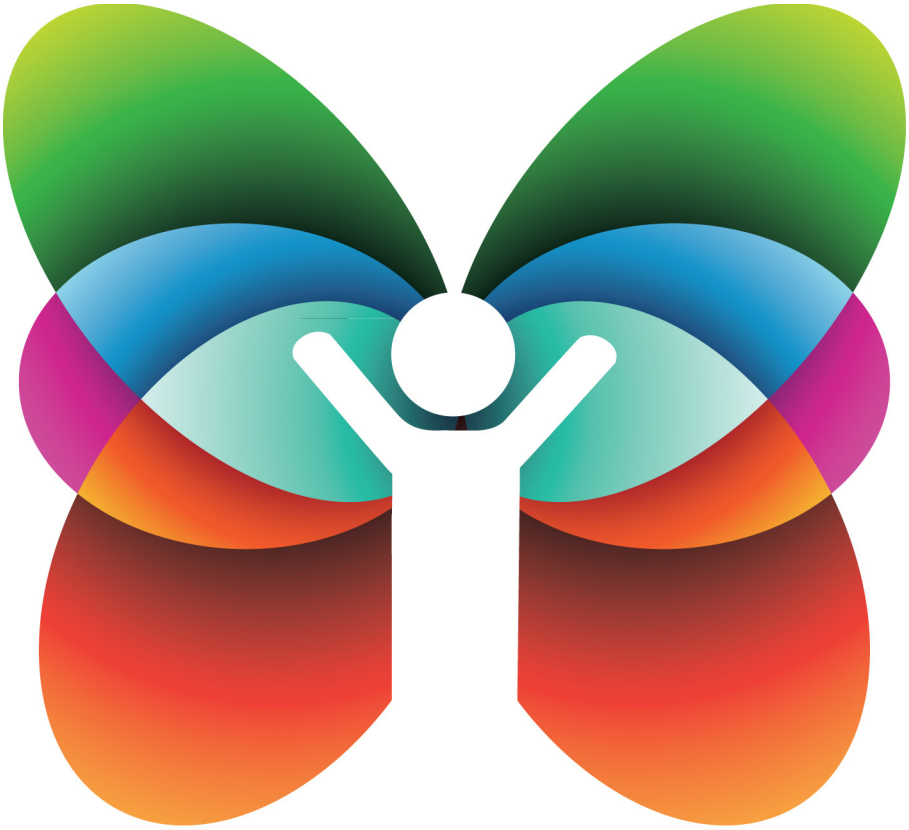
June 26
2013

McMaster Child Health Research Day

presented by the Department of Pediatrics



McMaster University
Department of Pediatrics

McMaster Children's Hospital

Percy Williams Memorial Fund

Event Program

Poster Presentations

1-2:30 pm | Ewart Angus Centre

Oral Presentations

2:30-4 pm | HSC 1A4

Reception & Trainee Awards Presentation

4-5 pm | Farncombe Atrium HSC- 3rd floor Blue

This event showcases the exciting child health research taking place in the Department of Pediatrics at McMaster University and McMaster Children's Hospital.

5th Annual McMaster Child Health Research Day

Program

Poster Presentations 1-2:30 pm | Ewart Angus Centre

Presenter(s) *Supervisor(s)*	Presenter Category	Title	Abstract No.
Balpreet Singh *Dr. Christoph Fusch*	Clinical Fellow	Opioid use for pain control in the NICU and development of tolerance and withdrawl syndrome	1
Dr. Salhab el Helou	New Investigator	Use of non-invasive high frequency oscillatory ventilation in the neonatal intensive care unit (NICU): A retrospective review	2
Mark Duffett	New Investigator	Clonidine in the sedation of mechanically ventilated children: a pilot randomized trial	3
Evan Cole *Dr. Melissa Parker*	Medical Student	Pediatric Fast Fluid Trial 2: A randomized controlled trial comparing the efficiency of two provider-endorsed manual pediatric fluid resuscitation techniques	4
Maria Chacon *Dr. Karen Choong*	Resident	Early rehabilitation in the Pediatric Critical Care Unit: A pilot study	5
Rachel Walker *Dr. Brian Timmons*	MSc	'Wii-Hab' in critically ill children: A pilot trial	6
Samah Al-Harbi & Kaitlyn Siu *Dr. Karen Choong*	Clinical Fellow & Resident	Functional recovery in critically ill children. The'Wee-Cover' Pilot Study	7
Hilary Caldwell *Dr. Brian Timmons*	MSc	Short-term tracking of fitness measures in preschoolers	8
Anna Romashkin *Dr. Katherine Morrison*	MSc	Sleep and Physical Activity in Youth (SPA) Study	9
Ninette Shenouda *Dr. Brian Timmons*	MSc	Fair to moderate tracking of pulse wave velocity in healthy preschool children (Ages 3-5)	10
Andrea Cross *Dr. Peter Rosenbaum*	PhD	Splashing through the 'F-words': Exploring the aquatic environment for disabled children	11

Presenter(s) *Supervisor(s)*	**Presenter Category**	**Title**	**Abstract No.**
Abbey Torek *Dr. Anne Klassen*	MSc	Developing a questionnaire to measure self-management skills in adolescents with chronic health conditions	12
Oksana Hlyva & Jan Burke-Gaffney *Dr. Jan Willem Gorter*	Research Staff	Towards setting new research agendas for knowledge translation in Trisomy 21: Parents' call for collaboration	13
Samantha J. Anthony *Dr. Anne Klassen*	Postdoctoral Fellow	Further development of a conceptual model of health-related quality of life within pediatric oncology - qualitative findings	14
Elena Tsangaris *Dr. Anne Klassen*	PhD	Identifying the health and supportive care needs of adolescent and young adult survivors diagnosed with cancer: A mixed methods study	15
Shikha Gupta *Dr. Tapas Mondal*	Resident	Successful transfer of pediatric patients with congenital heart disease to adult congenital care	16
Romy Cho *Drs. Herbert Brill & Anne Klassen*	Resident	Assessing needs during transition from adolescence to adulthood in young adults with inflammatory bowel disease: A qualitative study	17
Stephen Noorduyn *Drs. Jan Willem Gorter, Steven Hanna, & Peter Rosenbaum*	MSc	When childhood disability grows up: A systematic review of cardiovascular outcomes in adults with cerebral palsy	18
Stephanie Kay *Drs. Andrea Hunter & Rahim Valani*	Resident	Procedural skills in pediatric residency and in practice	19
Heather Bhan *Dr. Moyez Ladhani*	Resident	Mapping the Canadian Patient Safety Competencies to Residency Rotational Objectives: the process, strengths and gaps	20
Sophie Tanguay *Dr. Andrea Hunter*	Resident	Paediatric inpatient admissions in a tertiary public referral hospital in Guyana: Targeting the needs of a new postgraduate training program	21
Sabina Shin *Dr. Katherine Morrison*	MSc	Depression and its determinants in children and adolescents with obesity at presentation to a weight management program	22
Maryam Fesharaki *Drs. David Callen & Jonathan Gladstone*	Resident	A longitudinal 18-month observational study on new daily persistent headache in children and adolescents	23

Presenter(s) *Supervisor(s)*	**Presenter Category**	**Title**	**Abstract No.**
Jennifer Smith *Dr. Kristen Hallett*	Resident	Powassan Virus Encephalitis	24
Tahir Kafil *Dr. Tapas Mondal*	Medical Student	Utility of electrocardiography in identifying LVH or dilatation in pediatric aortic valve disease	25
Shaneela Shahid *Dr. Sandesh Shivananda*	Clinical Fellow	Impact of a protocol restricting the use of umbilical catheter on central venous catheter use in preterm infants: A quality improvement study	26
Niels Rochow *Dr. Christoph Fusch*	Clinical Fellow	Quality-based strategies are more effective than volume-based strategies in improving survival of VLBW infants	27
Justin Kwong *Dr. Vladimir Belostotsky*	Medical Student	Audit of hemodialysis adequacy in children over an 8 year period	28
Parnian Arjmand *Dr. Vladimir Belostotsky*	Medical Student	Management of anemia in hemodialysis patients at McMaster Children's Hospital	29
Renee Tseng *Dr. Vladimir Belostotsky*	Resident	Vitamin D levels in children with renal disease and compliance with Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines	30
Naomi Fink *Dr. Christoph Fusch*	MSc	Fatty acid profiles in commercially available lipid emulsions and breast milk	31
Preeya Raja *Dr. Christoph Fusch*	MSc	Developing individualized models to predict healthy postnatal growth for preterm infants	32
Sujane Kandasamy & Monisha Nundy *Drs. Gita Wahi & Sonia Anand*	Research Staff	Body composition assessment in neonates: Comparison of air displacement plethysmography (PEAPOD) vs. skinfold thickness (SFT) measurement	33
Jennifer Chin *Dr. Christoph Fusch*	MSc	Preliminary report: Body composition of preterm infants using air displacement plethysmography during the first weeks of life	34
Dilisha Rodrigopulle *Dr. Stephanie Atkinson*	MSc	Validation of surrogate limb analysis for measures of body composition in 3 year-old children by dual energy x-ray absorptiometry	35
Sau-Young Lee *Dr. Christoph Fusch*	Research Staff	Establishment and validation of a flow cytometric (FC) method to detect circulating endothelial cells (CECs) in blood of preterm infants	36

Presenter(s) *Supervisor(s)*	**Presenter Category**	**Title**	**Abstract No.**
Dhruvin Hirpara *Dr. Christoph Fusch*	Medical Student	Analysis of salivary cortisol via liquid chromatography-tandem mass spectrometry (LC-MS/MS)	37
Kal Mungovan *Dr. Elyanne Ratcliffe*	MSc	Effects of intestinal microbiota on the development of dopaminergic neurons in the mouse enteric nervous system	38
Tarushika Vasanthan *Dr. Christoph Fusch*	MSc	Identifying mechanism(s) of TNF-α release in the placenta perfusion model	39
Geerthana Jeyakumar *Dr. Christoph Fusch*	Research Staff	Transfer of lipopolysaccharide across the maternal-fetal interface of the placenta and its effect on TNF-α secretion	40
Asmaa Manan *Dr. Christoph Fusch*	MSc	'Artificial Placenta': A lung assist device for neonates	41

Oral Presentations 2:30-4 pm | HSC 1A4

Welcome: Dr. Stephanie Atkinson, Associate Chair, Research
Co-Chairs: Dr. Karen Choong & Dr. Brian Timmons

Time	Presenter *Supervisor(s)*	Presenter Category	Title	Abstract No.
2:30	Fawzah Alrwuili *Dr. Lucy Giglia*	Clinical Fellow	Neonatal outcomes of late preterm infants born after evidence based versus non-evidence based indication of late preterm delivery	42
2:40	Niels Rochow *Dr. Christoph Fusch*	Clinical Fellow	Target fortification of breast milk for preterm infants - What is the ideal measurement frequency?	43
2:50	Michelle Lee *Dr. Jeffrey Pernica*	Resident	Accuracy in the reporting and recording of immunization status upon admission to a tertiary pediatric hospital	44
3:00	Lia Abigail Siapno *Dr. Teresa Carter*	Resident	Social Anxiety and Autism Spectrum Disorders in Duchenne and Becker Muscular Dystrophy	45
3:10	Iqra Syed *Dr. Anne Klassen*	MSc	Examining predictors of self-management skills in teenaged survivors of childhood and adolescent cancer	46
3:20	Dustin Jacobson *Drs. Mohit Bhandari & Ehud Rosenbloom*	Medical Student	Levels of evidence in pediatric literature: A comparison between top medical journals and general pediatric journals	47

New Investigator Spotlight

Introduction: Dr. Lennox Huang, Chair/Chief Pediatrics

3:30	Dr. Melissa Parker	Systematic review of rapid infuser device product monographs for pediatric content	48

1 - Opioid use for pain control in the NICU and development of tolerance and withdrawl syndrome

Balpreet Singh, Theepika Ravitharan, Muzafar Gani Abdul Wahab, Christoph Fusch

Objectives: To find out how many babies receiving opioids developed withdrawal and tolerance, and adverse effects related to prolonged use of opioids Design: A retrospective chart review

Setting: McMaster Neonatal Intensive Care Unit (NICU), Ontario, Canada

Participants: Neonates admitted to McMaster NICU from July 2010 to June 2011 and received opioids Main Outcome: Development of tolerance and withdrawal among babies receiving opioid infusion. Secondary outcome was to find the correlation between prolonged use of opioids duration to reach full feeds, duration of hospital stay and duration of ventilation

Results: There were total 179 episodes of opioid infusion. Number of episodes with length ≤ 5 days were: 113/179 (63.1%); 6-14 days: 55/179 (30.7%); ≥15 days: 11/179 (6.2%). 50.5% of babies had at least one episode > 5 days. Among opioid infusion episodes of ≥ 5 days (34.6% of cases), 50 % of episodes were associated with tolerance and 21.9% were associated with withdrawal. The difference in duration of ventilation, between <5 days and > 5 days of opioid use was statistically significant ($p<0.001$) while it was not significant for time to reach full feeds and duration of hospital stay.

