAI, vital signs and requirement of non-invasive ventilation escalation.

Results: Of our 18 patient cohort, 8 were successfully managed with HFNC on the pediatric ward and 10 required transfer to the PICU. Those that remained on the pediatric ward had pre-HFNC oxygen support of 0.5-10L, venous pH of 7.25-7.42, venous CO₂ of 36-66, RDAI of 6-13. Maximum HFNC flow rate was 0.9-1.5L/kg/min with FiO₂ 0.24-0.75 and RDAI of 2-9. Length of stay in hospital 3-24 days. Those that required PICU admission had pre-HFNC oxygen support of 0.2-15L, venous pH of 7.31-7.45, venous CO₂ of 30-57, RDAI of 3-10. Maximum HFNC flow rate was 0.6-1.6L/kg/min with FiO₂ 0.3-0.8 and RDAI of 3-10. Duration of HFNC was 1-16 hours. After initiation of HFNC first venous pH was 7.31-7.42 and first venous CO₂ 30-59. Ten of twelve (10/12) patients required escalation of respiratory therapy to either CPAP or BiPAP. Length of stay in PICU was 1-9 days and length of stay in hospital of 5-13 days.

Conclusions: Our study is one of the first to publish outcomes following a hospital pediatric ward initiation of a HFNC protocol for pediatric patients with respiratory distress. However given the small sample size of patients, further research will be necessary to determine optimal suitability of ward patients for HFNC.

12:45pm - 1:00pm

The impact of methicillin resistant staphylococcus aureus (MRSA) on the epidemiology and outcomes of osteomyelitis in children at the Royal University Hospital, Saskatoon

BREANN KOZUN, ATHENA MCCONNELL

Osteomyelitis is an inflammatory process that occurs in the bone as a result of a bacterial or a fungal infection. It is most commonly caused by *S. aureus*. With the known increased prevalence of Methicillin resistant *S. aureus* (MRSA), and known worse outcomes of disease process, we completed a retrospective chart review to help identify the impact of this organism in our pediatric population. Pediatric patients (less than 18 years of age) admitted to RUH between January 1996 and December 2015 were identified using the ICD-10 code for osteomyelitis (M86.9), and cross-referenced with microbiological data for confirmed *S. aureus* etiology, either by blood culture or by bone biopsy. If microbiological data was not available for cross-referencing then a manual search of the chart was performed. With the advances in Saskatchewan with EHR viewer, it made it easier to find microbiological data that would have been missing from when the study was previously completed. A standard case form was used to abstract data from the hospital chart including demographics, history of presenting illness, radiological and laboratory diagnostic data and clinical symptoms. Patients whose microbial etiology was unknown or not *S. aureus* were excluded, as were those with chronic osteomyelitis (defined as the presence of symptoms \geq 2 weeks). Due to the sample size, only a descriptive statistical analysis was performed. Data were analyzed using SPSS v18. There were 57 children identified who met our inclusion criteria. The incidence of osteomyelitis has been increasing in our population, however, the actual incidence of MRSA caused osteomyelitis has remained stable. When comparing MRSA and MSSA the significant data points between MRSA and MSSA included mean days of hospitalization, WBC and CRP means at admission and length of antibiotic treatment required. However, when we compared complication rates, it was not statistically different between the two groups. In conclusion,

the predominant infection for pediatric osteomyelitis remains MSSA and, although MRSA osteomyelitis is worse with respect to length of antibiotic treatment and hospital stay, our data did not show more complications as compared to the MSSA group.

1:00pm - 1:15pm

Characterizing children's lunches at school in urban and rural locations in SK

TRACY EVERITT, RACHEL ENGLER-STRINGER, WANDA MARTIN

Background: Recent research shows that the diet quality of Canadian children during school hours is poor. Significant international evidence describes higher nutritional quality food in school meal program lunches compared to lunches brought from home, yet very little research on school food has been conducted in Canada.

Objective: This study characterizes the school lunches and snacks of elementary school children in Saskatoon and the surrounding rural areas.

Methods: Data was collected on lunches in schools that have a meal program, those that do not have a meal program, and rural schools, using a School Food Checklist (SFC) and digital photography. In other studies, the SFC was found to be an efficient and accurate method of obtaining dietary information in schools.

Results: Preliminary results of 741 lunches in 3 school types show that meal program lunches have more whole grains compared to lunches brought from home. Those not in meal programs have significantly more calories in their lunches from unhealthy foods. Final results include a comparison of the overall nutrient density of foods in the three school types.

Conclusion: Overall food provided in meal programs appears to be more nutritious than food brought from home. Elementary school children benefit from meal programs. This is the largest known study to date of this type in Canada. Findings will be used to inform school nutrition policy and research examining the impacts of a universal school lunch program.

1:15pm-1:30pm

Correlations between haematological parameters, cytokines, fatigue, and sleep in children with cancer.

**EMILIANA BOMFIM, ANATRIELLO E, NUNES MDR, LOPES-JUNIOR LC, LIMA RAG,
NASCIMENTO LC, FLÓRIA-SANTOS M.**

Background: Many haematological parameters are associated with overproduction of cytokines. As these parameters are altered due to systemic inflammatory process in pediatric cancer, this study was intended to evaluate the relationship between haematological parameters and pro- and anti-inflammatory cytokines in children with cancer. On top of that, fatigue and sleep problems are associated with cytokine production and alteration in some haematological parameters, leading, for example, to episodes of anemia.

Objective: investigate the plasma levels of IL-8, IL-1 β , IL-6, IL-10, TNF- α , IL-12p70 and analyze its correlation with haematological parameters, fatigue and sleep.

Methods: This is a quantitative, descriptive cross-sectional study, conducted at the Pediatric Oncology Unit at the University Hospital of the Ribeirão Preto School of Medicine, São Paulo, Brazil. Fatigue was assessed using the Pediatric Quality of Life Inventory and sleep was accessed using Actigraphy, an ambulatory method that estimates sleep-wake patterns. Chart review was performed in order to collect hematological and treatment information. Blood was collected (4mL) in order to measure cytokine plasma levels. BD™ Flow Cytometry Cytokine laboratory assays were used. The following information were retrieved from the medical charts hemoglobin; hematocrit; count of white blood cells, neutrophils, lymphocytes, monocytes; age and time of treatment. The Spearman's was the nonparametric statistic test used to assess the correlations.

Results: The final sample consisted of 33 hospitalized children and adolescents aged between 8 and 18 years. Hemoglobin levels negatively correlated with sleep efficiency ($r=-0.417$, $p=0.031$). The "mental fatigue" score correlated negatively with the number of neutrophils ($r=-0.360$, $p=0.004$). Monocyte count correlated positively with the "total quality of life" score ($r=0.346$, $p=0.048$), which in turn correlated negatively with IL-1 β ($r=-0.381$, $p=0.039$). The number of lymphocytes correlated positively with sleep efficiency ($r=0.487$, $p=0.01$). Interestingly, the number of lymphocytes, on the other hand, correlated negatively with the number of awakenings after sleep onset ($r=-0.026$, $p=-0.026$).

Conclusion: The results of this research indicate a promising role for cytokines and haematological parameters in fatigue and sleep in children and adolescents with cancer.

1:30pm - 1:45pm

Environmental, biochemical and genetic factors of the vitamin D pathway are associated with disease activity in Canadian children with juvenile idiopathic arthritis

SARAH L. FINCH, ELHAM REZAEI, FARHAD MALEKI, ANTHONY KUSALIK, ALAN M. ROSENBERG, HASSAN VATANPARAST, FOR THE BBOP STUDY GROUP

Background: Juvenile Idiopathic Arthritis (JIA) is one of the most common chronic diseases in children. Both genetic and environmental factors influence JIA development. Vitamin D may suppress inflammation and immune responses in JIA.

Methods: We analysed data from the Biologically-Based Outcome Predictors (BBOP) study, a prospective multi-center study of newly diagnosed Canadian children with JIA (n=186). Blood samples were obtained at baseline and 6 months to measure 25(OH)D, CRP, ESR, and the following cytokines: Interleukin (IL)-2, IL-17, IL-4, IL-1ra, IFN γ , IL-10, IL-1 β , IL-6, IL-8, and TNF α . Saliva was collected for genomic analysis. Vitamin D related factors (milk intake, season of measurement, supplementation and steroid use) and clinical data to define remission were recorded every 6 months for 2 years. Longitudinal analysis explored whether 25(OH)D and related factors could predict disease activity in BBOP children. Genome-Wide Association Studies (GWAS) techniques were applied to identify frequent gene polymorphisms of potential relevance to the vitamin D pathway in JIA. Significant variables from linear regressions, genes identified through GWAS, vitamin D pathway genes and gene-gene interactions were selected for further analysis.

Results: CRP and ESR concentrations decreased significantly over the 2 years ($p < 0.05$). Mean 25(OH)D concentrations (84.48 ± 37.54 nmol/L) and cytokine concentrations did not change from baseline to 6 months except for a reduction in IL-1a. Increased 25(OH)D or its associated factors predicted lower ESR, CRP and cytokine levels except TNF α . Overall, 36% of children achieved remission on continuing medications; 25% had sustained remission after discontinuing medication. Higher 25(OH)D concentration predicted a reduction in IL-2 in the presence of the following identified genetic components, NOTCH4, HGVM, HLA-DQA1, LEP, IGFBP4, and GPS1. Interactions between frequent gene polymorphisms and those in the vitamin D pathway (VDR, GC, CYP24A1, and CYP11B1) significantly predicted disease activity related outcomes.

Conclusion: This is the first time gene and environment influences in relation to vitamin D were analyzed together in association with JIA disease activity. Environmental, biochemical, and genetic factors including interactions of genetic polymorphism of the vitamin D pathway predict disease activity in children with JIA.

2:00pm-2:15pm

The integration of three analytical platforms for the targeted urine metabolomics of respiratory illnesses

MONA M. KHAMIS, H. AWAD, K. ALLEN, D.J. ADAMKO, A. EL-ANEED

Asthma and COPD are chronic inflammatory conditions of the respiratory airways. Their differential diagnosis can be hampered by their overlapping clinical presentations leading to higher chances of misdiagnosis which eventually leads to increased health and economic burden worldwide. Metabolomics investigates the identification and quantification of all metabolites in a biological system and it has demonstrated promising potential in biomarker discovery. However, the lack of validated analytical methods that can provide robust data remains a major bottleneck to biomarkers validation for clinical application.