Conclusion and Relevance: This study raises the concern that opioids may be over prescribed and some babies may develop tolerance and withdrawal related side effects. Babies with prolonged opioid administration(>5 days) has prolonged duration of ventilation(statistically significant), prolonged duration of hospital stay and more time to reach full feeds (statistically insignificant).Prospective study is being planned looking at rationalizing the use of opioids while still achieving appropriate analgesia

2 - Use of non-invasive high frequency oscillatory ventilation in the neonatal intensive care unit (NICU): A retrospective review

Amit Mukerji, Balpreet Singh, Salhab El Helou, Christoph Fusch, Jaques Belik and Vibhuti Shah

Objective: To review the effect of NIHFOV on preventing intubation, along with number of spells (apneas, bradycardias or desaturations), oxygen requirement and carbon-dioxide (CO2) clearance.

Design: A retrospective case series from patient data.

Setting: Four large North American tertiary neonatal intensive care units, Ontario, Canada.

Participants: All newborns admitted to the participating centers between July 2010 and September 2012 and trialed on NIHFV

Exposure: NIHFV use.

Main Outcome: Successful transition to another non-invasive ventilation (NIV) mode; comparison of the number of spells (defined as apnea, bradycardia or desaturation), oxygenation and ventilation preceding and following NIHFV; reported adverse effects.

Results: Fifty two infants were treated with NIHFV on 79 occasions. The mean (SD) corrected GA and weight were 28.8 (3.6) weeks and 1004 (520) grams, respectively. The mean (SD) duration of use was 81.1 (83.6) hours and 'rescue' use following another NIV mode accounted for 73% of cases. In 58% of cases, infants were successfully transitioned to another NIV mode. There was a significant reduction in number of spells [mean (SD): 3.2 (0.4) to 1.2 (0.3), $P<0.001$] with a favorable trend in oxygen requirements [mean (SD): 47.8 (3.4) to 39.6 (2.4)%, $P<0.001$] and TcCO2 [mean (SD): 74.3 (6.1) to 62 (3.7) mmHg, $P=0.025$] levels with rescue NIHFV. No complications were attributed to NIHFOV use.

Conclusions and Relevance: NIHFV is a promising NIV mode that may help prevent or delay intubation. However its efficacy and safety needs to be evaluated in prospective randomized controlled trials before widespread clinical use can be recommended.

3 - Clonidine in the sedation of mechanically ventilated children: a pilot randomized trial

Mark Duffett, Karen Choong, Jennifer Foster, Maureen Meade, Deborah Cook

Objective: To assess the feasibility of a larger trial of clonidine as a sedative in critically ill children with respect to: 1) effective screening, 2), recruitment 3) protocol adherence, and 4) timely drug administration.

Design: Randomized, concealed, blinded, placebo-controlled, pilot trial.

Setting: Pediatric intensive care units of 2 tertiary academic pediatric centers

Patients: Hemodynamically stable children aged 1 month to 18 years who were expected to require at least 2 days of mechanical ventilation and who required sedation.

Interventions: Enteral clonidine 5 mcg/kg or placebo every 6 hours in addition to usual sedation.

Results: We enrolled 50 children. The median (IQR) age was 2.5 (0.7 to 5.2) years and PRISM score on PICU admission was 12 (8 to 15). In terms of feasibility outcomes: 35 (70%) were enrolled within 1 day of becoming eligible (mean 1.2 days). 90 (87%) of 104 eligible patients were approached for consent, 94% of doses were administered according to protocol and on average 1.7 children were enrolled/month. 5 (10%) children had doses held or modified due to hypotension or bradycardia and the incidence of clinically diagnosed withdrawal was 40%. There were no statistically significant differences between the groups with respect to clinical outcomes and adverse effects or requirements for other medications.

Conclusions: This pilot trial has identified important challenges to the feasibly of a larger trial and allowed us to refine the study protocol and enrolment estimates. An trial powered to detect differences in clinically important outcomes is warranted and feasible.

4 - Pediatric Fast Fluid Trial 2: A randomized controlled trial comparing the efficiency of two provider-endorsed manual pediatric fluid resuscitation techniques

Evan Cole, Greg Harvey, Gary Foster, Lehana Thabane, Melissa Parker

Introduction: Pediatric shock is a life-threatening condition requiring emergent medical intervention. There are multiple possible etiologies, and current guidelines require rapid fluid administration in almost all cases. However, there is little evidence available to guide clinicians in choosing a method for rapid fluid resuscitation, resulting in frequent failure to meet guideline benchmarks.

Objectives: This study aimed to determine which of two commonly practiced pediatric fluid resuscitation techniques (disconnect-reconnect and push-pull) yielded a higher fluid administration rate in a simulated clinical scenario. Secondary objectives included accuracy of volume administration, subjective and objective measures of provider fatigue, as well as quantitative and descriptive measures of technical issues observed.

Methods: Sixteen consenting healthcare providers from McMaster Children's Hospital participated in this randomized crossover trial, and were asked to administer a target of 900mL (60mL/kg) of normal saline to a simulated 15kg infant as quickly as possible with each technique. The primary outcome, rate of fluid administration, was evaluated using a paired Student's t-test.

Results: Of sixteen participants, fourteen reported having at least 'some' pediatric resuscitation experience. The mean fluid administration rate with the disconnect-reconnect technique (DRT) was significantly higher than the push-pull technique (PPT) at 1.77mL/second and 1.62mL/second respectively (p-value 0.005). More technical difficulties were experienced with PPT than with DRT.

Conclusion: DRT can be used to administer fluid more quickly than PPT in a simulated pediatric resuscitation. This suggests that clinicians should consider choosing DRT over PPT in pediatric fluid resuscitation, and that a similar recommendation could be included in future guidelines.

5 - Early rehabilitation in the Pediatric Critical Care Unit: A pilot study

Karen Choong, Maria Chacon, Brian Timmons, Heather Clark, Rachel Walker, Lehana Thabane

Context: Critically ill children are often bed-ridden and immobile for prolonged periods of time. Immobility is an independent risk factor for the development of muscle weakness and wasting among PICU patients. There is evidence demonstrating that early rehabilitation and mobilization of critically ill adults is safe, feasible, cost effective, and improves short and long-term outcomes. In contrast, there is a paucity of research in pediatrics. Current prospective studies in critically ill adults have used the following different modalities to implement early mobilization in their population including Cycle-ergometer, mobilization teams and Interactive Video gaming. Acute rehabilitation in critically ill children requires a combination of innovative active and passive approaches that are tailored to the needs, cognitive and functional abilities of each child.

Objective: To evaluate feasibility and safety of implementing early physical rehabilitation using a combination of individualized interventions such as cycle ergometer or video gaming, in critically ill children admitted to the McMaster Children's Hospital PCCU. Design: Pilot prospective cohort

Methods: Admissions to the PCCU were screened for eligibility. The physical rehabilitation intervention included passive (cycle ergometer) and active (video-gaming). Implementation was based on patient's functional and cognitive ability.

Main outcome measures: The primary outcome in this pilot study is feasibility, including ability to screen, enrol and apply the intervention within 24 hours of approaching eligible patients. The secondary outcome is safety, including the rate of adverse events attributable to the rehabilitation intervention. Change in activity from baseline, during and following the intervention was measured by accelerometer. The results and conclusions of this pilot project are still pending.

Applications: The results of this pilot study will provide important information that will help to design the methodology for the next research proposal looking at how acute rehabilitation improve clinically important short and long-term outcomes in critically ill children.

6 - 'Wii-Hab' in critically ill children: A pilot trial

Rachel Walker, Farah Abdulsatar, Brian Timmons, Karen Choong

Purpose: To evaluate the safety and feasibility of virtual reality (VR) exercise as a novel acute rehabilitation intervention in a Pediatric Critical Care Unit (PCCU) setting.

Methods: Children aged 3-18 years with an anticipated PCCU stay > 48 hours, and baseline normal to moderate cognitive and functional disability were eligible. Exclusion criteria included: anticipated death, physical inability or a contraindication to mobilization. Nintendo Wii™ Boxing was prescribed for a minimum of 10 minutes twice a day for 2 days. Primary outcomes were feasibility and safety.

Results: Of 21 eligible patients, 12 (57.1%) were enrolled and 8 completed the study. 41.7%. (5/12) were males, and the median age was 11 (3,16) years. Four of the 8 participants who received the intervention were mechanically ventilated during Wii™ play. Participants used the Wii™ a median of 2 times (1,5) over the 2-day intervention period, for a median total duration of 54.5 (15, 224) minutes. There were no adverse events attributable to the intervention. Upper limb activity during Wii™ was significantly greater than the average daily activity (p=0.049). Grip strength did not change significantly from baseline (p=0.20).

Conclusion: While the results of this pilot trial suggest that VR exercise may be safely applied in a subset of critically ill children, we observed several threats to its feasibility in this population. Further research is therefore needed to evaluate the use of VR as a rehabilitation strategy in the PCCU setting.

7 - Functional recovery in critically ill children. The 'Wee-Cover' Pilot Study

Samah Al-Harbi, Kaitlyn Siu, Katie Wong, Heather Clark, Brian Timmons, Burke Baird, Jan Willem Gorter, Lehana Thabane, Mary Khetani, Karen Choong

Background: Intensive Care Unit acquired weakness (ICU-AW) is a well-recognized, important and preventable sequelae of critical illness, affecting up to 60% of adult ICU patients. ICU-AW is associated with increased mortality and length of stay, and negatively impacts long-term functional outcomes and quality of life in affected patients and their caregivers.

Objectives: The goals of this study are to describe the functional recovery following prolonged immobility and delayed rehabilitation in critically ill children and to explore the predictors of impaired functional recovery following immobilization in critically ill children.

Methods: A prospective, observational pilot study conducted in a single Canadian pediatric tertiary-care intensive care unit. Participants (n=30) aged >1 year to <18 years of age, admitted to the ICU and limited to bed rest during the first 48 hours of admission were evaluated with muscle strength testing, measures of functional outcome and exercise testing (where eligible). Follow-up measurements were conducted at 3 and 6 months. The primary outcome of interest in this pilot study is feasibility.

Results: A total of 30 patients were enrolled and complete baseline measurements were achieved in 28 patients (93%). 5 patients were eligible for CENC testing and 2 patients completed baseline measurements.