An untargeted 1H-NMR study suggested 50 urinary metabolites as candidate biomarkers for the differentiation of asthma and COPD. The metabolites were divided into 4 groups. Groups 1 and 2 contain basic and acidic metabolites. We developed two LC-MS/MS methods for their quantification using differential isotope labelling (DIL) strategies. Group 3 contains seven metabolites of diverse chemical properties, and a hydrophilic interaction liquid chromatography (HILIC)-MS/MS method was developed for their quantification. A method for group 4 is under development.

All methods were validated according to FDA and European Medicines agency (EMA) guidelines. While almost all of the validation criteria mentioned within the regulatory guidance were still applicable, in some situations, the same guidelines were insufficient to completely drive the validation process. Accordingly, in order to address the unforeseen challenges, some uncommon analytical and/or statistical approaches were adopted.

Non-blinded patients' samples with asthma and COPD were analyzed using the integrated platform and the data was processed using partial least square discriminant analysis (PLS-DA). A set of fifteen significant metabolites was found to differentiate asthma (n=10) from COPD (n=10) with high accuracy

(R² 0.935 Q² 0.864). The constructed model was then tested using a blinded subset of subjects with asthma (n=25) or COPD (n=16), where an accuracy of diagnosis of 80% (20 of 25) for asthma was achieved. However, blinded COPD samples had modest accuracy indicating a possibility of disease misdiagnosis which was later confirmed through clinical reassessment of the patients. Of the fifteen metabolites identified by the PLS-DA analysis from the mass spectrometry data, eight metabolites were common, as critical for disease diagnosis, to the previously reported 1H-NMR study. Therefore, this work also validates the diagnostic importance of these metabolites for the differentiation of asthma and COPD. Overall, while this remains a small study set, we believe that the methods are novel and offer promising results to consider for the improved diagnosis of airway diseases like asthma and COPD.

2:15pm-2:30pm

Daily minutes of physical activity and impact counts are positively associated with 1-year changes in trabecular and cortical bone micro-architecture at the distal radius and tibia in children.

ANTHONY M. KEHRIG, KELSEY BJORKMAN, AMY BUNYAMIN, CHANTAL KAWALILAK, JAMES D. JOHNSTON, SAIJA A. KONTULAINEN

Background: The Canadian 24-Hour Movement Guidelines for Children and Youth recommend at least 60 minutes for moderate-to-vigorous physical activity (MVPA) per day, and muscle and bone strengthening activities 3 times per week for musculoskeletal health. However, evidence linking objectively measured physical activity with bone growth and development is limited. Particularly the role of physical activity on bone micro-architectural development in children is poorly understood.

Objective: To test our hypothesis that daily minutes of MVPA and vigorous physical activity (VPA), and impact counts (3.9g magnitude) at baseline are associated with 1-year changes in HR-pQCT trabecular and cortical bone micro-architecture at the distal radius and tibia.

Methods: We recorded 7-day activity of 13 children (mean age 10.3, SD 1.3y) at baseline using accelerometers and measured trabecular and cortical bone microarchitecture at the distal radius (7% of ulnar length) and tibia (8% site) using high-resolution peripheral quantitative computed tomography (HR-pQCT) at baseline and 1-year follow-up (mean follow-up 1.2, SD 0.3y). We adjusted micro-architectural changes to 1-year for each participant. We tested our hypothesis using Spearman's rho coefficients ($p < 0.05$).

Results: Daily minutes of MVPA (mean 37.7, SD 24.9) were positively associated with changes in trabecular thickness (+0.56), cortical bone mineral density (+0.60), and fine cortical thickness (+0.58) at the radius. Daily minutes of VPA (mean 11.7, SD 7.7) were negatively associated with changes in cortical pore volume (-0.56) at the radius, and (-0.56) at the tibia. Daily impact counts (mean 34.8, SD 25.8) were positively associated with changes in cortical bone volume (+0.62) and density (+0.60) at the radius.

Conclusions: These findings suggest that children spending more time in MVPA, VPA, or impact activities may have greater annual increases in trabecular thickness, cortical volume, density, and thickness at the distal radius. Children engaged in greater amounts of vigorous activity may also experience larger decrease in pore volume at the distal radius and tibia. These preliminary results suggest beneficial relationships between physical activity and trabecular and cortical bone micro-architecture. These findings will guide future prospective studies and exercise interventions aiming to optimize bone micro-architectural development in children.

2:30pm-2:45pm

Precipitation, demographics and built environment features are associated with sedentary behaviour in 9-14-year-old children—the longitudinal study on Seasonality and Saskatoon Kids (SASK)

LARISA LOTOSKI, NAZEEM MUHAJARINE, DANIEL FULLER, KEVIN STANLEY, DANIEL RAINHAM

Objective: This longitudinal study seeks to establish: a) How changes in weather conditions affect total daily sedentary behaviour (SED) in children, and b) How SED effects are moderated by urban design.

Methods: Families with children aged 9-14 years were recruited from the prairie city of Saskatoon, Canada (n=816; population 260,000). Location-specific SED was objectively measured in children over three time frames (Sept-Dec 2014; Jan-April 2015; May-Sept 2015) using GPS equipped accelerometers. Neighbourhood level built environment (BE) features were assessed using multiple audit tools (Irvine Minnesota Inventory, Neighbourhood Active Living Potential, and WalkScore[®]) and neighbourhood era design. Using the random intercept model a multilevel modeling approach was taken to understand the relationship between weather conditions, demographics, BE and total daily SED of children.

Results: On average, children with valid accelerometry data accumulated 4.5 hours of sedentary time per day. In a multilevel model higher total daily precipitation was significantly associated with increased levels of SED ($p=0.0229$), but differentially moderated by BE universal accessibility ($p<0.05$). Increased levels of both light and moderate-to-vigorous physical activity (PA) were negatively associated with increased accumulation of SED ($p<0.0001$). With increased age, the level of SED increased at a greater rate in females, in comparison to males ($p=0.0068$). Pedestrian access was positively associated with reduced sedentariness in females, but increased sedentariness in males ($p=0.0157$).

Conclusions: Disruptive positive interventions to minimize SED in both boys and girls, especially as they age, may provide the greatest benefit when done so in our youngest populations. This project will shape infill and new urban development projects by providing necessary information to relevant public health policy architects. This study provides greater and more nuance detail about BE, weather and sedentariness/activity that helps urban transformations (healthy cities).

2:45pm-3:00pm

Does animal-assisted exercise session outdoors result in more minutes of physical activity than session indoors in children with autism spectrum disorder (ASD)?

BETHANY HASE, THOMPSON K, KEHRIG A, DELL C, CHALMERS D, KONTULAINEN S

Introduction: Children and youth with Autism Spectrum Disorder (ASD) have greater fracture risk which may relate to deficits in bone strength development (Neumeyer et al. J Autism Dev Disord 2015; Neumeyer et al. Bone 2017). Literature from typically developing children suggest; a) that engaging more time in moderate to vigorous physical activity (MVPA), vigorous physical activity (VPA) or impact activities will provide bone benefits and; b) activities in outdoor (greenspace) environment are associated with more intense activity (Kehrig et al. JMNI 2017; Ward et al. Health PI 2016). Our objectives were to compare minutes of MVPA and VPA and number of bone impacts between an outdoor and indoor exercise sessions in children with ASD.

Methods: We recruited 8 children with ASD (5 boys), mean age 10.4 (SD 2.9). We executed two 45-minute exercise sessions including same activities first in outdoors and a week after indoors. During each session children wore activity monitors (accelerometers). Two therapy dogs and handlers participated in both sessions to enhance children's adherence and engagement with activities. We used a cross-over design and paired t-tests to compare the minutes of MVPA, VPA and number of bone impacts between outdoor and indoor sessions ($p<0.05$).

Results: Minutes of MVPA and VPA in the indoor session (mean 10.9, SD 8.3 and mean 4.3, SD 4.0) did not differ from minutes spent in MVPA and VPA in the outdoor session (mean 11.5, SD 7.2 and mean 3.2, SD 3.4). The number of impacts was greater indoors (mean 45.0, SD 34.2) when compared to outdoors (mean 22.1, SD 24.2).

Conclusion: Findings suggest that indoor rather than outdoor physical activity interventions during the winter months may be more beneficial to increase bone impacts in children with ASD. Future interventions may benefit implementing outdoor (greenspace) physical activity interventions during the warmer months. These findings guide design of exercise interventions aiming to optimize bone development in children with ASD.

3:00pm-3:15pm

Retrospective review of the early clinical course of childhood-onset diabetes mellitus type 2 in Saskatchewan

NICOLE PENDLETON, TIM BRADLEY, PROSANTA MONDAL, ROLAND DYCK, MARK INMAN, MUNIER NOUR

Background: Childhood-onset diabetes mellitus type 2 (DM2) is rapidly increasing in prevalence worldwide, with Saskatchewan among the most affected provinces in Canada. Childhood DM2 differs from adult DM2 and childhood type 1 diabetes, with increased prevalence in ethnic and racial minorities and socially disadvantaged populations affected and earlier onset of diabetic complications. We aimed to describe our cohort of children with DM2 followed in Saskatchewan and to determine risk factors for early diabetic complications.

Methods: We performed a retrospective chart review of all children with DM2 followed in the Saskatchewan Pediatric Diabetes clinic and collated demographic and clinical data. For children with newly diagnosed DM2,

baseline HbA1C status and serial data on onset of diabetic nephropathy (albumin-to-creatinine ratio >2.0) and other diabetic complications and comorbidities were recorded. Fisher's exact test was used to assess the associations between demographic and clinical characteristics and HbA1C status at presentation ($\leq 7\%$ vs. $>7\%$). Repeated measures multivariable linear and logistic regressions were used to assess variables associated with the onset of nephropathy. Kaplan-Meier survival analysis was used to compare time to onset of nephropathy between the two HbA1C groups.