Conclusions: Preliminary data and baseline measurements in our cohort of patients suggests that this study will be feasible on a larger scale. Only a minority of patients were eligible for exercise testing suggesting that this sub-study is not feasible in our current population.

8 - Short-term tracking of fitness measures in preschoolers

Hilary Caldwell, Nicole Proudfoot, Sara-King Dowling, Leigh Gabel, Brian Timmons

In preschoolers, muscle power has exhibited moderate to strong tracking, while tracking of aerobic fitness indicators has not yet been studied. This study aims to establish the 12-month tracking of fitness measures in preschoolers. 144 preschoolers (age=4.3±0.9 years, BMI=15.9±1.1 kg/m2) completed exercise testing at baseline and follow-up, separated by 12.2±0.9 months. Muscle power was measured with a 10-second modified Wingate cycling test (n=78), represented as peak and mean power, per kilogram of body weight. The Bruce Treadmill Protocol (n=129) was used with time on the treadmill and 60-second heart rate recovery (HRR) as indicators of aerobic fitness. Differences in performance between baseline and follow-up were analyzed with paired t-tests. Spearman rank order correlations and Kappa statistics (κ) were used to analyze tracking. Kappa statistics indicate baseline to follow-up agreement on tertile categorization (high, moderate, and low). Peak power per was significantly higher ($p<0.001$) at follow-up (5.88±0.84 W/kg) compared to baseline (4.73±1.24 W/kg), and exhibited fair tracking ($r=0.628$, $p<0.001$, $\kappa= .385$). Mean power per kilogram was also significantly higher ($p<0.001$) at follow-up (5.09±0.88 W/kg) compared to baseline (3.87±1.31 W/kg), and showed moderate tracking ($r=.628$, $p<.001$, $\kappa=.576$).Time on the treadmill was significantly longer ($p<0.001$) at follow-up (10.99.±2.41 minutes) compared to baseline (8.95±2.3 minutes) and showed moderate tracking ($r=.823$, $p<0.001$, $\kappa= .477$). HRR was significantly improved at follow-up (65±14 bpm) compared to baseline (63±14 bpm) and showed fair tracking ($r=0.525$, $p<0.001$, $\kappa=.337$). Muscle power and treadmill time increased over a 12-month period in preschool-aged children, with measures of mean power and time on the treadmill exhibiting the strongest tracking.

9 - Sleep and Physical Activity in Youth (SPA) Study

Anna Romashkin, Ofir Turel, Katherine Morrison

Lifestyle behaviours including nutritional intake, physical activity, screen time and sleep are linked to cardiometabolic health indicators in youth. We hypothesize that these behaviours may influence each other and are interested in understanding how they influence health indicators in youth enrolled in clinics focussing on behaviour change to improve cardiometabolic health. Youth age 10-17 years old are recruited from the Growing Health Weight Management Program (GHWMP) and/or Pediatric Lipid Clinic (PLC) at McMaster's Children Hospital. In this cross-sectional study, we measure self-reported screen time and video game exposure and objectively measure physical activity and sleep for a 7 day period. Collection of a minimum of 3 days of recording is required for physical activity and sleep measurements. To date 96 participants have been recruited. Data presented is for the first 87 participants (average age= 13.4 years old ±2.35 years). Of the 49 participants (13.2 years old ±2.4 years, BMI z-score= 2.79 ±0.82) from the GHWMP, 41 play videogames (average= 3.23 hours/day ±2.44). FITBIT data is available on 37 participants (average step count=9150.343 ±4881) and 37% took ≥ 10000 steps per day. Sufficient sleep (≥ 8.5 hours /night) was recorded in 48.6%. Of the 38participants from the PLC (13.68 years old ±2.25 years, BMI z-score= 1.70 ±1.35), 32 play videogames (average=3.29 hours/day ±2.99). Of the 27 with valid PA/sleep data 18.%% have greater than 10,000 steps / day average step count=9118.61 ±627.07) and29.6% slept ≥ 8.5 hours / night. Future direction is to continue recruitment and analyze whether videogame use influences sleep, physical activity, blood pressure and insulin resistance, as we predict that those with higher videogame use will have reduced sleep duration and physical activity.

10 - Fair to moderate tracking of pulse wave velocity in healthy preschool children (ages 3-5)

Ninette Shenouda, Nicole Proudfoot, Maureen MacDonald, Brian Timmons

Pulse Wave Velocity (PWV), the speed of a pressure waveform along the arterial tree, is the gold-standard measurement for assessing arterial stiffness non-invasively. PWV is used extensively in adults and youth, but not in preschool children. Our primary objective was to determine how PWV tracks over a one-year period in healthy 3-5 year-olds. A secondary objective was to investigate sex differences in tracking behaviour. 49 boys (age = 4.52 ± 0.89 years, BMI = 15.77 ± 1.02 kg/m2) and 49 girls (age = 4.32 ± 0.88 years, BMI, 15.80 ± 1.11 kg/m2) completed baseline and follow-up assessments one year apart. Whole-body PWV was measured between the right carotid and dorsalis pedis arteries. Tracking of PWV from year 1 (baseline) to year 2 (follow-up) was evaluated with the Spearman rank-order correlation. Kappa statistic was used to determine the agreement in PWV tertile categorization (low, moderate, high) over time, and a chi-square test was used to determine the effect of sex on agreement. Mean ± SD values (m/s) of PWV for boys and girls, respectively, were 4.26 ± 0.47 and 4.28 ± 0.33 at year 1, and 4.76 ± 0.50 and 4.87 ± 0.51 at year 2. PWV showed moderate tracking ($r= 0.37$, $p<0.01$), with fair agreement of PWV ranks ($K= 0.25$). Also, no sex differences were observed ($\chi^2(2, N=98)= 0.49$, $p= 0.79$). Whole-body PWV exhibited fair to moderate tracking over a one-year period in healthy 3-5 year-old children. Furthermore, sex does not appear to influence PWV tracking behaviour in early childhood.

11 - Splashing through the 'F-words': Exploring the aquatic environment for disabled children

Andrea Cross, Margaret Schneider, Peter Rosenbaum, Jan Willem Gorter

Introduction: In 2011, CanChild researchers published 'The 'F-words' in childhood disability: I swear this is how we should think!' Targeting parents and practitioners, this conceptual article packaged a set of ideas (Function, Family, Fitness, Fun, Friends, Future), grounded within the ICF framework, that they argue should be the focus of health services for disabled children. One potentially beneficial strategy for incorporating the 'F-words' into children's services is to include alternative therapies (e.g., aquatic programs) in treatment plans. This poster illustrates how the aquatic environment fosters all the 'F-words'. The findings are based on an earlier study examining the influence of a structured swim program on children with autism spectrum disorders (ASD) and communication delays.

Methods: This study utilized a phenomenological qualitative framework involving 15 children, 13 parents, 2 teachers, and 13 volunteers. Children participated in 10 weekly 1-hour swim classes. Data included a background questionnaire, in-depth interviews, open-ended questionnaires, journal entries, and evaluation forms.

Findings: Parents, teachers, and volunteers agreed that all children benefited from the swim program. Swimming not only fosters physical activity (i.e., function and fitness) but also provides social (i.e., family and friends) and emotional (i.e., fun) benefits for disabled children across the lifespan (i.e., future).

Conclusion: All children have the potential to thrive in the aquatic environment. As physicians, therapists, and parents continue to search for effective interventions for disabled children, it is crucial to explore holistic services that focus on each of the 'F-words'.

12 - Developing a questionnaire to measure self-management skills in adolescents with chronic health conditions

Abbey Torek, Elena Tsangaris, Ronald Barr, Herbert Brill, Jan Willem Gorter, Christina Grant, Olaf Kraus de Camargo, Tapas Mondal, Anne Klassen

Background: Successful transition from pediatric to adult healthcare requires the development of self-management skills. Recently, a questionnaire measuring self-management skills was developed for use with childhood cancer survivors. The current study aimed to determine how to adapt this questionnaire into a generic tool for use in adolescents with any chronic health condition.

Methods: Interviews were conducted with adolescents aged 12 to 18 years recruited from multiple outpatient clinics at McMaster Children's Hospital. Problems with the instructions, response options, item wording, and missing content were identified. Subsequently, the scale was revised and tested in a second sample of adolescents.

Results: The sample included 32 adolescents (23 original; 9 revised). In the first iteration, 23/23 participants found the instructions easy. For the items, 8 were judged by most participants as 'easy' and were retained; 9 were judged by several participants as either 'moderate' or 'hard' or had a Flesch-Kincaid grade level over 6 and were revised; 3 were dropped and an additional item was added. Response options were changed from agree/disagree to a frequency format (never to always) based on the suggestion of 12/23 participants. In the second iteration, most participants preferred the revised items and new response options. Finally, the Flesch-Kincaid grade level was computed and 15/18 items were below grade 5 (average 4.3; range 2.2 to 7.9).

Discussion: Cognitive interviews made it possible to identify problems and make revisions to the scale. The revised scale is now being field-tested in multiple outpatient clinics.

13 - Towards setting new research agendas for knowledge translation in Trisomy 21: Parents' call for collaboration

Oksana Hlyva, Jan Burke-Gaffney

Trisomy 21 remains to be the most common genetic condition affecting approximately 1 in 800 newborns, their families as well as education and healthcare providers. More inclusive societal practices combined with medical achievements have contributed to the dynamically changing phenotype of individuals with T21 and enabled them to live longer and richer lives. The recent decades have witnessed major breakthroughs in research on T21, including studies using triploid mice, worms called C. elegans, gene silencing and, more recently, a few randomized control trials. Yet, good quality evidence involving humans is very scarce, often leaving practitioners with very limited choices when making decisions about best care practices. As a result, parents whose choices are reduced to prenatal screening feel hopeless and abandoned by healthcare system. As parents, we would like to take this opportunity to encourage collaboration with and among future and present practitioners on extending the existing research, translating it into practice, and creating new research agendas and therapies. We will share our parental perspectives on cognition research and beyond and outstanding research groups and funding agencies Canadian researchers can partner with. Inspired by CanChild's approaches, we call for research that is practical and empowering for families, supporting sibling and social relationships, providing complex service systems, and encouraging meaningful family engagement. Implications from socio- and biomedical research on T21 are multifold, including ethical (research equity), economic (more independent lives/less cost), and advancing knowledge in other related research areas: Alzheimer, depression, learning and cognition-related disorders, nutrition, neurodegeneration, and neuroinflammation.

14 - Further development of a conceptual model of health-related quality of life within pediatric oncology - qualitative findings

Samantha Anthony, Enid Selkirk, David Dix, Robert Klaassen, Katrin Scheinemann, Lillian Sung, Anne Klassen

Background: Numerous controversies have arisen in health-related quality of life (HRQOL) research, primarily relating to conceptualization and measurement. Following a systematic review to identify all patient-reported outcome (PRO) instruments used in research with childhood cancer patients and survivors, our team developed a preliminary conceptual model of HRQOL by categorizing the content from the 20 identified PRO instruments into domains and concepts [1]. Building on this research, the objective of our present study was to refine the preliminary model using data gathered in a qualitative study examining the perspectives of pediatric cancer patients and survivors.

Methods: We performed a qualitative study with patients and survivors (aged 8 - 18 years) from four Canadian hospitals. Interview data was coded using the preliminary framework developed from our content analysis. The codes identified in the qualitative data were then compared with the domains and concepts within the emerging framework. This comparison provided a means to identify concepts included within established PRO instruments as well as new concepts.