Results: Between January 1, 2014 and June 30, 2017, 67 children (60% female, mean age 12.7 \pm 2.3 years) met diagnostic criteria for DM2. Most were First Nations (84%), had a family history of DM2 (82%), were obese or overweight (92%) and had traveled to clinic from outside Saskatoon (78%), from a mean distance of 256 km (range 26 to 512 km). During the study period, 27 children (63% female, mean age 13.0 \pm 2.2 years; mean follow-up 27 \pm 9 months) were newly diagnosed with DM2 and had adequate follow-up data. In this subgroup, mean HbA1C at presentation was 8.6 \pm 2.9%, with 18 (66%) with HbA1C $>7\%$. DM2 males were more likely to have HbA1C $>7\%$ at presentation (90% vs. 50%, $P=0.08$). DM2 who were older at presentation were more likely to develop nephropathy, with every one-year increase in age, increasing the odds by 54% ($P=0.046$). DM2 with HbA1C $>7\%$ vs. $\leq 7\%$ were 89% more likely to develop nephropathy during follow-up ($P=0.055$).

Conclusions: Children with DM2 in Saskatchewan are mostly female, First Nations, obese or overweight, with a family history of DM2 and have to travel long distances to receive tertiary care. Males are more likely to have higher HbA1C at presentation. Older children with higher HbA1C at presentation are more likely to develop early diabetic nephropathy.

POSTER PRESENTATIONS

#1

RESIDENT CATEGORY

Agreement between hemoglobin values on a blood gas analysis and a complete blood count in the NICU

GEORGINA MARTIN, LANNAE STRUEBY, MARTHA LYON

Introduction: Neonates that are admitted to the NICU frequently receive red blood cell transfusions during their stay and blood tests are a major contributor to the anemia seen in this population. In addition, transfusion decisions are often based on precise transfusion thresholds. A complete blood count (CBC) is the typical test ordered when measuring a hemoglobin level and is considered the reference standard, but the blood gas analysis also reports a hemoglobin value. The accuracy of the hemoglobin value on the blood gas compared with the reference standard is currently not known; thereby, limiting the ability of a clinician to trust this value for clinical decision making. We hypothesized that the value of hemoglobin reported on a blood gas analyzer would show clinically acceptable agreement with that reported on a complete blood count. We predefined a clinically acceptable agreement as within 5g/L.

Methods: Data will be retrospectively collected from records of patients previously admitted to the NICU with at least one value for both a blood gas analysis and a complete blood count within 30 minutes of one another. The primary outcome was the agreement between the hemoglobin reported on a blood gas analysis and that on a CBC. The mean differences and the standard deviation of the differences will be obtained for each set of values and data will be analyzed using a Passing-Bablok regression and the Bland-Altman method. 95% confidence intervals will be reported for all statistical comparisons.

Discussion: If close agreement is found between the reported hemoglobin values on these two tests this could potentially eliminate unnecessary blood draws. Additionally, if we can trust the blood gas hemoglobin result it may become the preferred test as it requires less blood compared to a CBC.

#2

RESIDENT CATEGORY

Pediatric lung ultrasound for the diagnosis of pneumonia: effect on patient flow and care in the emergency department

BREANN KOZUN, PAUL OLSZYNSKI

Pneumonia is the leading cause of death in children. Diagnosis still remains a challenge, and there is a lack of universally accepted criteria for clinical and radiographical diagnosis. CT scan is considered the gold standard, however, due to ionizing radiation, diagnosis is most commonly made with chest radiograph. Data has now been published showing high sensitivity and specificity for diagnosis with the use of ultrasound. Due to its lack of ionizing radiation, portability of the machine, and ease of use, ultrasonography has become the ideal tool to be used in the pediatric population. Because there is already current data to sensitivity and specificity for diagnosis, our center set out to determine if ultrasound implementation could affect the length of stay

within our pediatric emergency department. We conducted an observational study, that included patients from birth to 17 years less a day who presented to the emergency department with a clinical suspicion of pneumonia that would be sent for chest radiograph. A population target number of 140 was determined to obtain a precision error of 0.05, however, we currently have only 26 children enrolled in the study. Early observations include a mean time to ultrasound of 74.18 minutes, and mean time to chest radiograph of 101.21 minutes. An early appreciation can be made that with high sensitivity and specificity for diagnosis, easy use and portability as well as decreased time to diagnosis, that the use of ultrasound for the diagnosis of pneumonia in the pediatric emergency department will increase efficacy and decrease length of the stay.

#3 **RESIDENT CATEGORY**

Efficacy of opioid-free anesthesia in reducing postoperative respiratory depression in children undergoing tonsillectomy: a pilot study.

JAYDEN COWAN, UROOJ SIDDIQUI, MARY FRAS, KAREN BROWN, JENNIFER O'BRIEN, JONATHAN GAMBLE

Background: Tonsillectomy is a common procedure for children that risks postoperative respiratory depression. Obstructive sleep apnea and opioids elevate this risk. Current practice involves opioid-sparing anesthesia to minimize the risk of respiratory depression. Opioid-free anesthesia is a new concept; despite encouraging results, its efficacy has not been studied in pediatrics. The benefits of opioid-free anesthesia have the potential to reduce postoperative respiratory depression in children with sleep-disordered breathing undergoing tonsillectomy.

Research Question: Can opioid-free anesthesia reduce postoperative respiratory depression in the Post-Anesthesia Care Unit (PACU) and Acute Care Pediatrics ward compared to opioid-sparing anesthesia?

Methods: This study is a randomized, open label pilot study with blinded assessment. Ethics and Health Canada approval have been obtained. We plan to recruit 50 pediatric patients with suspected sleep-disordered breathing who are scheduled for elective tonsillectomy +/- adenoidectomy; currently 10 patients have been enrolled. Participants are randomized to receive either an opioid-free anesthetic utilizing gabapentin, dexmedetomidine, ketamine, and lidocaine, or an opioid-sparing anesthetic utilizing dexmedetomidine and fentanyl. The primary outcome will be the incidence of respiratory depression during the first postoperative night, plus the incidence of associated minor and/or major airway interventions required. Secondary outcomes will include respiratory depression in the PACU, intraoperative hemodynamic and analgesic acceptability, PAED (Pediatric Anesthesia Emergence Delirium) and FLACC (Face, Legs, Activity, Cry, Consolability) evaluation, quantified opioid use, time until discharge readiness, and the incidence of adverse effects. Parametric data will be assessed for effect size through comparison of means and calculation of confidence intervals. Inferential statistics will be used to compare means between groups.

Discussion: N/A

Implications: If opioid-free anesthesia has a measurable reduction in postoperative respiratory depression, with similar PAED scores, FLACC scores, and PACU stay durations between groups, then it may represent a superior anesthetic technique for children undergoing tonsillectomy.

#4 **RESIDENT CATEGORY**

Case report: acute chest pain, ST changes, and troponin elevation in Duchenne Muscular Dystrophy

GUILLAUME LECLAIR, MATTHEW BRADSHAW, TIM BRADLEY

A 13-year-old boy with Duchenne muscular dystrophy (DMD) followed with significant skeletal striated muscle involvement, had not been documented previously to have significant cardiac muscle involvement. He was not on any cardiac medications or steroids. Three months prior a 12-lead electrocardiogram (ECG) had shown normal sinus rhythm, tall R-waves in lead V1 suggestive of right ventricular hypertrophy and a prominent Q-wave in lead aVL. An echocardiogram (Echo) had shown normal left ventricular ejection fraction (LVEF) 69% by M-Mode and 55% by biplane Simpson's method, with no segmental wall motion abnormalities seen. He presented with an acute onset of retrosternal chest pain, diffuse severe ST elevation and acute troponin elevation. Serial ECGs over the next 5 days, showed his diffuse ST elevation change to negative T waves and pathologic Q-waves in the anterolateral leads and his troponin levels normalized. Blood work did not show a significant inflammatory response and viral studies were all negative. By Echo, his LVEF was reduced to 62% by M-Mode and 43% by biplane Simpson's method, with akinesis of all apical and hypokinesis of the mid anterior and lateral wall segments. Serial Echo showed the LVEF to improve to 68% by M-Mode and

58% by biplane Simpson's method, with only mild residual hypokinesis of the affected apical and mid wall segments. At follow-up one month later, ECG still showed Q-waves in the anterolateral leads and Echo showed the LVEF was 56% by M-Mode and 58% by biplane Simpson's method, with only mild residual hypokinesis of the affected apical and mid wall segments. DMD with acute chest pain, troponin elevation, ST changes, depressed LVEF and negative viral studies, has been previously described in isolated case reports and a small case series. Cardiac magnetic resonance imaging, performed in some of these patients, showed increased late gadolinium enhancement consistent with myocardial injury and fibrosis. The authors postulate that these events may represent an important pathophysiological mechanism in cardiomyopathy progression in DMD. The serial ECGs in our patient, which will be provided, clearly show progression of myocardial ischemia to significant myocardial injury. This case illustrates an unusual presentation in DMD with rapid cardiomyopathy progression, which will be highly informative to pediatricians, and pediatric neurologists and cardiologists caring for these patients.

#5 **MASTERS CATEGORY**

Can we reliably monitor muscle strength development in children?

YUWEN ZHENG, KELSEY BJORKMAN, JOEL LANOVAZ, SAIJA KONTULAINEN

Introduction: Muscle forces provide the largest voluntary loading on bone. Reliable monitoring of muscle strength development is therefore fundamental in pediatric bone studies. We aimed to assess reliability of muscle strength measurements in children by 1) defining precision errors, and contrasting these errors to annual muscle strength development and 2) determining monitoring time intervals (MTI) for muscle strength measures in children.

Methods: To define short-term precision errors, we measured maximal push-up force, number of endurance push-ups, maximal grip force, countermovement and long jump peak forces, power and impulse, and long jump length on two different occasions (approximately 1 month apart) from 33 children (18F) with mean age of 10.5, SD 1.8yrs (precision cohort). To define annual change, we obtained the same measures approximately one year after the first visit from 33 (19F) participants (1-year follow-up cohort). We assessed precision errors by calculating root-mean-squared coefficient of variation (CV%RMS) and assessed annual changes with paired t-test ($p < 0.05$). We then contrasted %-annual changes to precision errors. We determined MTIs by dividing least significant change (calculated from CV%RMS) by median annual change.

Results: For the maximal push-up force, precision error was 9% and annual increase was 29% ($p < 0.001$). Number of endurance push-ups had the highest precision error (27%) with an annual increase of 43% ($p < 0.001$). For the maximal grip force, precision error was 14% and annual increase was 38% ($p < 0.001$). For force related measures in the countermovement jump, precision error ranged from 11% - 23% and annual increase ranged from 18% - 68% (all $p < 0.001$). For the long jump, vertical and horizontal force related measures had precision errors ranging from 6% - 25% while annual increases ranged from 16% - 92% (all $p < 0.001$). Long jump length had the lowest precision error (6%) and annual increase (8%) across all measures. Number of endurance push-ups had the longest MTI (2.7yrs), while MTIs ranged from 1 - 2yrs for all other force related upper and lower extremity measures.

Conclusion: Annual increases in the tested muscle strength measures exceeded related short-term precision errors in children. Estimated MTIs ranged from 1 - 2yrs for all upper and lower extremities force related measures. These findings indicate that annual monitoring over two years will reliably capture muscle strength development in children when recording force from the push-up, grip strength, countermovement and long jump tests.

#6 **MASTERS CATEGORY**

The influence of socioeconomic factors and location on the impact of children in Healthy Start-Départ Santé

SE'ERA ANSTRUTHER, HASSAN VATANPARAST

Introduction/Purpose: The results of the 2015 CCHS indicated that approximately 34.1% of Canadian 2-5 year old children are at risk of being overweight or obese. In response to these threatening trends, the Healthy Start-Départ Santé (HSDS) health promotion initiative was launched in Saskatchewan and New Brunswick to address and help prevent some of the primary causes of obesity in 3-5 year old children. The project encourages families and educators to incorporate healthy eating and physical activity opportunities in the daily lives of preschoolers. Pre-kindergarten and childcare centres were targeted and randomly assigned to either receive the HSDS intervention, spanning 6-8 months, or serve as a control, and data was collected before and after the intervention period.

In general, people with a low socio-economic status are at a higher risk of being overweight/obese. So, to further evaluate the Healthy Start Initiative, social determinants of health were examined alongside a modified Nutrient Rich Foods Index (NRF) as a measure of diet quality before and after the intervention in a randomized controlled design. Thus, the purpose of this study is to examine food consumption patterns of 3-5 year old children attending childcare centres across Saskatchewan and New Brunswick and how these patterns are influenced by geographic location (urban versus rural) and parental socioeconomic status.

Methods: Data was collected from childcare centres and pre-kindergarten centres across Saskatchewan and New Brunswick. To evaluate the difference in distribution of participants based on their location, income and education across NRF tertiles, we used Chi-square and ANOVA statistical tests (including post-hoc analyses) at the baseline and endpoint. The analyses on the impact of intervention on the quality of food provided in childcare centers is in progress.

Preliminary Results: At baseline, in intervention sites, rural centres had statistically significant higher quality meals ($p < 0.001$) than their urban counterparts. Similarly, in control sites, rural centres also had statistically significant higher quality meals than urban centres ($p = 0.001$). After the intervention, urban intervention centres showed a significantly higher diet quality ($p < 0.001$) than rural intervention centres. There were no statistically significant differences in distribution of children based on their parents income and education across NRF tertiles.

Conclusion: Based on our preliminary results, it appears that childcare centres in rural areas provided higher quality meals than urban centres. The role of location may play a bigger role than maternal education or parental income when it comes to dietary quality in childcare centres.

#7

MASTERS CATEGORY

Discovering the architecture of a new p63 gene network regulating tooth formation.

CASSY APPELT, AUNUM ABID, JULIA BOUGHER

Congenital facial and dental defects are among the most common birth defects in Canada. The p63 transcription factor is an evolutionarily ancient member of the p53 family of tumor suppressors. Expressed in epithelium, p63 helps mediate cross-talk with the underlying mesenchyme layer, affecting the healthy differentiation of epithelium-derived structures such as hair, skin, glands, teeth, and limbs. In humans, inherited heterozygous p63 mutations cause a range of syndromes such as: Limb mammary syndrome (LMS), Ankyloblepharon-ectodermal deficits-cleft lip/palate syndrome (AEC), Rapp-Hodgkin syndrome (RHS), Acro-dermato-unguinal-lacrimal-tooth syndrome (ADULT), and Ectrodactyly, ectodermal dysplasia, cleft lip/cleft palate syndrome (EEC). Notably, these syndromes all have orofacial clefting, ectrodactyl hand/foot malformations, and other complications arising from the failed development of ectoderm-derived structures in common. Knocking out p63 in mouse models causes similar malformations. Mouse embryos are born with underdeveloped skin; they lack hair, glands, and fully formed limbs; and they exhibit craniofacial defects such as cleft palate. Additionally, p63-null mice fail to develop teeth; these are arrested in the placode stage of early odontogenesis, meaning that the dental epithelium thickens but fails to progress further towards a tooth organ. Our lab has revealed a novel gene regulatory network (GRN) controlled by p63 that drives odontogenesis, linking for the first time several genes to both odontogenesis and p63. To investigate this GRN further, we ran immunohistochemistry assays to define the expression of 5 genes (Fermt1, Krt15, Cldn23, Cbln1, Prss8) in mouse. We also probed for these genes in tissues of garfish, an emerging model organism. Gar belong to an order of ancient bony fishes that have retained oral teeth homologous to mammalian teeth. Thus gar is an excellent model to query whether our p63 GRN is ancient and conserved. Our results show for the first time the expression of these five genes in dental epithelium of mouse (wildtype p63+/+) and gar, highlighting that this GRN is integral to the development and evolution of tooth development. Next, we are building the architecture of this GRN; notably, determining how P63 interacts with each of its 30+ downstream targets. My master's project uses Next Generation ChIP-Sequencing to identify which genes are primary binding targets of P63, and which are secondary targets transcriptionally controlled by other GRN members. Building the specifics of this p63-driven GRN will help explain how p63 mediates normal tooth epithelium development, and how p63 is involved in craniofacial development and malformation on a broader scale.

#8

MASTERS CATEGORY

Preventing childhood death post-discharge in resource-limited settings: a systematic literature review.

BROOKLYN NEMETCHEK, LACEY ENGLISH, NIRANJAN KISSOON, J MARK ANSERMINO, PETER MOSCHOVIS, SUSAN FOWLER-KERRY, ELIAS KUMBAKUMBA, MATTHEW O. WIENS

Objectives: The burden of preventable childhood death remains and is born predominantly by Sub-Saharan Africa and Southern Asia. These deaths result largely from infectious diseases, resulting in sepsis. Mortality in the months following hospital discharge for infectious diseases is often neglected, although substantial numbers die during this period. The purpose of this systematic review is to create an updated evidence base of relevant literature, bringing attention to the critical nature of pediatric post-discharge mortality (PDM) in resource-limited settings, thus propelling research and innovation towards reducing childhood mortality and achieving the third sustainable development goal (SDG).

Methods: An updated systematic search of Medline and EMBASE was conducted from October 2012 to July 2017. Studies were included if they were conducted in resource limited settings and examined pediatric PDM. 1238 articles were independently screened by two reviewers, yielding 11 eligible studies. These were added to 13 studies identified in a previous systematic review including studies prior to October 2012. In total, 24 studies were included for analysis and data extraction.

Results: Included studies were conducted mostly within African countries, and looked at all admissions/infectious admissions, or specific subsets of admissions. The primary sub-populations included malnutrition, respiratory infections, diarrhea, malaria, and anemia. The anemia and malaria sub-populations had the lowest PDM rates, while those with malnutrition and respiratory infections had the highest. Studies consistently found rates of post-discharge mortality to be comparable to, or exceed, in-hospital mortality. Furthermore, where reported, about 75% of deaths after discharge occurred at home. Risk factors often identified across all types of infectious admissions as highly significant for post-discharge mortality included HIV status, young age, pneumonia, malnutrition, anthropometric factors (including MUAC among others), hypoxia, anemia, leaving hospital against medical advice, and previous hospitalizations.

Conclusion: There is growing evidence emphasizing the largely neglected burden of post-discharge mortality. Critical is the fact that most children who die following discharge do so at home, suggesting that interventions pre-discharge to guide health seeking behaviour and access to medical care are ideally suited to addressing this gap. The development, therefore, of evidence based, risk-guided, interventions must be a focus of funders, researchers and policy makers to achieve the SDGs.

#9

MASTERS CATEGORY

Bringing back birth: the path to culturally secure birth in Saskatchewan

CARRIE PRATT, ANGELA BOWEN

"Bringing Birth Back" is a multifaceted research project that will bring back culturally secure birth for Indigenous women in Saskatchewan. An important outcome of the project is the Indigenous Birth Network (Network). The Network brings together mothers, community leaders, careproviders, and decision makers to inform a model of Indigenous maternal care and education for careproviders. Participants are invited to share their individual stories, participate in talking circles, interpret findings, and disseminate knowledge, including a photovoice learning resource and an anthology of vignettes to share the mother's stories. Such strategies of knowledge exchange reflect Indigenous research worldviews rather than traditional western methods of knowledge translation. Results will inform careproviders, policymakers, and community members alike about traditional birth practices and how to create cultural security of Indigenous families during pregnancy and birth. Research shows cultural practice serves as a protective health factor; therefore, our research hypothesis is: supporting Indigenous women to practice their culture during childbearing will promote positive outcomes for the mothers, their babies, and families. We believe that protecting cultural safety for Indigenous mothers will promote kinship between the baby and its community from the moment it enters the world. Bringing birth back in a safe and meaningful way for Indigenous mothers could have widespread effects for their infants. Ultimately, the goal is to improve the birth experiences and health outcomes of Indigenous families.

"Bringing Birth Back" uses Participatory Action Research (PAR) methodology and orients itself in the social constructivist paradigm. The project is enhanced by a resolution of the Federation of Sovereign Indigenous Nations and is a partnership between numerous community partners and organizations,

Indigenous communities, and most importantly, mothers themselves. The research will benefit communities directly and aims to make real change in the delivery of maternal care for Indigenous mothers.

Indigenous mothers who have experienced childbirth in Saskatchewan tertiary centers will be at the forefront of the research. The network participants, including the mothers will participate in data collection and analysis through talking circles and regular gatherings to ensure that the research is relevant, meaningful, and beneficial for knowledge exchange. We will develop policy briefs for presentation to Indigenous, provincial, and federal governments.

Colonization processes have created barriers for Indigenous children to achieve their best health outcomes. This project serves to re-imagine and support maternal care that serves the unique cultural needs of Indigenous mothers and their families.