Results: Findings identify the important HRQOL concepts from the perspective of 34 study participants. While many concepts overlap with domains and concepts included in PRO instruments, providing validity for our framework, we identified unique concepts that are not captured by these instruments, particularly dimensions of positive transformation.

Conclusions: Findings contribute to the further development of a HRQOL conceptual framework that may help to guide researchers in selecting an appropriate PRO instrument. Findings will offer direction to improve patient care and lead to the development of evidence-based intervention strategies.

[1] Klassen AF, Khan AF, Anthony S, Klaassen R, Sung L. Conceptualizing quality of life in children with cancer and childhood cancer survivors. International Society of Quality of Life Research Conference, London October 2010. Poster presentation.

15 - Identifying the health and supportive care needs of adolescent and young adult survivors diagnosed with cancer: A mixed methods study

Elena Tsangaris, Jessica Johnson, Rachel Taylor, Lorna Fern, Denise Bryant-Lukosius, Ronald Barr, Graeme Fraser, Anne Klassen

Background: In Canada, adolescents are treated in pediatric hospitals, while young adults are treated in adult hospitals. The inability of either model to meet the needs of adolescents and young adults (AYA) leads to complex issues. The purpose of this study was to investigate health and supportive care needs of AYA survivors with cancer.

Methods: A concurrent nested mixed methods design was used. Qualitative description (QD) and a systematic literature review (SLR) were the major and minor methods respectively. For QD, a purposive sample of AYA survivors (15 to 25 years) was recruited from a pediatric and adult cancer program in Hamilton, Ontario. Interviews were conducted, digitally recorded and transcribed verbatim. Line-by-line coding was used to establish codes and categories. The SLR entailed a search of CINAHL, Cochrane Central, EMBASE, Medline, PsycInfo and PubMed from their date of inception to October 2011. Two screeners worked independently to screen abstracts, titles and relevant full text articles. Findings from the QD and SLR were later synthesized.

Results: Twenty interviews were conducted for the QD. For the SLR, 760 citations were identified, of which 12 met inclusion criteria. The most commonly reported HSC needs for AYA survivors with cancer from both studies, were social wellbeing, information sharing and communication and service provision.

Conclusion: Comparison of findings from QD and SLR reveal overlapping (e.g., entertainment for teens) and novel (e.g., collaboration) themes. Study results will be used to inform the potential development of a healthcare program for AYAs' in Hamilton.

16 - Successful transfer of pediatric patients with congenital heart disease to adult congenital care

Shikha Gupta, Laura-Lee Walter, Luca Greville, Tapas Mondal

Background: Over 85% of patients born with congenital heart disease are surviving to adulthood, with the numbers growing each day. Despite this, only about 50% are successfully transferred to adult care.
Objective: To determine the prevalence of successful transfer of adolescent patients from pediatric to adult congenital care at McMaster Children's Hospital, and to identify predictors of successful transfer.

Methods: Using a retrospective cohort study, all patients eligible for transition from pediatric to adult congenital care from January 2006 to December 2012 (ages 18-24) were identified from the database of the Cardiology Program. Successful transfer was defined as attendance at first adult congenital care clinic appointment within 3 years of discharge from pediatric care. Complexities of cardiac diagnoses were classified using the Adult Congenital Heart Disease Consensus Statement. Additional variables reviewed included attendance at pediatric appointments, and documentation of recommended follow-up at adult center.

Results: A total of 280 patients were identified, of which 268 (95.8%) were successfully transferred to adult congenital care. Of the 12 (4.2%) lost to follow-up, 8 had mild disease, 3 had moderate disease and 1 had complex disease. None of these missed pediatric appointments, all had documented recommendation to follow-up with an adult cardiologist, and only 2 were missing referrals to the adult clinic.

Conclusions: Most patients with congenital heart disease were successfully transferred to adult care. Protective factors may include location of both clinics in the same building, phone-call reminders prior to clinic appointments and documented recommendation to follow-up.

17 - Assessing needs during transition from adolescence to adulthood in young adults with inflammatory bowel disease: A qualitative study

Romy Cho, Natasha Wickert, Anne Klassen, John Marshall, Herbert Brill

Background: Studies have recognized the increased vulnerability of adolescents and young adults with chronic illnesses, and among patients with IBD, there is still a paucity of literature on transition of care. Current programs are based on what issues we anticipate adolescents and their families will face in the future. This research study would be the first to examine the needs faced by young adults diagnosed with IBD, including those who have already been through the transition process.

Objectives: 1. Examine the needs of young adults with IBD in regards to their disease status and to identify common themes regarding how they live and cope with this chronic disease. 2. Determine similarities and differences in themes between: (a) those diagnosed before and after the age of 18, and (b) severity of disease (mild or severe) using the 'Harvey Bradshaw Index' for Crohn's disease and the 'Ulcerative Colitis Activity Index' for ulcerative colitis.

Methods: Use of qualitative interpretive description approach, including face-to-face interviews of young adults (18-30 years) diagnosed with IBD at the McMaster University Medical Centre adult IBD clinic. Interviews were audiotaped, transcribed and coded using constant comparative method, then data was imported into QSR Nvivo10 for analysis.

Results/Discussion: 21 patients were interviewed (pediatric diagnosis = 15, adult diagnosis = 6). Needs were identified by patients in the key areas of 'knowledge', 'independence and assertiveness', 'health and lifestyle', and 'psychosocial and emotional needs'.

18 - When childhood disability grows up: A systematic review of cardiovascular outcomes in adults with cerebral palsy

Stephen Noorduyn, Patrick McPhee, Jan-Willem Gorter, Steven Hanna, Peter Rosenbaum, Lawrence Mbuagbaw

Introduction: Cardiovascular disease is a leading cause of death and hospital admissions in worldwide. Many risk factors are modifiable lifestyle factors such as increased sedentary activity. Adults with cerebral palsy (CP) are known to have increased sedentary activity compared with healthy peers. Other physiological considerations may also exacerbate the risk of cardiovascular disease in this population.

Methods: A systematic review was performed of MEDLINE, EMBASE, CINAHL, and CENTRAL. No limits were placed on language or date of publication. Primary outcomes were stroke, heart attack, angina, cardiac ischemia, and mortality. Secondary outcomes were hypertension, peripheral artery disease, general description of heart disease, and risk factors such as diabetes, smoking, obesity, arterial stiffness, cardiovascular health, and sedentary time. A tertiary outcome of interest was survival in the context of cause of death statistics. All interventions and primary study designs were included.

Results: 2281 unique articles provided 10 studies for final inclusion. No trials or longitudinal studies were identified. All included articles were cross-sectional surveys. Studies commonly (n=5) reported little correlation of body mass index (BMI) with measures of cardiovascular risk. Three studies reported cause of death in the context of survival.

Conclusion: Little is known about adults with CP and they are just recently becoming a recognized medical reality. More research is necessary into the prevalence of events, related conditions, and risk factors of cardiovascular disease in this population. Clinicians and policy makers should be aware of the potentially high risk and misleading classical signs of risk within this population.

19 - Procedural skills in pediatric residency and in practice

Meera Rayar, Stephanie Kay, Andrea Hunter, Rahim Valani

Background: Procedural skills are an integral part of pediatric residency training programs in Canada. It is uncertain which skills practicing pediatricians consider important in practice versus the comfort level of residents for these procedural skills.

Summary of work: This prospective survey was undertaken at a single academic institution. Residents and general pediatricians were surveyed on how often they performed procedures listed by the Royal College of Physicians of Canada training objectives. Participants were also asked to rate their confidence level in performing each skill, along with their perception of which skills were necessary for pediatrics practice.

Summary of results: Thirty seven participants completed the survey (22 residents, 15 staff). 14 residents were in their first two years of training. All staff physicians had community practices, over 90% also had academic appointments. 100% of residents and practitioners identified neonatal and pediatric resuscitation skills as essential to practice though used this skill set less than 5 times in the last year. Competence in all other non-resuscitation procedures were rated as either useful or important, but not essential to general pediatrics. The emphasis placed on a skill was not predictably related to the frequency they were performed. Residents uniformly described less confidence in performing all procedures than attending physicians.

Conclusions: This study shows that despite limited training and exposure to a skill, residents are able to distinguish which procedural skills are important to the practice of general pediatrics.

Take-home message: There remains a need for continued exposure to essential skills in practice, even if limited in opportunity, to continue to build confidence in implementation.

20 - Mapping the Canadian Patient Safety Competencies to Residency Rotational Objectives: the process, strengths and gaps

Andrea Hunter, Heather Bhan, Moyez Ladhani, Jonathan Gilleland, Pierrette Leonard, Nancy Winslade

Background/ Objectives: The Canadian Patient Safety Institute (CPSI) Safety Competencies (SC) are important for residents to develop to become clinicians practicing in a culture of patient safety. Although these competencies are addressed both formally and informally within pediatric residency programs, it is unclear how comprehensively they are covered. Through mapping to the CPSI SC, the strengths and gaps of the program's safety curriculum could be identified and addressed through increasing awareness, re-structuring assessments and enhancing curriculum. The purpose of this project was to evaluate the comprehensiveness of safety content taught within a pediatric residency program.

Methods: The core content of the pediatric residency program, as determined by rotation-based evaluation forms and CanMeds curriculum objectives, were mapped to the CPSI SC using software developed by CPSI. Academic half day, morbidity and mortality rounds, and resident teaching objectives were not mapped as these are not included in assessment of resident learning.

Results: 20 rotations were mapped over two days. There was a strong emphasis on safety competencies targeted at communication with families and team members, patient advocacy, and team collaboration. Gaps were identified in patient safety core theories and terminology, defining and reporting adverse events and identifying and utilizing safeguards in prescription writing. Mappers noted some gaps were covered within the program through sessions not formally assessed.

Conclusion: With the growing emphasis, and understanding of the importance of patient safety, mapping the competencies assessed in the Pediatric Residency Program to the CPSI SC has facilitated identification of strengths and gaps in coverage within the program. To further capture the safety competencies addressed, formal and informal teaching session objectives would need to be included.

21 - Paediatric inpatient admissions in a tertiary public referral hospital in Guyana: Targeting the needs of a new postgraduate training program

Sophie Tanguay, Narendra Singh, Julie Johnstone, Madan Rambaran, Andrea Hunter

Objective: In October 2011, an accredited three-year postgraduate training program in pediatrics was established at Georgetown Public Hospital Corporation (GPHC) in Guyana to assist with specialist training shortage and high pediatric mortality (under five mortality 65 per 1000). Curriculum was initially developed in consultation with medical education faculty, and continues to evolve to meet local needs and disease burden.

Methods: Health records of children admitted to the paediatric medical ward at GPHC during the first year of the residency program (November 2011-October 2012) were examined for demographics, admitting/discharge diagnoses and outcome (including length of stay).

Outcomes: 1380 children were admitted to the paediatric ward during the study period, with 58.5% male, and mean age 3.85 (1wk to 12.8yrs). There were 45 deaths on the paediatric ward (excluding ICU and ER deaths), representing a mortality rate of 3.2%. The most common diagnoses included pneumonia (n=150), lower respiratory tract infection, LRTI (n=140), acute gastroenteritis (n=139), epilepsy/seizure (n=132), asthma exacerbation (n=109), accidental substance ingestion (n=107), anaemia including sickle cell crisis (n=102: sickle cell 67, unspecified 35), malaria (n=56), nephrotic syndrome (n=34), and snake bite (n=20). Most common causes of mortality were malignancy (n=7), nephrotic syndrome (n=3) and sequelae of HIV infection (n=3).

Discussion: Paediatric inpatient admissions in Guyana represent infectious diseases (LRTI/pneumonia, gastroenteritis) but also significant non-infectious disease including seizures, asthma, anaemia, accidental ingestions and nephrotic syndrome. The curriculum for paediatric postgraduate trainees can be further tailored to meet local needs, with opportunity for development of clinical guidelines, and preventative public health/advocacy measures.