#10

MASTERS CATEGORY

Development of a liquid chromatography tandem mass spectrometry method for the identification and quantification of cannabidiol and Δ^9 -tetrahydrocannabinol in pediatric patients

STEPHANIE VUONG, DEBORAH MICHELS, RICHARD HUNTSMAN, RICHARD TANG-WAI, FANG WU, ANDREW W. LYON, JANE ALCORN

Up to 30% of children with epilepsy will be refractory to conventional treatment such as anticonvulsant medications and the ketogenic diet, placing the child at risk of having poor long term cognitive, behavioral, and psychological outcomes. This is particularly true for the epileptic encephalopathies which are associated resistance to medical treatment and neurodevelopmental decline. Over the years, cannabis has been emerging as a therapeutic product for many different health conditions. With the recent interest in cannabis being used as a treatment for refractory epileptic encephalopathy, parents are desperate to obtain medical cannabis products without any knowledge of the safety and efficacy of these products. By understanding the oral pharmacokinetics of CBD and THC in children, we can begin to develop a dosing regimen for the oral administration of cannabis oil to children with refractory epileptic encephalopathy. A sensitive and efficient liquid chromatography-tandem mass spectrometry method is under development to identify and quantify cannabidiol, Δ^9 -tetrahydrocannabinol, and metabolite 11-hydroxy- Δ^9 -tetrahydrocannabinol in plasma volumes from pediatric patients undergoing cannabis oil therapy for refractory epileptic encephalopathy. Plasma sample processing involves solvent protein precipitation, evaporation of supernatant under nitrogen, and reconstitution with mobile phase. The LC-MS/MS method demonstrates acceptable sensitivity, linearity, precision, and accuracy. We currently are in process of determining recovery, carryover, and stability. This method will be applied in clinical tolerability and efficacy studies and for oral pharmacokinetic studies that will further help us determine the dosage requirements for oral administration of cannabis oil in children.

#11

MASTERS CATEGORY

The planned menus in childcare centres across the province fall short of meeting the Saskatchewan childcare nutrition guidelines

LILA ABOBAKAR, HASSAN VATANPARAST, ANNE LEIS, AMANDA FROELICH CHOW, MATHIEU BÉLANGER, RACHEL ENGLER-STRINGER, STEPHANIE WARD

Purpose: This study was conducted to assess the extent to which the planned menus in Saskatchewan's childcare centres adhere to the Saskatchewan childcare nutrition guidelines before the Healthy Start/Départ Santé (HS/DS) intervention was implemented.

Methods: Overall, 39 licensed childcare centres were selected through a cluster randomized control trial to evaluate the impact of the HS/DS intervention. The baseline food menus of these centres were analyzed and compared to the Saskatchewan Childcare Nutrition Guidelines (SCNG). Descriptive analyses were performed to determine the characteristics of the menus and the percentage of adherence to the guidelines.

Results: The results of our study indicated that only 15.3% of the centres met the lunch and snacks guidelines. Overall, 61.5% of the centres met the milk guideline and 35.9% met the processed food limitation recommendations. Furthermore, among the centres that listed breakfast meals on their menus, 69% met the breakfast guideline recommendation.

Conclusion: The analysis of the rate of adherence to each guideline showed that both the lunch and snacks guidelines are the benchmarks that centres most frequently failed to meet. Without any targeted intervention, the planned menus in childcare centres across the province fall short of meeting the SCNG.

Implications: This study provides a baseline of evidence for further monitoring of menu compliance in other provinces across Canada and revealed the needs for menu planning programmes targeting the childcare centres.

Findings from this study contribute to the overall evaluation of the nutrition practices at childcare centres and to ongoing studies aimed at improving the menu planning and the food served throughout Phase III of the HS/DS intervention.

#12

PHD/POST-DOC CATEGORY

Sleep, cognitive impairment, and dexamethasone correlations with cytokine plasma levels in children and adolescents with cancer

EMILIANA BOMFIM, ANATRIELLO E; NUNES MDR; LOPES-JUNIOR LC; LIMA RAG; NASCIMENTO LC; FLÓRIA-SANTOS M.

Introduction: Several studies have explored the hypothesis of involvement of the immune system in the sleep quality and cognitive function in adults with cancer via release of cytokines. However, even though children with cancer are at increased risk for sleep and cognitive impairment, studies with this population are scarce. Chronic inflammation and cytokines mediating inflammatory processes can influence both cognition and sleep pattern.

Objective: investigate the plasma levels of IL-8, IL-1 β , IL-6, IL-10, TNF- α , IL-12p70 and analyze its correlation with sleep patterns and cognition in a sample of children and adolescents with cancer.

Methods: This is a quantitative, descriptive cross-sectional study, conducted at the Pediatric Oncology Unit at the University Hospital of the Ribeirao Preto School of Medicine, Sao Paulo, Brazil. Cognitive impairment was assessed using the Pediatric Quality of Life Inventory and sleep was accessed using Actigraphy, an ambulatory method that estimates sleep-wake patterns. Blood was collected (4mL) in order to measure cytokine plasm levels. BD™ Flow Cytometry Cytokine assays were used.

Results: The final sample consisted of 33 hospitalized children and adolescents aged between 8 and 18 years. Sleep efficiency ($r=0.452$, $p=0.018$) and percentage of sleep ($r=0.384$, $p=0.048$) were positively correlated with IL-10 cytokine, while the duration of sleep was positively correlated with the cytokine IL-12p70 ($r=0.604$, $p=0.001$). A significant difference was found between cognitive impairment scores and dexamethasone (DEX) use. The DEX-exposed children had fewer cognitive difficulties ($p=0.046$).

Conclusion: Given the increase in survival rates of the youth diagnosed with cancer, understanding the biological mechanisms that underlie cancer-related symptom such as sleep and cognitive impairment is essential in order to continue improving quality of life. The results of this research indicate a potential role for cytokines in sleep pattern in children and adolescents with cancer. Additional retrospective studies of larger cohorts to either confirm or challenge the relationship between cognitive impairment, sleep and DEX use.

#13

PHD/POST-DOC CATEGORY

Saskatchewan parents perspective on physical literacy

NATALIE HOUSER, HUMBERT ML, SULZ LD

Physical activity participation is a critical component of healthy growth and development of children, with a wide range of physical, psychosocial, and cognitive health benefits associated. Recent evidence suggests that physical literacy influences the likelihood of physical activity participation throughout the lifecourse. Physical literacy is described as the development, motivation and confidence, knowledge and understanding, and physical competence to participate in a range of physical activities and environments, influencing the healthy development of the individual. With this, children are encouraged to experience a range of different movement opportunities in a variety of different environments (ground, ice, water, etc.). Additionally, parental involvement can play an influential role in how physically active and physically literate children are. This study explored parental involvement by looking at the perceptions of parents with respect to development of physical literacy, as well as the current knowledge on the concept of physical literacy. A total of 384 parents (65.9% female) over the age of 18 years, with a child/children between the ages of 0 and 16 years participated in the phone survey part of the study, through random digit dialing. Despite the rise in awareness of the concept of physical literacy both nationally and internationally, this study found that approximately 80% of the sample of Saskatchewan parents had not heard of the concept of physical literacy. Although there appears to be a lack of knowledge on the concept of physical literacy, when the term was defined to participants, 91.5% of parents agreed or strongly agreed that their child was physically literate. Further, 87.8% of the sample believed that they have the primary responsibility for helping children develop physical literacy, reporting developing movement skills and playing sports are the most important factors in this development. Recognizing the role that physical activity plays in a child's health, this leads us to ask how physical literacy should be approached in non-research settings, in order to see the best outcomes in understanding and practice of the concept, with the ultimate goal of improving the health of children.

Does animal-assisted intervention increase physical activity in children with autism spectrum disorder?

MAHDI ROSTAMI, BETHANY HASE, ANTHONY KEHRIG, COLLEEN DELL, DARLENE CHALMERS, LYNN WEBBER, HASSANALI VATANPARAST, JD JOHNSTON, SAIIJA KONTULAINEN

Introduction: Children with ASD have an increased risk of fracture compared to their healthy peers (Neumeyer et al. 2015). Fractures in children can be considered as an advance bone fragility marker, and children with ASD have poorer bone properties than their typically developing peers (Martins et al. 2017; Neumeyer et al. 2017). One proposed reason for the bone deficit and related fracture risk is the low physical activity reported in children with ASD (Neumeyer et al. 2017). Limited vigorous and impact-type activities may prevent children with ASD from gaining loading-stimulus required for optimal skeletal development (Kontulainen et al. 2013; Pan 2008). It has been shown that the presence of a therapy dog increased physical activity in obese children (Wohlfarth et al. 2013); hence, child interaction with a therapy dog may optimize physical activity levels in children with ASD that exhibit social, communicative and behavioral challenges.

Objective: The objective of this study was to investigate the effect of a therapy dog on physical activity in children with ASD.

Method: Children with ASD (n=18, mean age 10.3 ± SD 2.6 yrs) were randomly selected in two groups. Both groups participated in one weekly physical activity session for seven weeks. After the first introductory session, groups were randomized for following 6 sessions with or without 1-2 therapy dogs (and handlers). We recorded physical activity in each session using activity monitors (ActiGraph accelerometers). We used cross-over design and paired t-tests to compare average minutes of sedentary time, moderate to vigorous physical activity (MVPA) and vigorous physical activity (VPA) between sessions with or without the therapy dog(s). We set significance to p<0.01 to control for multiple comparisons. We assessed intervention adherence and collected feedback from participants and their parents/guardians.

Result: Minutes of sedentary time (8.8±3.5 vs 11.0±4.8), MVPA (20.8±9.1 vs 21.5±9.1) and VPA (8.8±5.4 vs 9.8±6.2), did not differ between sessions with or without therapy dog (p>0.01). However, based on the excellent adherence (91%) and participant feedback, therapy dog served as an important motivator for children with ASD to participate in physical activity intervention.

Conclusion: Therapy dog presence did not increase physical activity in children with ASD. However, adherence to intervention and participants' feedback suggested that the therapy dog presence may contribute as an environmental and social catalyst to enhance motivation for physical activity. Therapy dog presence may benefit adherence to future exercise interventions aiming to optimize bone development in children with ASD, with the ultimate goal of improving the health of children.

Exploring family life when a child has cancer: an unobtrusive qualitative study of parents' online narratives

MERIDITH BURLES, JILL BALLY

Families of children with cancer are often thrust into unfamiliar territory as a result of diagnosis and treatment. Specifically, parents face complex emotions and numerous challenges related to the care of their child. Due to these complexities, it can be difficult to conduct research with family caregivers. Nonetheless, evidence-based health and supportive care is reliant on comprehensive understanding of families' experiences and support needs. As such, innovative approaches are needed to ensure that diverse perspectives of families of children affected by cancer are captured in research. One such approach that can address barriers related to research recruitment and retention of family caregivers of children with cancer is to examine pre-existing narratives about family life that have been shared on the Internet. For instance, families frequently share their experiences through blogs, social media platforms, and personal stories on organizational websites. This presentation will describe an unobtrusive qualitative study that is in progress about online narratives shared by Canadian parents about their family experiences of navigating life with pediatric cancer. A narrative approach is being employed to analyze publicly available online narratives for what they reveal about family life, psychosocial support needs, and online interactions. Attention is also being paid to the way in which parents tell their family stories and make sense of their experiences. Progress to date and emerging themes will be outlined, along with implications for family-centred health and supportive care.

Asthma diagnosis among children along an urban-rural gradient in Saskatchewan

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Rationale: Most studies investigating childhood asthma have reported a lower prevalence in rural compared to urban areas. Environmental factors have mostly been implicated for these differences. However, the association could also be linked to possible under-diagnosis of asthma in rural children. The aim of this study was to investigate if rural children experience more asthma under-diagnosis compared to urban children.

Methods: In 2013, we conducted a cross-sectional survey of 5–14 year old schoolchildren living in rural, small urban (~35,000), and large urban (~200,000) areas of Saskatchewan, Canada. In 2015, we approached those who gave the consent for further testing and repeated the survey and included a clinical testing component. Children were classified into one of three categories based on their responses to the survey: No asthma, at-risk-for-asthma (report of wheeze with no asthma diagnosis), and diagnosed asthma (report of physician diagnosis of asthma). Children also performed spirometry and exercise challenge testing (ECT). Following assessment, we then classified asthma status as either no asthma or probable asthma based on a validated asthma algorithm.

Results: The study population was comprised of 335 schoolchildren (diagnosed asthma = 28.4%; at-risk-for-asthma = 36.1%; no asthma = 35.5%). Location of dwelling was 73.4% large urban, 13.7% small urban, and 12.8% rural. Overall, percent predicted FEV1 was lower in rural children compared to small urban and large urban children [Mean (SD) = 89.3% (12.9), 98.2% (10.0), and 96.0% (13.3), p<0.05, respectively] as was FEF25-75 [Mean (SD) = 78.8% (20.4), 91.6% (20.2), and 88.6% (23.1), p<0.05, respectively]. Lower mean values for FEV1 and FEF25-75 observed in the rural group were only found in the at-risk-for-asthma children and not in the diagnosed asthma or no asthma groups. Among those not classified as diagnosed asthma by survey, the validated algorithm further identified the presence of asthma in 5.5% of large urban, 8.1% of small urban, and 18.8% of rural children (p = 0.026).

Conclusion: The study revealed evidence of asthma under-diagnosis in rural areas and further supports the use of objective measures in addition to symptoms history when investigating asthma burden across an urban-rural gradient. This may have direct implications for better childhood asthma management, especially in rural populations.

Bone health in adolescent anorexic females

CHANTELLE BARIL, MARTA ERLANDSON

Introduction: During adolescence, there is a time in which peak bone mass is attained and any interruption of bone accrual during this time contributes to a higher chance of developing osteoporosis. Anorexia nervosa (AN) is an eating disorder characterized by a severe low body weight prevalent among adolescents. AN can cause a disturbance or cease in menstruation and, along with the drastic change in diet, can result in a less than optimal amount of bone building. The purpose of this study was to examine the effect anorexia nervosa has on bone in adolescent females.

Methods: The participants of this study included 17 females with an average age of 15.65 (range: 13-19 years) and average height of 165cm. From this population, lumbar spine and total body dual x-ray absorptiometry (DXA) scans were collected. Five of the 17 participants had their hips scanned and they were analyzed using hip scan analysis (HSA). 17 controls were selected from the pediatric bone mineral accrual study (PBMAS) matching for age, height and then body weight closest resembling the anorexic individual.

Results: The anorexic group had a significant less percentage of body fat (23 vs. 35%) and weight (52 vs. 68 kg) (<0.05 p). Unadjusted data, not controlled for age or height, demonstrated that the participants with anorexia exhibit lower bone in total body area (2022 vs. 2002cm²) and lumbar spine area (59 vs. 50 cm²) (<0.05 p).

Conclusion: These results suggest that anorexia influences total body and lumbar spine bone area in adolescent females. This is a negative influence as lower bone area is associated with osteoporotic diagnosis. Therefore, it is most likely that those inflicted with anorexia have a higher chance of being diagnosed with osteoporosis later in life.

Examination of talin expression in the human placenta

MARLIZE FOURIE, DANIEL J. MACPHEE

Placental invasion into the uterine wall is crucial for a successful pregnancy, since this process allows for the anchoring of the placenta as well as the establishment of maternal blood flow to the fetus. This process is dependent, in part, on proteins that facilitate cell-substrate adhesion and cell invasion. The adapter protein Talin works closely with heterodimeric cell membrane receptors named integrins. Integrins consist of α and β subunits. They bind molecules in the extracellular environment to mediate cell adhesion and invasion. Talin acts as an adaptor protein that binds cytoplasmic β -integrin tails and activates the integrin receptor so it can bind to extracellular molecules like collagen or fibronectin. Despite the importance of Talin in cellular behaviours such as invasion, the expression and role of Talin in the placenta has not been studied. We determined the expression profile of Talin in sections of human placenta collected from the 1st and 2nd trimester as well as from term pregnancy. We also assessed co-expression of Talin with markers of trophoblast lineages. Results demonstrated that Talin is highly localized to the basolateral membranes of cytotrophoblast and membranes of invasive extravillous cytotrophoblast cells in chorionic villi. Additionally, Talin was expressed in basement membrane regions of endothelial cells within placental blood vessels. The results support the ongoing hypothesis that Talin could play a crucial role in regulating placental trophoblast invasion. Further study of this protein could lead to important discoveries about the mechanism(s) underlying development of preeclampsia that is marked by superficial trophoblast invasion.

The influence of pro-inflammatory conditions on heat shock protein expression in human myometrial cells

LOGAN HAHN, DANIEL J. MACPHEE

The uterine myometrium undergoes a remarkable program of phenotypic differentiation to produce a powerful, contractile organ capable of expelling a fetus. The initiation and progression of labour within the myometrium also appears to require an inflammatory process as it is infiltrated by immune cells and it produces proinflammatory mediators. The small heat shock protein B (HSPB) family have recently garnered interest in the study of myometrial differentiation because they can act as chaperones to regulate protein folding, regulate apoptosis, and can be involved in inflammatory processes. Previous research has shown that both HSPB1 and HSPB5 expression significantly increased during late pregnancy and labour; however, the exact mechanism(s) inducing their expression remained a mystery. Using an immortalized human myometrial cell line (hTERT HM), we examined the protein expression of HSPB1, HSPB5 and various inflammatory signaling mediators following exposure of the cell cultures to the pro-inflammatory stimulator lipopolysaccharide (LPS). Immunoblot analysis of cell lysates collected after LPS treatment (100 ng/mL) revealed induced myometrial cell expression of HSPB1, HSPB5 and the pro-inflammatory modulator NF- κ B after 0.5 and 1 h of LPS exposure. Furthermore, the expression of the pro-inflammatory response protein cyclooxygenase-2 was induced upon 3 and 6 h of LPS treatment. Using immunofluorescence microscopy, an increased cytoplasmic expression of phosphoserine-59-HSPB5 as well as NF- κ B translocation to myometrial cell nuclei were observed following LPS induction. The results indicate the possible establishment of an HSPB5-NF- κ B-COX-2 signaling pathway in myometrial cells during late pregnancy and labour to facilitate myometrial inflammation.

Assessing the dietary intake of children with congenital heart defects in Saskatchewan

ASTRID LANG, MARTA ERLANDSON, COREY TOMCZAK, KRISTI WRIGHT, ASHOK KAKADEKAR, SCOTT PHARIS, CHARISSA POCKETT, TIM BRADLEY

Background: 25% of children with congenital heart disease (CHD) are obese. Obesity may be the only modifiable risk factor for heart health in this population. To our knowledge, dietary assessment has not been completed on children with CHD. Our primary aim was to determine the daily caloric intake of children with CHD in Saskatchewan, compared with normative control data.

Methods: This was a prospective cohort study involving 19 children aged 8-18, recruited from the CHAMPS (Children's Healthy Heart Monitoring Program) Summer Camp 2017. 24 hour dietary recalls were collected using the ASA24-Canada2016. Anthropometric data was measured. Normative control data was taken from the Canadian Community Health Survey, Cycle 2.2 (2004) and 2015. Preliminary statistical analysis using deltas has been completed.

Results: Diet assessment was completed for at least 1 day in 15 children.

Mean intakes of macronutrients and selected micronutrients were lower in the CHAMPS group. One major exception is percent calories from fat. CHAMPS participants ate 10% more fat than controls. The rate of overweight and obesity in the cohort was 31.5%, similar to provincial data.

Conclusions: Ongoing collection of data on children with congenital heart disease is feasible and will provide useful data to inform diet education and interventions.

A retrospective review of fetal vs. postnatal echocardiographic diagnosis of congenital heart disease in Saskatchewan

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Background: Congenital heart disease (CHD) occurs with an incidence of ~1% of live births and is the leading cause of death due to congenital birth defects. Fetal echocardiography (ECHO) provides early access to prenatal counseling and allows determination of optimal location and preparation for delivery. It also has been shown to decrease short- and long-term morbidity and mortality rates for certain lesions, but not overall mortality rate for all CHD. We aim to describe our cohort of children with CHD born in Saskatchewan over the last 10 years and to determine the survival rates of those diagnosed by prenatal fetal vs. postnatal ECHO.

Methods: We are performing a retrospective chart review of all children with CHD aged 0-10 years (born January 1, 2007 and December 31, 2016) followed in Pediatric Cardiology Clinics in Saskatoon and Regina. Demographic and clinical data are being collated from the medical electronic records and fetal ECHO database including: age; sex; place of residence; fetal vs. postnatal ECHO diagnosis; CHD diagnosis type; surgical and interventional history; extra-cardiac diagnoses; medications; types of CHD; duration of follow-up; and age at death.