22 - Depression and its determinants in children and adolescents with obesity at presentation to a weight management program

Sabina Shin, Valerie Taylor, Katherine Morrison, DECCO investigators

There is increasing recognition of the relationship between mental illness and obesity in youth. While studies suggest conflicting prevalence of depression in adolescents with obesity, few studies have examined the determinants of depression in obese youth. Our objectives were to explore the determinants of depression in children and adolescents with obesity in a clinical setting as part of the baseline evaluation for the DECCO Study. We studied 244 youth aged 8 - 17 years (125 girls, 119 boys) at the time of entry to a weight management program, as part of a prospective, longitudinal study. Depression was identified by a score of 15 or greater on the CES-DC or antidepressant use. Adiposity was measured using DXA and pubertal stage was self-assessed. Parental socioeconomic status was evaluated by questionnaire. We compared sex, age, pubertal stage, extent of obesity, socio-demographic factors, and family history of depression in those with and without depression. Of the 244 children and adolescents included in this study, 8 were on antidepressants and 88 (36.1%) met the criteria for depression. Household income and adiposity, as determined by % body fat but not BMI, were associated with an increased risk of depression but sex, age, and other potential correlates were not. These factors need to be considered when implementing weight management programs for youth. The influence of depression on outcomes during weight management in youth is not known but will be the focus of future investigations in this longitudinal study.

23 - A longitudinal 18-month observational study on new daily persistent headache in children and adolescents

Maryam Fesharaki, David Callen, Jonathan Gladstone

Introduction: New daily persistent headache (NDPH) is classified as a Primary Headache Disorder by the ICHD-II classification system. It has been reported in up to 0.1% of general population. NDPH is more common in pediatric population than adults. The etiology of NDPH is not completely understood and as a result, no definite/effective treatment has been proposed. Current treatment options consist of a variety of pharmacological and nonpharmacological treatments including supplements, massage and yoga. All the proposed treatments have shown variable level of effectiveness. We propose an observational study in children and adolescents who are diagnosed with NDPH. Our objectives are to measure the incidence of NDPH among this population, to describe the characteristics of the patients, type of treatments they receive and their efficacy.

Method: We propose a multicentre cohort study in Toronto and Hamilton in children less than 18 years of age diagnosed with NDPH as outpatients by neurologists. Each consented patient will be interviewed based on our questionnaire by phone for an initial assessment, and every 6 months for 3 follow up interviews. Collected data will be finalized and the results will be published in a comprehensive report.

Conclusion: We expect to find risk factors that will help the investigators in explaining the etiology of this condition and in finding better treatment alternatives to help patients suffering from this type of headache.

24 - Powassan Virus Encephalitis

Jennifer Smith, Kristen Hallett

This is a case of Powassan virus encephalitis in an 11-year-old boy with findings suggestive of herpes simplex virus encephalitis. The case demonstrates some key features of Powassan virus while emphasizing the diagnostic difficulty. Powassan virus is a rare but increasingly recognized cause of viral encephalitis. It is found mainly in the North Eastern United States and Ontario, Quebec and the Maritimes in Canada. It can be difficult to diagnose especially when clinicians are not familiar with the presentation and investigations. Symptoms and imaging mimic herpes simplex encephalitis and acute disseminated encephalomyelitis. Definitive diagnosis relies on seroconversion of antibody titres. Treatment remains supportive and sequelae are common.

25 - Utility of electrocardiography in identifying LVH or dilatation in pediatric aortic valve disease

Tahir Kafil, Ankur Goswami, Sean Kennedy, Tiffany Li, Tapas Mondal

Left ventricular hypertrophy (LVH) is a thickening of myocardial tissue of the left ventricle (LV) in the heart. It typically presents as a compensation for a chronic increase in cardiac workload. This increased workload can be pressure-mediated or volume-mediated (dilatation). Though LVH has been observed in response to exercise, its true utility is in its role as a marker of hypertension and heart disease. The most significant cause of LVH in the pediatric population is aortic valve disease such as aortic stenosis and regurgitation. LVH can be detected by electrocardiography (ECG), though with poor sensitivity. However, the ECG findings for LVH are similar to LV dilatation. LVH can be detected by echocardiography as measured by increased LV wall thickening and left ventricular mass - this is considered the gold standard. In this investigation, we examine the correlation between LVH and dilatation detection by electrocardiography and echocardiography in a pediatric population of 50 patients. We aim to characterize a relationship between LVH findings using echocardiography and electrocardiography indices. *Results pending.*

26 - Impact of a protocol restricting the use of umbilical catheter on central venous catheter use in preterm infants: A quality improvement study

Shaneela Shahid, Sourabh Dutta, RESIN, Sandesh Shivananda

Introduction: Central venous catheters (CVC) are often used in modern neonatal intensive care units (NICU). Due to uncertainty of hospital course of infant with an absence of a clear policy/protocol on umbilical catheter use, may potentially sway the frontline staff to over-use umbilical catheters in preterm infants. Objective of our study was to evaluate the feasibility of implementing a protocol restricting the use of umbilical catheters and its impact on incidence of sepsis and resource use.

Patients/Methods: Study population included all inborn preterm infants delivered at less than 33 weeks of gestation and admitted to McMaster University NICU from January 2010 to March 2012. The primary outcome was proportion of infants receiving umbilical catheters (UAC and UVC) during hospital stay. Secondary outcomes were proportion and days of each type of CVC, duration of antibiotics use, length of hospital stay, neonatal morbidities (including CLABSI rate).

Results: The proportion of infants receiving UACs and UVCs was significantly lower in post intervention period versus pre intervention period [93(42.3%) vs. 52 (23.6%), p=0.0001] and [137(62.3%) vs. 93(42.3%), p=0.0001] respectively. There was no corresponding increase in proportion of infants receiving PICC or surgical CVL during the post intervention period [87(39.5%) vs. 65(29.5%), p=0.02] and [6(2.7%) vs. 7(3.2%), p= 0.77)] respectively. There was significant reduction in proportion of infant receiving CVCs (UVC, PICC and Surgical CVL) in post interventional period as compared to pre -interventional period [151 (68.6 %) vs. 110 (50%), $p < 0.001$]. The incidence of sepsis and CLABSI was similar in the two time periods. Length of hospital stay, morbidity and mortality were not significantly different.

Conclusion: Implementation of a protocol restricting the use of umbilical catheters in NICU is feasible and results in significant reduction in proportion of infants receiving UAC and UVC without any corresponding increase in use of PICC or surgical CVLs.

27 - Quality-based strategies are more effective than volume-based strategies in improving survival of VLBW infants

Niels Rochow, Sau-Young Lee, Young-In Kim, Jeff Horbar, Holger Schünemann, Jochen Bredehöft, Christoph Fusch

Introduction: Regionalization of NICUs by closing small units is a common approach to improving neonatal mortality. However, recent studies evaluating annual VLBW-infant admission volume in comparable NICUs have shown weak volume-outcome relationship. As such, statistics have not been able to identify an appropriate volume-based cut-off for unit closures that can optimize overall outcome. Even among units of comparable size, mortality rates vary by a factor of 3, and altogether raising the hypothesis that volume-driven NICU closures have minor effects on the outcome. Aim of this study was to investigate the changes in mortality rates when NICU closures are based on either volume size (VLBW-infants/year) or outcome quality (mortality).

Methods: NICU volumes and mortality rates given in recent publications (Vermont-Oxford-Network, n=22446 VLBW-infants) were used. Centers were closed down stepwise using either volume or quality cut-offs. Infants from these centers were randomly relocated to remaining centers, where the overall mortality rate was subsequently calculated. For each exclusion step, this procedure was repeated 1000 times.

Result: Volume-based strategy required closure of 85% of the units (71% VLBW-infants) to achieve a 5% improvement in mortality. Interestingly, quality-based strategy required closure of only 11% of the units (9% VLBW-infants) to achieve the same improvement in overall mortality.

Discussion: This study shows that quality-based strategies are considerably more effective than volume-based strategies in improving VLBW-outcome. As such, volume-based cut-offs alone are not appropriate for improving VLBW-infant mortality and instead should be combined with other quality indicators.

28 - Audit of hemodialysis adequacy in children over an 8 year period

Justin Kwong, Vladimir Belostotsky

Urea Reduction Ratio (URR) and Kt/V are two formulas used to quantify urea clearance and adequacy of hemodialysis sessions. Internationally accepted consensus standards by the National Kidney Foundation Kidney Disease Outcome Quality Initiative (KDOQI) propose that the achieved clearances should be equal to or greater than adult recommendations of Kt/V>1.2 and URR>65%. We conducted a retrospective chart review of all 10 children who underwent hemodialysis of more than 3 months duration at McMaster Children's Hospital over the last 8 years. The objectives of our study were to 1) establish the frequency of testing for dialysis adequacy against the KDOQI standard of once a month and 2) establish the percentage of adequate hemodialysis sessions against KDOQI standards. We discovered that there was an improvement in hemodialysis frequency of testing and adequacy from pre April 2007 to April 2007-2010 which may be attributable to the hiring of a specialist pediatric hemodialysis nurse. We also discovered improvement in hemodialysis adequacy from April 2007-2010 to April 2010-present which may be attributable to the implementation of 'Crit Line' to provide better control of patient status during each hemodialysis session. In summary, over last 8 years, McMaster Children's Hospital Nephrology service has shown improvement in providing successful hemodialysis and since April 2010 is compliant with KDOQI guidelines for both frequency of measurements and dialysis adequacy.

29 - Management of anemia in hemodialysis patients at McMaster Children's Hospital

Parnian Arjmand, Vladimir Belostotsky

A retrospective chart review assessing Hb, TSAT, Ferritin, dose of iron and dose of erythropoietin was performed to address the management of anemia in all 10 pediatric hemodialysis patients at the McMaster Children's Hospital from 2004 to 2012. We found that measurement of all hematological markers of anemia were performed monthly in 9 out of 10 patients which is compliant with internationally accepted KDOQI guidelines for frequency of measurements. While it was determined that all patients received iron and EPO supplements at some point during dialysis, an accurate record of timing and dose of these administration was not accessible. We found no particular correlation between iron deficiency anemia and low ferritin (<100 ng/mL). Each patient was found to be anemic (Hb<110 g/L) in at least 50% of time. The total percentage of anemic episodes for all patients was 69%. Amongst all anemic episodes, iron deficiency contributed to low hemoglobin in 60% of cases. Either low dose of erythropoietin or resistance to it, could possibly contribute to remaining 40% of cases. Our center results suggest that despite required regular measurement of anemia markers in pediatric hemodialysis patients, iron deficiency should be managed more actively in order to comply with KDOQI guidelines. As well, better records of EPO and iron administration is necessary to aid future assessment of our management and areas of improvement.

30 - Vitamin D levels in children with renal disease and compliance with Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines

Renee Tseng, Vladimir Belostotsky

Aim: Determine whether nephrology service at McMaster Children's Hospital is compliant with the internationally accepted Kidney Disease Outcomes Quality Initiative (KDOQI) guidelines for the prevention and treatment of Vitamin D deficiency in Chronic Kidney Disease (CKD) Patients.

Methods: Charts of 28 CKD patients from September 2008 to September 2011, under the care of the nephrology service at McMaster Children's Hospital, were analyzed. Measurements of serum 25(OH)D, PTH, creatinine, calcium, and phosphate were reviewed, along with accompanying clinic notes for documentation of calcium/phosphate, and Vitamin D/calcitriol supplementation.