Results: Between January 1, 2007 and March 30, 2011, 1135 children aged 0-10 years were seen in Pediatric Cardiology Clinics in Saskatoon and Regina. Of these, 745 (66%) were seen for other cardiac indications (e.g. arrhythmia, syncope, innocent murmurs, familial screening), 22 (2%) had acquired heart disease (e.g. cardiomyopathy, viral myocarditis, Kawasaki disease), and 368 (32%) had structural CHD. Of structural CHD, 281 (76%) had simple CHD (e.g. ASD, VSD, AVSD, PDA, isolated aortic or pulmonary stenosis or coarctation of aorta, bicuspid aortic valve, vascular rings or dysplastic tricuspid or mitral valves), 51 (14%) had complex CHD (e.g. tetralogy of Fallot, transposition of great arteries, single ventricles or other complex lesions), and 36 (10%) had miscellaneous other lesions.

Conclusions: This study cohort is currently being expanded to cover all children aged 0-10 years, for the second half of the study period. The children with structural CHD will then be matched to our fetal ECHO database to determine those diagnosed by prenatal fetal ECHO and Kaplan-Meier analysis will be used to compare survival with the postnatal ECHO diagnosis group. Identifying this cohort is essential to our further research which aims to determine the current rate of successful prenatal diagnosis of CHD in Saskatchewan and whether more resources are needed to improve access prenatal fetal ECHO across the province.

From pediatric to adult care: healthcare transition needs of adolescents with IBD

DANIELLE MITCHELL, JUAN MARTINEZ, TRACIE RISLING, NOELLE ROHATINSKY

Background: As more children and families navigate early diagnoses of diseases such as diabetes, cystic fibrosis, inflammatory bowel disease (IBD), and others, issues related to healthcare transition (HCT) have become a focus of global interest. Adolescents living with IBD are often two to three times more likely to develop anxiety or depression in comparison to those without the condition. The current study aimed at exploring the HCT needs of adolescents living with inflammatory bowel disease (IBD) to support the patient-oriented development of a HCT mobile web-based intervention.

Methods: A mixed-methods explanatory sequential approach was used, consisting of two phases. In phase one, an online survey was conducted to explore these HCT needs. The sample size consisted of $n = 16$ females and $n = 33$ males. The age ranges of all participants and children with IBD of the caregiver ranges from 14 to 49. The survey was programmed on the Fluid Surveys online survey platform and data was then analyzed in SPSS version 24. In phase 2, $n = 13$ participants were interviewed for the qualitative phase of the study. The interviews were then coded and divided into themes using Braun and Clarke's thematic analysis.

Results: In phase one, the results showed that the participants considered

most of the HCT needs to be either 'very important' or 'essential'. The top three were: 1) "Being able to take medications on my own"; 2) "Being able to talk to my doctor easily"; And 3) "Talking to people when I feel frustrated or angry with my IBD." In phase two, two themes emerged "managing complex care," and "creating connections," along with three sub-categories were identified.

Conclusions: Patients and caregivers of those living with IBD are important catalysts in the development of a patient-oriented web-based application that can positively impact the outcome of HCT from pediatric to adult care. From phase 1 of the research, the results point to adolescents wanting more independence in managing their IBD and better support and mental health resources.

#23 **UNDERGRADUATE CATEGORY**

Determining eligibility for the children's healthy-heart and activity monitoring program in Saskatchewan (CHAMPS)

PRESTON NJAA, COREY TOMCZAK, MARTA ERLANDSON, KRISTI WRIGHT, ASHOK KAKADEKAR, SCOTT PHARIS, CHARISSA POCKETT, TIM BRADLEY

Background: With improved longer-term survival after surgery for congenital heart disease (CHD), there are now more adults than children living with CHD. Adults with CHD are at risk of early onset acquired cardiovascular disease. The Children's Healthy-Heart and Activity Monitoring Program in Saskatchewan (CHAMPS) brings together a multidisciplinary research team to study the cardiovascular health, growth and body composition and psychological well-being of children with CHD. We aimed to describe the types of CHD and disease severity of all children with CHD aged 7-17 years currently living in Saskatchewan to determine if they would be eligible for the CHAMPS program.

Methods: We performed a retrospective chart review of all children with CHD aged 7-17 years (born January 1, 2000 – December 31, 2009) seen in the Pediatric Cardiology Clinics in Saskatoon and Regina between January 1, 2007 and December 31, 2016. Demographic and clinical data were collated including: age; sex; place of residence; CHD diagnosis type; surgical and interventional history; extra-cardiac diagnoses; medications; and duration of follow-up.

Results: Of the 445 children aged 7-17 years, currently followed by Pediatric Cardiology in Saskatchewan, 101 (22%) would be graded as mild complexity of structural CHD (e.g. isolated lesions), 84 (18%) graded as moderate (e.g. complex CHD with biventricular repairs), and 162 (36%) graded as severe (e.g. complex CHD with single ventricle palliation). The other 108 (24%) are followed for other cardiac indications (e.g. arrhythmia, cardiomyopathy, pulmonary hypertension). Place of residence was within Saskatoon in only 123 (27%) and elsewhere in Saskatchewan in 332 (63%).

Conclusions: There are a large number of children aged 7-17 years, followed by our Pediatric Cardiology service in Saskatchewan with moderate and severe grade complexity of structural CHD, who would be eligible for the CHAMPS program. The majority of these children live outside of Saskatoon, which produces additional challenges for establishing a monitoring program.

#24 **UNDERGRADUATE CATEGORY**

Male with mosaicism for maternally inherited supernumerary ring X chromosome: new clinical case and literature review

SPENCER S. ZWARYCH, CARLA M. HOLINATY, REENA RAY-SISK, KELLIE A DAVIS

Supernumerary ring X chromosomes are commonly reported in Turner syndrome females but are rarely seen in males. The ring is often found as a mosaic cell line, which results in variable phenotype between male patients, making it difficult to counsel both patients and their families on possible clinical outcomes and recurrence risk. The literature is extremely limited with fewer than ten reports published to date. Common features reported include facial dysmorphism, developmental delay, urogenital anomalies, and limb anomalies. This report describes an additional patient who is a male, born to term to a non-consanguineous Punjabi couple. Prenatally, there were no concerns. Postnatally, the infant presented with hypotonia, hypospadias, a congenital midline cervical cleft, and a midline capillary hemangioma on the forehead. Array CGH showed an ~27.4Mb duplication for the region spanning Xp21.1 to Xq11.2. Chromosome analysis showed a mosaic karyotype with a normal male cell line and a second cell line having the ring X chromosome. FISH using a probe for XIST mapping to Xq13.2 showed the normal pattern of hybridization on the X chromosome but absent on the ring X chromosome. Maternal cytogenetics testing demonstrated low levels of the ring X chromosome in the peripheral blood with paternal testing showing a normal male karyotype. The goal of this study is to contribute to the literature for this disorder through description of the phenotypic spectrum of disease and providing insight into its prognosis.

#25

NON-JUDGED POSTERS

Canadian surveillance study of complex regional pain syndrome in children and youth

KRISTA BAERG, S TUPPER, A FINLEY

Background: Complex Regional Pain Syndrome (CRPS), previously regional sympathetic dystrophy, is a chronic severe pain condition characterized by continuing pain seemingly disproportionate in time or degree to the usual course of known trauma or lesion. Pain is regional and has a distal predominance of abnormal sensory, motor, sudomotor, vasomotor, and/or trophic findings. CRPS involves peripheral, central and autonomic nervous system and immune system mechanisms. Incidence and disease trajectory are unknown in children and adolescents. In adults, incidence is 5.5 – 26.2 new cases per 100,000 annually. Approximately 11-18% of adults will develop CRPS following a fracture or knee arthroplasty. CRPS has not been studied in detail in paediatrics. CRPS results in greater functional impairment and symptoms than other chronic pain conditions. The study aims to determine the minimum incidence and geographic distribution of CRPS in Canadian children and youth, highlight current resource needs, and promote early recognition and treatment.

Method: Launched September 2017 through the methodology of the Canadian Paediatric Surveillance Program (CPSP). Approximately 2,700 pediatricians and pediatric subspecialists are surveyed monthly for 2 years to determine the incidence of CRPS. CPSP enables detection of CRPS cases that present in pediatric primary care, sub-specialty care, and in-patient care. For the study period pediatric pain clinics are included. Participating physicians will complete a detailed questionnaire regarding each case.

Case definition: Any patient aged 2 to 18 years with a new diagnosis of CRPS, meeting the following International Association for the Study of Pain clinical diagnostic criteria:

1. Continuing pain, which is disproportionate to any inciting event
2. Reports at least one symptom in at least three of the following four categories: sensory, vasomotor, sudomotor/edema, motor/trophic.
3. Displays at least one sign at time of evaluation in at least two of the following four categories: sensory, vasomotor, sudomotor/edema, motor/trophic.

Results: AS of February 2018, 21 potential cases have been signaled to the CPSP and less than 5 detailed case questionnaires have been received.

Discussion: Surveillance will determine the minimum incidence of CRPS and highlight current resource needs in Canada. The estimated number of cases annually is 390 based on incidence estimate of 5 per 100,000 annually and population 7,848,844 aged 0-19 year's inclusive (Statistics Canada, 2015). Furthermore, exploration is needed to determine whether risk factors and disease trajectory differ between pediatric and adult populations.

#26

NON-JUDGED POSTERS

Neocate®-induced hypophosphatemic rickets: nutritional deficiency despite adequate dietary intake

KAYLA FLOOD, INMAN M, OLVER C, NOUR MA

Introduction: Rickets results from inadequate mineralization of bone secondary to deficiencies in calcium, phosphate, or vitamin D. Although nutritional rickets due to vitamin D deficiency is the most common etiology, we present a case of a 3-year-old girl with hypophosphatemic rickets due to exclusive consumption of the elemental formula, Neocate Junior®.

Case Description: A 3 year-old girl was referred for evaluation following her second low-impact fracture. She had a preceding history of bone pain with refusal to weight bear. Past medical history was significant for extreme prematurity, grade 3 vesicoureteral reflux, failure to thrive, and nephrocalcinosis. She had oral aversion and was fed exclusively Neocate Junior® via gastrostomy tube for the preceding two years.