Results: All patients had their PTH and 92.9% had their 25(OH)D levels measured at least once. 35.7% of patients were compliant with the KDOQI guidelines for both adequate supplementation and recommended frequency of serum 25(OH)D, PTH, calcium, and phosphate measurements. When adjusted for their stage of CKD: 60% of patients with normal PTH levels, 27.3% with high PTH levels and 20% of patients on vitamin D supplementation had vitamin D levels checked at time intervals recommended by KDOQI. Vitamin D deficiency was identified at least once in 10.7% and vitamin D insufficiency in 25% of patients. Of all serum 25(OH)D measurements from all CKD patients, 4.4% were deficient and 23.3% were insufficient.

Conclusion: A minority of CKD patients at McMaster Children's Hospital were Vitamin D deficient or insufficient. However, the Nephrology Service needs to review its policy of checking vitamin D levels to comply with KDOQI guidelines for the prevention and treatment of Vitamin D deficiency in CKD patients.

31 - Fatty acid profiles in commercially available lipid emulsions and breast milk

Naomi Fink, Gerhard Fusch, Niels Rochow, Christoph Fusch

Background: Growth and development of the preterm infant is influenced by energy intake and nutrient composition. Lipid emulsions (LE) are the main source for energy and essential fatty acids (FA) during preterm infants' critical phase of postnatal adaption. Adverse side effects in infants fed LEs versus breast milk (BM) suggest that these products may not have a metabolically optimal FA profile for neonates.

Aim: 1) To determine how the FA profile of BM obtained from mothers of preterm infants compares to commercially availabl LEs, 2) To determine how the FA profile of BM compares to that of a serum sample obtained 48-72 hours later.

Methods: Extraction and esterification of FAs from 100 uL samples of BM (n=20), LE products (Intralipid, ClinOleic, Lipidem, Omegaven, SMOFlipid) and serum and subsequent analysis of the FA composition using GC/MS.

Results: Preterm BM samples exhibit a markedly different FA profile compared to LEs. Different profiles of FA chain length categories were observed between samples; Lipidem has a high proportion of medium-chain FAs compared to BM, and Omegaven has a high proportion of polyunsaturated long-chain FAs compared to BM and other LEs. Matched pairs of BM and corresponding serum samples do not display comparable FA profiles.

Clinical Significance: LEs do not display a comparable FA profile to that of BM, yet they are intended to replace the lipid portion of BM for infants. The mismatch in FA profile between nutrition source and serum suggest that some FA's are preferentially metabolized and uptaken before others.

32 - Developing individualized models to predict healthy postnatal growth for preterm infants

Preeya Raja, Niels Rochow, Susanne Göttler, Andrea Olbrich, Lehana Thabane, Sandi Seigel, Douglas Campbell, Matthias Heckmann, Johannes Poeschl, Christoph Fusch

Background: It is recommended that postnatal growth of preterm infants match intrauterine growth rates of age-matched fetuses. However, due to irreversible contraction of extracellular water-space during postnatal adaptation, postnatal growth trajectories are below intrauterine trajectories. Which trajectory a preterm infant should ideally adjust to after postnatal adaptation is unknown.

Objective: To develop postnatal growth references of 'healthy' preterm infants, by 1) Characterizing growth of infants requiring minimal postnatal support; 2) Using this data to compute models that predict healthy postnatal growth for an individual infant by inputting clinical data available at birth.

Methods: Inclusion criteria: 30-36 weeks gestational age, admitted to one of five participating centres (2008-2012). Exclusion criteria: maternal diabetes/substance use, major malformation, nCPAP >3 days, proven sepsis, not on full enteral feeds by day of life (DoL)10, unavailable data until DoL14. Day-specific anthropometric data was collected retrospectively from birth until discharge. Regression models to predict growth trajectories were developed using SPSS v.21.

Results: 665 infants were eligible of 6203 that met inclusion criteria. On average, infants experienced maximum weight loss on DoL5, regained birth-weight by DoL11 and had stable growth during DoL7-21. At birth, infants were 96±16% of recommended weight-for-age, but adjusted to 84±13% by DoL14. The z-score difference from birth on DoL14 was -0.8±0.3. Multiple linear regression models accurately predicted weight at DoL 7, 14 (n=665; R2=0.94,0.89) and 21 (n=334; R2=0.85).

Conclusions: These results provide robust estimates of postnatal growth trajectories for preterm infants. Future steps include extending models to 24 weeks of gestation and validating models.

33 - Body composition assessment in neonates: Comparison of air displacement plethysmography (PEAPOD) vs. skinfold thickness (SFT) measurement

Sujane Kandasamy, Monisha Nundy, Sonia Anand, Gita Wahi

Background: Infant adiposity provides insight into nutrition, growth patterns, and obesity later in life. Skinfold thickness (SFT) is a simple method for estimating body fat yet with high inter-operator variability. The PEAPOD is another non-invasive instrument to measure body composition and is an emerging tool to measure adiposity in infants.

Objective: Among term neonates, to compare two methods of estimating percent body fat (%BF) in neonates: skinfold thickness (SFT) versus air displacement plethysmography (PEAPOD). Methods: Skin fold thickness - bicep, tricep, subscapular, and suprailiac - were measured in each infant and %BF was estimated. Each infant was placed in the PEAPOD for measurement of body composition. Linear regression analysis was used to calculate the Pearson's correlation coefficient (r). A Bland-Altman analysis was done to assess the agreement in %BF estimated by SFT vs. PEAPOD.

Results: There were 20 neonates in the sample (50% female). The mean (sd) age was 23.9 (19.6) hours; birth weight 3.2(0.5) kg and length 50.1(3.1) cm. The correlation (r) between PEAPOD and SFT for estimating %BF was $r = 0.73$ ($p < 0.001$). Average difference between %BF from SFT and PEAPOD was 6.99% (95%CI 0.13, 13.85). There was a significant association, $r = 0.56$ $p = 0.01$, between the difference in %BF measured by SFT and PEAPOD and the average %BF from SFT and PEAPOD measurements.

Conclusion: The correlation between %BF estimated by SFT and PEA POD was strong. The SFT overestimated %BF compared to PEAPOD.

34 - Preliminary report: Body composition of preterm infants using air displacement plethysmography during the first weeks of life

Jennifer Chin, Niels Rochow, Gerhard Fusch, David Pogorzelski, Christoph Fusch

Aim: Establish longitudinal reference data of preterm infant body composition (BC) and growth using air displacement plethysmography at bedside.

Design/Methods: Ongoing, single-centre, longitudinal, observational study of preterm infants. Inclusion criteria: 24-36 weeks gestational age (GA), infants without IV lines and stable off respiratory support for 7 min, written and informed consent. Exclusion criteria: chromosomal or congenital abnormalities, hydrops fetalis. BC assessed by PEA POD daily for the first 21 days of life, then twice per week. Weight, length, head circumference collected once per week. Infants assessed from study inclusion to hospital discharge.

Results: A total 180 measurements of 60 preterm infants (GA range at birth: 27-36 1/7 weeks) were performed. Percent fat mass (%FM) of preterm infants at postmenstrual ages 30, 31, 32, 33, 34, 35, 36 weeks were 8.1±3%, 6.2±3%, 8.1±4%, 6.8±4%, 8.9±6%, 11.6±6% and 10.9±5% respectively. Fat free mass and FM accretion occurred at different rates leading to an overall %FM increase after sufficient caloric intakes were established. Preliminary data suggests that %FM is not predicted by GA at birth. No infant experienced an adverse event relating to a measurement.

Discussion: Successfully established the infrastructure needed to routinely measure preterm infant BC at bedside in the NICU indicating PEA POD's feasibility for clinical use. To our knowledge, this is the first longitudinal, observational data of preterm infants measured so soon after birth using PEA POD.

35 - Validation of surrogate limb analysis for measures of body composition in 3 year-old children by dual energy x-ray absorptiometry

Dilisha Rodrigopulle, Stephanie Atkinson

Dual energy x-ray absorptiometry (DXA) is recognized as the 'gold standard' for measurement of body composition and provides the benefits of low dose radiation, quick scan time, and multiple measurement options. Challenges arise in scanning young children, particularly when subjects move their limbs during the scan. To address this limitation, we aimed to validate the use of surrogate limb substitutions compared to whole body scans for measuring fat, lean and bone mass in 3 year old children. A total of 451 DXA scans (Hologic Inc, Waltham, MA) were obtained as part of an ongoing birth cohort study. The analysis included 246 scans that had normal positioning and no limb movement. By replacing the measurements of one scanned limb with those of the opposite limb we obtained an estimate value that was compared to the whole body scan for fat, lean and bone mass, percent whole body fat and total mass. In comparing surrogate limb measurements to the whole body measurements, there were significant correlations for all body composition variables ($P<0.005$, $R2= 0.970-0.997$). Bland-Altman analysis demonstrated high levels of agreement between estimates that included one surrogate limb and whole body measurements. This study supports using limb surrogate methodology for fat mass, lean mass, BMC, percent fat and total mass, as a valid alternative in analyzing young children with DXA scans in which a single limb is affected by movement or other artifacts in the scan field. This will allow greater inclusion of scans with movement artifacts in a single limb.

36 - Establishment and validation of a flow cytometric (FC) method to detect circulating endothelial cells (CECs) in blood of preterm infants

Sau-Young Lee, Balpreet Brar, Niels Rochow, Kaarthigeyan Kalaniti, Salhab el Helou, Gerhard Fusch, Denis Snider, Christoph Fusch

Background: Enumerating CECs - a biomarker of vascular injury - is difficult in preterm infants due to relatively large blood volume required for FC analysis (>4mL). There is need for establishing a mico-method feasible for a preterm population. Objective: To establish a FC method of enumerating CECs for a preterm population (≤0.5mL).

Method: Adult peripheral and cord blood from term pregnancies were processed by PBMC isolation. CECs were identified as CD31+; CD146+; Syto16+; CD45-; CD14-; CD133- and their morphology was assessed using TEM. Intra-sample variability was assessed by processing 5 aliquots of the same sample in parallel (n=5). To test the precision in enumerating CECs from cord blood (0.45mL in reference to 4.5mL), duplicates of each volume was processed simultaneously (n=5). To assess the feasibility of the method in clinical settings, temporal decline in CECs was evaluated in stored whole blood (0, 12, and 24 h after sampling; n=10-12) as well as stained cells that are stored either post fixed or unfixed (0, 1 and 2 d post processing; n=6). Absolute CEC count was determined using a hematological analyzer.

Results: Mean frequency of CECs/1000 lymphocytes in adult and cord blood (n=10) was 0.10‰ and 0.23‰, respectively. The average CV in cord blood (0.45mL) and adult peripheral blood (4.5mL) was 23% and 19%, respectively. Average enumeration in 0.45mL was 1.5 times the reference volume. No significant decline in CEC levels was observed over the course of analysis.

Conclusion: This method is reproducible and feasible for use in clinical studies for preterm population.

37 - Analysis of salivary cortisol via liquid chromatography-tandem mass spectrometry (LC-MS/MS)

Dhruvin Hirpara, Gerhard Fusch, Arum Choi, Christoph Fusch

Background: The Neonatal Intensive Care Unit (NICU) can be a potentially stressful environment for patients, parents and health care providers alike. Cortisol is a promising biomarker for quantifying stress, and has long been used as a diagnostic tool to measure adrenal function. Salivary cortisol is of special interest, due to its non-invasive and stress free nature of sample collection.

Objectives: To develop and validate a method for quantifying salivary cortisol levels using a tandem mass spectroscopy. Secondly, to apply the method in healthy, adult, volunteers to examine daily cortisol profiles, the influence of perturbations (i.e. intake of drinks) on baseline salivary cortisol levels as well as the stability of cortisol in acidic solutions.

Methods: Analyses were performed with a Waters UPLC-TQD using the mass transitions of m/z 363.2/121.1 for cortisol and 365.2/121.1 for the internal standard cortisol-d2 respectively. Proteins were removed by acetonitrile precipitation.

Results: 1) The intra-day and inter-day precision was found to be 11.1% and 11% respectively. 2) Circadian cortisol profiles in adult volunteers (n=6), show an overall decrease in salivary cortisol concentration throughout the day, with peak values observed during the early morning hours. 3) Salivary cortisol levels are decreased in response to drink intake, (n=7 volunteers), with mean concentrations eventually leveling out over a 2-hour period. 4) Cortisol, acidic is stable in acidic solutions leading to higher intensity signals than in solutions with lower pH values.

Conclusion: This method has the potential to assess stress levels and therefore improve health care in the NICU.

38 - Effects of intestinal microbiota on the development of dopaminergic neurons in the mouse enteric nervous system

Kal Mungovan, Rajka Borojevic, Elyanne Ratcliffe

Background: Colonization of the gastrointestinal (GI) tract begins at birth and proceeds rapidly over the first few years of life. During this time, the enteric nervous system (ENS), the intrinsic nervous system of the gut, continues to undergo significant morphological and functional changes. Disruptions in microbial colonization could alter ENS development and later GI function. The present study was designed to elucidate changes in ENS circuitry brought about by intestinal microbiota.

Methods: The ENS of conventional, specific pathogen-free (SPF) mice was compared to that of mice raised in a germ-free (GF) environment at two time-points: postnatal day 1 (P1) and P7. Whole-mount preparations of small and large intestines from each of these time-points were double-labeled immunohistochemically with antibodies to a pan-neuronal marker as well as to the rate-limiting enzyme in the synthesis of dopamine, tyrosine hydroxylase.

Results: There was no significant difference in the number of dopaminergic neurons in GF and SPF mice in any region of the intestine examined at P1. However, at P7, the ileum of SPF mice had a significantly greater number of dopaminergic neurons than that of GF mice.

Conclusions: The results of the present study suggest that enteric microbiota are capable of altering the development of the ENS. However, one day of exposure to intestinal flora may not be sufficient to elicit major changes in enteric circuitry. The reduced proportion of dopaminergic neurons in GF mice at P7 may account for some of the previously reported functional changes in juvenile GF mice.

39- Identifying mechanism(s) of TNF-α release in the placenta perfusion model

Tarushika Vasanthan, Niels Rochow, Firoz Mian, Gerhard Fusch, Christoph Fusch

Background: To investigate how a maternal bacterial infection like chorioamnionitis elicits fetal inflammation, the response of pro-inflammatory cytokine TNF-α, upon LPS stimulation was examined using the placenta perfusion model. High TNF-α levels in perfusates without LPS stimuli indicated an activation of the inflammatory pathway that cannot be attributed to the added LPS, suggesting there is a pre-existing entity capable of activation.

Objective: Determine the underlying mechanism(s) for TNF-α release.

Methodology: To examine if the materno-feto-placental unit contributed to elevated TNF-α levels, maternal blood (N=18), cord blood (N=18) and placental tissue (N=18) were analyzed. To determine if the perfusion system was a potential source for TNF-α activation, solutions were circulated through the system and incubated in mouse macrophage cells lines. TNF-α expression was analyzed via an ELISA.

Results: TNF-α levels in maternal and cord blood were within physiological range (<10pg/mL). Mild TNF-α release was observed in placental tissue (<90 pg/g). Solutions that were circulated through the perfusion system and the perfusion media alone exhibited high TNF-α levels (>2500 pg/mL).

Conclusion: The materno-feto-placental unit did not contribute to high TNF-α release. High TNF-α levels in the perfusion system and media indicated contamination of the solution and equipment. Current efforts are focused on validating a cleaning protocol effective in LPS removal. Establishing a cleaning procedure effective in LPS removal has applications in sterilizing equipment that are not heat resistant (i.e. medical and laboratory equipment).

40 - Transfer of lipopolysaccharide across the maternal-fetal interface of the placenta and its effect on TNF-α secretion

Geerthana Jeyakumar, Gerhard Fusch, Niels Rochow, Christoph Fusch, Tarushika Vasanthan

This study investigates the transfer of Lipopolysaccharide (LPS), an endotoxin, across the maternal-fetal interface of the placenta using a dual in-vitro placenta perfusion system. LPS contains an active receptor that promotes dose- and time- dependent increases in proinflammatory cytokines including tumor necrosis factor-α (TNF-α), causing intrauterine inflammation, rupturing of the amniotic sac, and oftentimes, premature delivery. It was hypothesized that a higher TNF-α concentration be detected in LPS-stimulated perfusions versus control perfusions, as the transfer of LPS across the maternal-fetal interface can result in LPS-induced TNF- α secretion. It was also expected that in LPS-stimulated perfusions, maternal LPS values decrease and reach equilibrium, while fetal LPS values increase and reach equilibrium, demonstrating transfer between the interface. In the results gathered, TNF-α values showed a time-dependent increase in both the maternal and fetal sides. However, LPS was not detected in the LPS Sandwich-ELISA assay. This means that the LPS used was nonfunctional, did not have enough time to create a noticeable stimulation in the placental tissue, or was unable to bind to the primary or secondary antibody of the ELISA. This elucidates why there were no significant differences between TNF-α values in LPS-stimulated versus control perfusions. The time-dependent increase in TNF-α values can be explained by maternal and fetal stress on the placenta from delivery or previous contamination in the system. Looking forward, to ensure a more accurate detection of LPS concentrations in collected perfusates, perfusions should be run for more than 5.5 hours.

41 - 'Artificial Placenta': A lung assist device for neonates

Asmaa Manan, Niels Rochow, Wen-I-Wu, Gerhard Fusch, Ravi Selvaganapathy, Christoph Fusch

Background: Respiratory failure is a major cause of mortality and long-term morbidity in preterm infants. Based on the concept of the placenta we previously reported the development of a pump less lung assist device (LAD), which is connected via the umbilical vessel. In vitro testing with different gas permeable membranes demonstrated that a polydimethylsiloxane (PDMS) membrane provides the most effective gas exchange in LAD.

Objective: Assess the performance of PDMS membrane LAD (i) In vitro and (ii) In vivo in a new-born piglet model.

Method: The LAD is a parallel array of single oxygenator units (SOUs). An SOU is composed of a micro fluidic network bonded to a PDMS gas permeable membrane through micro contact printing. (i) In vitro: Human blood was deoxygenated to an oxygen saturation value of 40%. Pre, and post LAD blood samples were taken and assessed for gas exchange at flow rates varying from 5-40mL/min. (ii) In vivo: Subsequently, the LAD was attached via umbilical vessel to a newborn piglet. Flow rate and gas exchange data of LAD was recorded. Results: (i) In vitro: LAD provides 1.9ul/min/cm2 of O2 function while removing 9.4ul/min/cm2 of CO2. (ii) In vivo: A maximum flow rate of 57ml/min was achieved. Via the umbilical vessels, (flow rate= 13.5ml/min), the LAD provides 3ul/min/cm2 of O2 function, while simultaneously improving the oxygen saturation by 15%.

Conclusion: In vitro results indicate LAD can potentially support 10% neonatal lung function. Further experiments are needed to validate gas exchange performance in vivo.

42 – Neonatal outcomes of late preterm infants born after evidence based versus non-evidence based indication of late preterm delivery

Fawzah Alrwuili, Sladajna Bulatovic-Stajkovic, Prakesh Shah, Sarah McDonald, Kellie Murphy, Kate Bassil, Lucy Giglia

Background: Late preterm birth (between 34 0/7 and 36 6/7 weeks gestational age) is associated with complications such as respiratory distress, hypoglycemia, hypothermia, hyperbilirubinemia, sepsis, feeding difficulties and seizures.

Objective: The objective of this study was to compare respiratory distress, feeding requiring support, hyperbilirubinemia, hypoglycemia and sepsis between late preterm infants who were delivered with documented evidence based (EB) versus non-evidence based (NEB) indications for late preterm delivery.

Methods: A retrospective cohort study was completed at two tertiary care referral centers involving late preterm infants admitted between August 1st 2010 and July 31st 2011. Definitions of EB and NEB indications were based on the medical literature and determined a priori by the research team. The frequency of outcomes were compared between the two groups using Pearson Chi-square test for categorical variables and logistic regression for Odds ratios.

Results: During the study period, a total of 783 infants were born between 34 0/7 and 36 6/7 wks gestational age. Sixteen infants were excluded due to lack of maternal information. A total 148 infants who were from a twin pair, were randomly excluded from the analysis to account for the correlation between the outcomes among twins within a twin gestation. The remaining co-twin remained in the analysis to represent the pregnancy outcomes. Thus, 619 infants were included in the analysis. There were 445 (71.9%) EB deliveries and 174 (28.1%) NEB deliveries. The mean gestational age was lower for infants born with EB indications for delivery (35.3 + 0.8 versus 35.5 + 0.7, $p<0.01$) when compared to NEB. Similarly, birth weights for EB were lower when compared to NEB infants (2544 + 509 vs 2678 + 497, $p< 0.01$). No statistically significant differences were noted with respect to: respiratory distress (OR 1.21 (95% CI 0.80,1.82), feeding requiring support (OR 1.35(95% CI 0.92,1.99), hyperbilirubinemia (0.94 95% CI 0.63,1.42) or hypoglycemia (OR 1.24 (95% CI 0.66, 2.34). Four cases

of sepsis were identified in the EB infants and none in NEB.

Conclusion: Neonatal complications are common among late preterm infants. Our research shows that late preterm infants born with EB versus NEB indications are at similar risk for developing complications during the neonatal period. Therefore, caution should be exercised when making the decision to deliver a late preterm infant without evidence based indications.

43 - Target fortification of breast milk for preterm infants - What is the ideal measurement frequency?

Niels Rochow, Gerhard Fusch, Anaam Ali, Bianca Zapanta, Christoph Fusch

Background: Target fortification (TFO) standardizes the macronutrient composition of breast milk (BM). We have shown that TFO in preterm infants improved growth rates. However, TFO adds considerable amount of work load to the NICU: time required for BM composition measurement, TFO calculation and documentation is 10-12 min per patient. We acknowledge that daily BM analysis may not be feasible in all locations, particularly in units with limited resources.

Objective: To analyze the variation of macronutrients in BM when TFO is done at different frequencies.

Method: Single-center, prospective study; 10 stable, fully BM fed VLBW infants on TFO. Calories, fat, protein and carbohydrates were measured on a daily basis (n=295). Single additives of fat, protein and carbohydrate were added to routinely fortified BM (fat: 0.36, protein: 1, carbohydrate: 1.8g/100mL) to achieve a target concentration of fat 4.4, protein 3, carbohydrate: 8.8g/100mL. The variation in calories and macronutrients was modelled with varying frequency of BM measurements (daily, weekdays, Monday/Wednesday/Friday, Monday/Thursday, and Monday) and compared to native BM.

Results: Average composition of kcal was 65±8, fat: 4.1±0.9, protein: 1.2±0.2, carbohydrate: 5.8±0.2g/100mL. A measurement frequency of 1x per week reliably increased the average intake to the desired level, however still with considerable day-to-day variation. Day-to-day variation of macronutrients decreased as the frequency of milk analysis increased.

Conclusions: The mean macronutrient intake was stable and independent of which approach was used. We believe that in units with limited resources a weekly measurement of macronutrient content might provide a reasonable balance between workload and outcome.