Her weight was 10kg and height was 82cm (both <3rd percentile, WHO growth chart). She had normal sclera and dentition as well as normal cardiac, respiratory, and abdominal examinations. No gross bony deformity was noted.

Radiography demonstrated generalized hypomineralization with metaphyseal flaring and cupping in keeping with rickets (Figure 1). Biochemistry demonstrated normal serum 25-hydroxy-vitamin D, calcium, and parathyroid hormone. Review of past labs revealed persistent hypophosphatemia with an elevated alkaline phosphatase (ALP) (Table 1). Renal phosphate reabsorption was maximal, excluding renal loss of phosphate as a cause of her rickets. Neocate® induced hypophosphatemic rickets was suspected and she transitioned to Compleat® Pediatric formula with subsequent normalization of biochemistry and radiographs.

Discussion: Patients with hypophosphatemic rickets most commonly

have a disorder of renal phosphate loss. However, our patient demonstrated appropriate renal reabsorption of phosphate, thus suggesting a nutritional etiology. A recent case-series implicated exclusive Neocate® consumption as the cause of hypophosphatemia, despite adequate phosphate content of Neocate®. A clear mechanism for hypophosphatemia related to Neocate® consumption has not been described; however, we postulate this is due to the complexed cation specific to Neocate® powder, namely calcium phosphate dibasic which is not present in other formulas, nor present in liquid Neocate® products (Table 2). In all cases, as seen in our patient, correction of hypophosphatemic rickets was observed when transitioned to another formula.

Conclusions: Hypophosphatemic rickets can result from renal phosphate wasting or, less commonly, nutritional deficiency. Pediatricians should be aware that patients exclusively fed powdered Neocate® may be at higher risk of hypophosphatemic rickets and should be screened with serum phosphate and ALP concentrations. Children who develop Neocate®-induced rickets can be transitioned to another formula, while close attention must then be paid to prevent subsequent hypocalcemia.

#27

NON-JUDGED POSTERS

Renal agenesis, Müllerian agenesis, and hypomagnesemia: a case report of a unique HNF1B deletion

KAYLA FLOOD, ANKE BANKS, MARK INMAN, MUNIER NOUR

We present a 16-year-old female with primary amenorrhea, hypomagnesemia, and a solitary kidney. In addition, we review the literature on phenotypes associated with 17q12 deletion syndrome, as it applies to the investigation of patients presenting with renal and endocrine disease.

Our patient presented at one month of age with a urinary tract infection leading to an incidental finding of a solitary kidney. At 15 years of age, she was referred to nephrology whose assessment revealed elevated serum creatinine, persistent proteinuria, and a non-hypertrophied left solitary kidney on renal ultrasound. Further laboratory investigations demonstrated hypomagnesemia and renal magnesium wasting. She was noted to have primary amenorrhea, despite normal pubertal development, including thelarche and adrenarche. A pelvic ultrasound revealed normal adnexal structures but an absent uterus. A pelvic MRI confirmed the absence of a uterus and the upper one third of the vagina consistent with Mayer-Rokitansky-Küster-Hauser (MRKH) syndrome.

Detailed endocrine evaluation revealed 46, XX karyotype with appropriate gonadotropin, estradiol, and testosterone concentrations. She had normal blood glucose regulation. Molecular genetic sequencing studies failed to identify the expected sequence variant in the Hepatocyte Nuclear Factor 1β (HNF1B) gene. However, array comparative genomic hybridization (CGH) analysis demonstrated a heterozygous 1.4Mb deletion in chromosome 17q12 region corresponding to the loss of the HNF1B, LHX1 and PIGW genes.

Although HNF1B mutations are most commonly thought of as a candidate gene for monogenic diabetes and associated with renal cysts, our patient demonstrates a broader phenotypic presentation stemming from the complete loss of HNF1B. The findings of 17q12 deletion explain the constellation of clinical findings seen in our patient with MRKH syndrome, renal agenesis, and hypomagnesemia. Therefore, in the presence of clinical suspicion, analysis of the HNF1B gene by both molecular gene sequencing and array CGH may be required to confirm the diagnosis.

#28

NON-JUDGED POSTERS

Implementation and evaluation of a DKA order set in a pediatric tertiary care hospital: A quality improvement initiative

KAYLA FLOOD, NOUR M A, HOLT T, CATTELL V, KROCHAK C, ROZDILSKY J, SEIFERT B, INMAN M

Background: Diabetic ketoacidosis (DKA) is a common clinical presentation in new and previously diagnosed pediatric patients with type 1 diabetes. In contrast to other Canadian tertiary pediatric hospitals, our center lacked a physician-endorsed evidence-informed care pathway for management of DKA. In the absence of a standardized approach to DKA, variability in patient management and outcomes were observed. This project was a quality improvement initiative that sought to develop and pilot a pediatric DKA order set.

Objectives: Our primary aim was to attain broad clinical uptake of the order set at our tertiary care center over a 12-month period. Secondary aims included improved standard-of-care DKA management: appropriate fluid bolus volume and maintenance rates; initial potassium management; and timely dextrose supplementation.

Methods: A pediatric multidisciplinary collaborative was created to examine evidence for the development and implementation of a DKA order

set. Implementation of the order set involved department wide education, targeted end-user education, and quarterly end-user review. A modified plan-do-study-act (PDSA) cycle guided by end-user feedback and early clinical outcomes allowed progressive order set modifications.

Results: A retrospective chart review of fifty pediatric patients presenting to our center between April 2014 and September 2016 (pre-implementation) was compared to thirty pediatric patients presenting in DKA during the post-implementation phase (September 2016 – September 2017). There were no statistically significant differences in demographic and clinical characteristics between the groups. We achieved 83% uptake of the order set for patients presenting to our tertiary center and 67% uptake for patients transferred from peripheral centers. Improvements in DKA management included: appropriate intravenous (IV) maintenance fluid rates (20% vs. 48.3%, p=0.008), earlier administration of potassium to IV fluids (66% vs. 93.1%, p=0.006); appropriate potassium chloride dosing (40 mmol/L to IV fluid (40% vs. 79.3%, p=0.0007) and earlier addition of IV dextrose (67.4% vs. 93.1%, p=0.009). No differences in moderate to severe hypokalemia (< 3.0 mmol/L), hypoglycemia (<4.0 mmol/L) or clinically suspected cerebral edema occurred.

Conclusions: Implementation of a DKA order set in a tertiary hospital required identification of key stakeholders, formation of a multidisciplinary team, and the development of an evaluation process. There was an observed increase in physician order set uptake and DKA management practice improvements. Future goals involve expanding the implementation and evaluation process to regional and remote centers and analyzing the impact on resource utilization.

#29

NON-JUDGED POSTERS

Impact of waiting time on the assessment of first seizure onset in pediatrics

ASMA KHAN, JUNE LIM, BONNIE JANZEN, SALAH ALMUBARAK

Background: Childhood epilepsy has increased in global incidence. Children with epilepsy require immediate healthcare evaluation and monitoring. Waiting times between first seizure onset and pediatric neurology assessment may impact seizure outcome at follow-up. Quality of medical care for children with first seizure onset will be assessed and the impact of pediatric neurology clinic waiting times on seizure outcomes will be determined.

Methods: This retrospective study, based on chart review, includes patients with first seizure evaluation at the Royal University Hospital in Saskatoon between January 2012 and December 2015. The interim period before first assessment and other factors were studied in relation to seizure outcome on follow-up.

Results: 1158 patients were assessed. 378 (32.6%) patients had first seizure clinic assessment. 197 (52%) had epileptic events. 181 (48%) had non-epileptic events. The mean age of patients was 8.8 years. The mean waiting time for assessment by a pediatric neurologist was 4.33 months. The mean duration of follow-up was 20.9 months. At the last seizure assessment, 132 patients were seizure-free and 65 patients had seizures recurrence.

Conclusion: First seizure assessment is crucial for management of children with epilepsy. Waiting time and other factors may influence seizure outcome, representing opportunities to improve standard medical care.

#30

NON-JUDGED POSTERS

A retrospective review of the disposition of adolescents followed in pediatric cardiology outpatients in Saskatchewan

ERIK YIP-LIANG, MICHELLE KEIR, ERIK PAUSJENSSEN, ASHOK KAKADEKAR, TIM BRADLEY

Background: With more effective surgical and medical treatments, childhood mortality rates have decreased for congenital heart defects (CHD). There are now an estimated 250,000 Canadians with CHD, with two-thirds being adults. Adults with CHD are at increase of cardiovascular disease and require long-term follow-up and often further interventions. However, adolescents with CHD are often lost to follow-up during transition from pediatric to adult cardiology care. We aimed to describe our cohort of adolescents with CHD or other cardiac indications requiring follow-up, who were eligible for transition over the past 10 years and to determine what patient characteristics determine successful transition from pediatric to adult cardiology care. We hypothesize that patients living in Saskatoon and Regina were less likely to be lost in follow-up care compared to the rest of the province, due to greater availability of cardiology resources in these urban areas. Our secondary hypothesis is that adolescents of certain demographics and clinical characteristics were less likely to be lost to follow-up e.g. females, more severe CHD diagnosis, shorter time interval from most recent surgery, closer distance to larger urban areas.

Methods: We are performing a retrospective chart review of all adolescents who became adults (>18 years) and were followed in Pediatric Cardiology

Clinics in Saskatoon and Regina between 2007-2016. Demographic and clinical data are being collated including: age; sex; place of residence, CHD diagnosis type; surgical and interventional history; extra-cardiac diagnoses; medications; date of last clinic visit and follow-up plan.

Results: Between January 1, 2007 and December, 2011, 587 adolescents were seen Pediatric Cardiology Clinics in Saskatoon and Regina. These adolescents included: 184 (31%) with CHD or other cardiac indications requiring follow-up who were eligible for transition from pediatric to adult cardiology care; 265 (45%) who either had CHD and no longer required follow-up or were seen for other cardiac indications and discharged; and 138 (34%) who were lost to follow-up or who did not attend initial assessments for other cardiac indications. Demographic and clinical data has been collated on all these patients.

Conclusions: This study cohort is currently being expanded to cover all adolescents who became adults (>18 years) followed in Pediatric Cardiology Clinics in Saskatoon and Regina, between 2012-2016, the second half of our study period. Identifying this cohort is essential to further research we are undertaking to determine the current rate of successful transition and to determine whether more resources are needed.

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