44 - Accuracy in the reporting and recording of immunization status upon admission to a tertiary pediatric hospital

Michelle Lee, Nicole Shea, Jeffrey Pernica

Background: In recent years, new vaccines have been added to the Ontario publicly-funded immunization schedule - making it increasingly difficult for health care providers and parents to ensure that children are kept truly 'up-to-date'. Hospital admissions could be an opportunity to identify missed vaccinations.

Objectives: 1) To assess the accuracy of immunization RECORDING by comparing hospital records to the reference standard (GP and public health records). 2) To assess the accuracy of immunization REPORTING by the parents.

Methods: All pediatric patients greater than 4 months admitted to MUMC in July-August 2012 were eligible to participate (excluding Oncology & Psychiatry). The medical record was reviewed and caregiver was questioned regarding the child's vaccinations; then both GP and Public Health were contacted to obtain immunization records. Criteria for being 'up-to-date' were established for different age categories using Ontario immunization schedules (1993-present).

Results: 212 eligible patients were enrolled. Preliminary analysis showed that 52% of hospitalized children did not have their immunization status recorded. Only 25% of our sample were found to be fully immunized when their primary care/Public Health records were verified. The positive predictive value of being fully immunized if declared 'up-to-date' by the admitting team was only ~40%.

Conclusion: It appears that a significant proportion of children admitted to our hospital are not optimally immunized, even though most of the caregivers in our sample had not refused vaccination. Developing a system to automatically verify immunization status may be more useful than relying solely on parental report. Further immunization education might be beneficial.

45 - Social Anxiety and Autism Spectrum Disorders in Duchenne and Becker Muscular Dystrophy

Lia Abigail Siapno, Teresa Carter

Background: Dystrophinopathy patients have a higher prevalence of autism spectrum disorders (ASD) compared to the general population. The most recent CDC figures indicate a general population ASD prevalence of 1.13%.[1] There are several studies finding higher rates of social anxiety disorder in first-degree relatives of autistic probands versus controls.[2] Social anxiety is a chronic debilitating condition that should be recognized to facilitate early intervention.[3] In the general pediatric population, the prevalence range from 3-5%.[4] However, among those affected with dystrophinopathies, there is little evidence available on social anxiety as a co-morbidity.

Objective: To determine if social anxiety co-occurs with dystrophinopathies (Duchenne, intermediate and Becker) at a greater frequency than in the general population

Method: Patients that are regularly seen at our multidisciplinary neuromuscular clinic and evaluated by the clinic developmental pediatrician were identified by chart review. A total of 63 dystrophinopathy patients were identified in our clinic: 81% (51/63) had Duchenne muscular dystrophy, 14.3% (9/63) had Becker muscular dystrophy and 4.7% (3/63) had intermediate type.

Results: We identified 35% (22/63) of patients with anxiety issues. Social anxiety was present in 25.4% (16/63) of all patients; selective mutism manifested in 18.8% (3/16) of the patients with social anxiety. The prevalence of ASD was 11.1% (7/63) in our patient population.

Conclusion: This study identifies a heightened association with social anxiety and autism spectrum disorders occurring in boys with dystrophinopathies; the prevalence rates are higher in comparison to the general population (25.4% vs. 3-5%) and (11.1% vs. 1.13%). It supports studies that show that the dystrophinopathies are not only a muscular disorder but also a disorder affecting the brain.[6] In the future, studies should consider the correlation between these social conditions and the dystrophinopathies either at the genetic or protein level. Clinical awareness should be heightened because social anxiety creates further impairment in terms of academic function, peer relationships and

community participation in patients with existing muscular dystrophy.

References

1. Autism and Developmental Disabilities Monitoring Network Surveillance Year 2008 Principal Centers for Disease Control and Prevention Prevalence of autism spectrum disorders--Autism and Developmental Disabilities Monitoring Network, 14 sites, United States, 2008. MMWR Surveill Summ. 2012 Mar 30;61(3):1-19.
2. Schneier FR, Blanco C, Antia SX, Liebowitz MR. The social anxiety spectrum Psychiatr Clin North Am. 2002 Dec;25(4):757-74.
3. J Piven, P. Palmer Psychiatric disorder and the broad autism phenotype: evidence from a family study of multiple-incidence autism families Am J Psychiatry, 156 (1999).
4. S.L Smalley, J. McCracken, P. Tanguay Autism, affective disorders, and social phobia Am J Med Genet, 60 (1995), pp. 19-26
5. Costello EJ, Angold A. Epidemiology, Anxiety Disorders in Children and Adolescents. March JS (Ed.), Guilford Press, New York, NY, USA, 109-124 (1995).
6. Hendriksen JG, Vles JS. Neuropsychiatric disorders in males with duchenne muscular dystrophy: frequency rate of attention-deficit hyperactivity disorder (ADHD), autism spectrum disorder, and obsessive--compulsive disorder. J Child Neurol. 2008 May;23(5):477-81. Epub 2008 Mar 19.

46 - Examining predictors of self-management skills in teenaged survivors of childhood and adolescent cancer

Iqra Syed, Ronald Barr, Paul Nathan, Zahava Rosenberg-Yunger, Norma D'Agostino, David Dix, Leigh-Anne Ward, Anne Klassen

Purpose: Self-management skills are one of the most important barriers/facilitators of transition from pediatric to adult long-term follow-up care in childhood cancer survivors. The aim of this study was to identify factors that predict self-management skills in teenage cancer survivors.

Method: A sample of 184 childhood cancer survivors aged 15 to 19 years was recruited as part of a larger study to develop a new 15-item Self-Management Skills (SMS) scale. Patients were recruited from 3 Canadian pediatric cancer centres between July 2011 and January 2012. In addition to the SMS scale, patients were asked demographic, clinical, lifestyle (i.e., cigarettes, alcohol and drug use) and cancer worry questions. Linear regression was used to examine the association between SMS and the range of independent variables after controlling for hospital and method of recruitment (i.e. mail and clinic).

Results: Higher SMS scores (i.e., more skills) were significantly associated with the following independent factors: older age (β= 1.23, 95% confidence interval (CI)= 0.10-2.36), being female (β= 4.58, 95% CI= 1.81-7.36), engagement in 1 (β= 3.75, 95% CI= 0.50-7.01) and 2 or more (β= 7.10, 95% CI= 2.30-11.91) risky behaviours, and having leukemia versus central nervous system (CNS) cancer (β = 7.86, 95% CI= 1.97-13.74).

Conclusions: Interventions designed to promote self-management skills in childhood cancer survivors should target younger patients, males, and patients with CNS tumours to improve these skills before transition. Future research is required to better understand the positive association between engagement in risky behaviours and self-management skills.

47 - Levels of evidence in pediatric literature: A comparison between top medical journals and general pediatric journals

Dustin Jacobson, Kunal Bhanot, Blake Yarascavitch, Jennifer Chuback, Ehud Rosenbloom, Mohit Bhandari

Background: Evidence-based medicine and levels of evidence (LOE) have become important cornerstones in medicine. Given the large number of publications in all fields of practice, it is essential that clinicians focus on the resources that provide the highest LOE.

Methods: Clinical pediatric literature, published between April 2011 and March 2012 inclusive in high-impact clinical journals (HICJ) (NEJM, JAMA, & The Lancet) and the highest-impact general pediatric journals (GPJ) (Pediatrics, Journal of Pediatrics, & Archives of Pediatrics & Adolescent Medicine), was assessed by two independent reviewers. In addition to LOE, articles were evaluated on several secondary parameters. Eligible level I randomized control trials (RCTs) were appraised using the Consolidated Standards of Reporting Trials (CONSORT) guidelines.

Findings: Over 6000 articles were screened, of which 804 met inclusion criteria. On average, LOE in pediatrics-focused articles within The Lancet were significantly higher than all GPJ ($p<0{\cdot}05$). The Lancet had significantly higher proportions of level I & II evidence compared to all other journals ($p<0{\cdot}05$). Average CONSORT scores were significantly higher in HICJ vs. GPJ (15·2 vs. 13·6, respectively, $p<0{\cdot}001$) Reliability in assessing LOE and CONSORT was excellent between reviewers.

Interpretation: LOE and quality of RCTs within the pediatric field is greatest within HICJ, with The Lancet publishing higher proportions of level I & II evidence than all other journals and having higher mean LOE compared to GPJ. Therefore, in addition to GPJ, medical professionals should readily incorporate HICJ into their repertoire of clinical sources.

48 - Systematic review of rapid infuser device product monographs for pediatric content

Parker MJ, Urbanski S

Background: Rapid Infuser Devices were developed primarily for use in adult trauma patients, however these medical devices are available and used in many pediatric hospitals.

Objective: To systematically search for and identify Rapid Infuser Devices currently approved for clinical use in humans and to review the full product monographs for instructions or warnings regarding use in children.

Methods: A modified systematic review was conducted. PRIMSA guidelines were followed in spirit and adapted as required. National regulatory bodies responsible for medical device licensing were identified and accessible on-line databases systematically searched. To augment database searching, Google and Medline were searched and contact was made with hospital procurement staff. Device titles and descriptors were screened, and a device was included if prespecified criteria were met. Operating manuals of qualifying devices were then obtained and data was extracted using a data collection form.

Findings: Eight registry databases for medical devices were identified of which 3 were publicly accessible to search [Health Canada Medical Devices Active License Listing (MDALL) database, U.S. Food and Drug Administration medical device database, Australian Register of Therapeutic Goods (ARTG)]. Access to the WAND (New Zealand), MHLW (Japan), China SFDA, and EUDAMED (European Commission) databases was restricted. Three qualifying devices were identified. Device operating manuals provided no instruction or warning regarding use in children, though one had pediatric/neonatal set which permitted flow rate adjustment.

Conclusions: Rapid Infuser Device product monographs provide no instruction to practitioners regarding use in children, including age/weight thresholds for use or relevant safety considerations.

Acknowledgements

Planning Committee

Dr. Stephanie Atkinson
Dr. Lucy Giglia
Dr. Sandy Raha
Lindsay Akrong
Joyce Obeid
Elizabeth Fonseca

Judges

Dr. Stephanie Atkinson
Dr. Ronald Barr
Dr. Christoph Fusch
Dr. Anne Klassen
Dr. Melissa Parker
Dr. M. Constantine Samaan
Dr. Jonathan Schertzer
Dr. Sandesh Shivananda
Dr. Deborah Sloboda
Dr. Brian Timmons
Dr. Christine Wekerle

Oral Session Co-Chairs

Dr. Karen Choong
Dr. Brian Timmons

Research Supervisors

Dr. Sonia Anand
Dr. Stephanie Atkinson
Dr. Vladimir Belostotsky
Dr. Mohit Bhandari
Dr. Herbert Brill
Dr. David Callen
Dr. Teresa Carter
Dr. Karen Choong
Dr. Christoph Fusch
Dr. Lucy Giglia
Dr. Jan Willem Gorter
Dr. Steven Hanna
Dr. Andrea Hunter
Dr. Anne Klassen
Dr. Kristen Hallett
Dr. Moyez Ladhani
Dr. Tapas Mondal
Dr. Katherine Morrison
Dr. Melissa Parker
Dr. Jeffrey Pernica
Dr. Elyanne Ratcliffe
Dr. Peter Rosenbaum
Dr. Ehud Rosenbloom
Dr. Sandesh Shivananda
Dr. Brian Timmons
Dr. Rahim Valani
Dr. Gita Wahi

Many thanks to the McMaster University Faculty of Health Sciences **Department of Pediatrics** & **Post-Graduate Committee** and the **Percy Williams Memorial Fund** for generously sponsoring this event.

Department of Pediatrics
Faculty of Health Sciences
1280 Main Street West, HSC 3A
Hamilton, ON L8S 4K1