NEONATAL-PERINATAL MEDICINE (PLATFORM PRESENTATIONS) PRÉSENTATIONS PLATEFORMES EN MÉDECINE NÉONATALE ET PÉRINATALE

1

EARLY CPAP USE AND ITS IMPACT ON VLBW OUTCOMES

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BACKGROUND: Recent RCTs have shown that CPAP is safe & feasible for preventing routine intubation in delivery room & shortens the duration of intubation after extubation. However, it also increases risk of airleaks.

OBJECTIVE: To determine the trends in early CPAP use & its impact on outcomes of VLBW babies admitted to Canadian NICUs.

DESIGN/METHODS: A retrospective study of VLBW infants was done in participating CNN NICUs between 2003 & 2008. Yearly data on demography, interventions (CPAP, IMV, HFV, indomethacin, surfactant, pressors, antenatal & postnatal steroids) & outcomes untill discharge were extracted from CNN database. The proportion of infants using CPAP on day 1 & 3 were used as indicators of early CPAP use. Trends in CPAP use over time & its relationship with outcomes were analyzed.

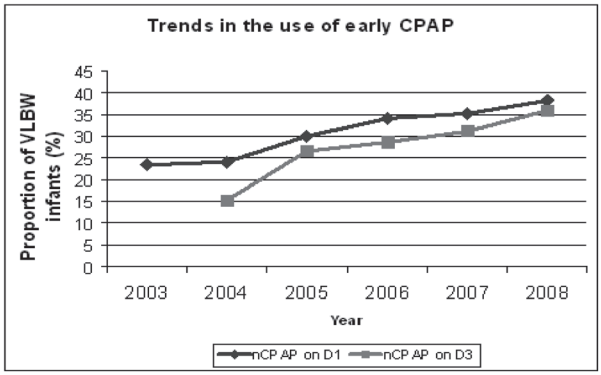
RESULTS: There were 12,056 infants. The median gestational age, birth weight & SNAP scores were 28w, 1065g & 9 respectively. 51%, 78% and 62% of infants were males, inborn and delivered by C section. The proportion of infants receiving early CPAP & antenatal steroids increased and pressors reduced significantly overtime. Other interventions & demography did not change. The incidence of BPD or pneumothorax did not change, but nosocomial infection (NI), ventricular enlargement/parenchymal echodensities and ROP reduced overtime. With increased use of CPAP on D3, there was significant reduction in NI (p=0.008, r=–0.97) & ROP (p=0.02, r=–0.93). A trend towards lower mortality (p=0.06, r=–0.85), BPD at 28d (p=0.06, r=–0.86), & BPD at 36w (p=0.06, r=–0.87) was also observed [Table][Figure].

Table: Early CPAP use and VLBW outcomes*

	2003	2004	2005	2006	2007	2008	p value#
CPAP D1	23	24	30	34	35	38	0.001
CPAP D3	NA	15	27	29	31	36	0.01
Pressor use	19	16	14	14	13	12	0.005
Antenatal steroid use	64	68	78	79	78	80	0.02
NI	2.4	2.4	2.3	2.2	2.2	2.1	0.01
ROP stage ≥3	9.1	10.9	6.3	7.7	6.3	5.7	0.06
VE/PEC	13.7	14.0	14.0	13.9	11.9	12.0	0.08
Pneumothorax	3.8	4.2	3.8	4.3	4.8	4.1	0.26
BPD 28d	33.4	38.0	33.4	35.4	34.6	33.1	0.59
BPD 36w	27.2	28.7	26.0	27.5	26.5	24.5	0.12
Mortality	11.7	12.3	10.5	10.4	11.0	10.4	0.11

*** proportion of patients (%), #change over time**

Figure:



CONCLUSIONS: Early CPAP may be associated with improved outcomes in VLBW.

2

INCREASED RISK OF BRONCHOPULMONARY DYSPLASIA IN PRETERM SMALL FOR GESTATIONAL AGE INFANTS BORN AT ≤32 WEEKS GESTATION IN CANADA: A MULTICENTRE STUDY

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BACKGROUND: Preterm SGA infants have been reported to have significantly higher risk for death and possibly BPD compared to preterm non-SGA infants. The risk of BPD in SGA preterm infants has not been studied in a large population cohort.

OBJECTIVE: To compare risk of BPD and other neonatal outcomes among preterm SGA, AGA and LGA infants who were born at <=32 weeks GA and were admitted to participating NICUs in the Canadian Neonatal Network.

METHODS: Neonates born at <=32 weeks GA and admitted to participating NICUs during the period 2006-2007 were included in this study. Preterm infants were divided into three groups: SGA, AGA, and LGA according to GA and sex based population standard. Demographic information, perinatal risk factors, and severity of illness at admission were compared. Data on common neonatal outcomes were compared in univariate and multivariate logistic regression between groups.

RESULTS: Of the 21810 infants admitted to participating NICUs, 6343 were born at <=32 wks GA. Of these, 6295 (99.2%) were eligible for inclusion in this study. Baseline comparison revealed higher number of infants with BW <750g and higher SNAP–II scores in SGA group compared to AGA and LGA groups. Results of univariate and multivariate (adjusted for confounders and baseline characteristics) analyses for neonatal outcomes are reported in the table 1.

Table 1

Outcome	SGA N=638	AGA N=5261	LGA N=396	Unadjusted OR(95%CI)	Adjusted OR(95%CI)
BPD at 36 wks CGA	182(31%)	1063(22%)	65(18%)	1.64(1.4-1.9)	2.46(1.9-3.1)
Nosocomial infection	143(22%)	892(17%)	70(18%)	1.42(1.1-1.7)	1.56(1.2-1.9)
Severe brain injury (Grade 3 or 4 IVH or PVL)	54(10.5%)	544(14.1%)	46(17.7%)	0.72(0.5-0.9)	1.10(0.8-1.5)
ROP stage 3 or more	39(11%)	264(12%)	12(9%)	0.90(0.6-1.2)	2.28(1.4-3.5)
Death ≤28 days	38(6%)	308(5.9%)	33(8.3%)	1.02(0.7-1.4)	1.53(1.01-2.3)
Death >28 days	19(3%)	80(1.5%)	4(1%)	1.99(1.2-3.3)	2.42(1.41-4.1)

Adjusted for GA, mode of birth, sex, birth place, Apgar score, antenatal steroids, SNAP-II score and plurality

CONCLUSIONS: Preterm SGA infants had higher risk of BPD at 36 weeks PMA compared with preterm AGA infants in Canadian NICUs. There were higher odds of nosocomial infections, severe ROP and mortality (<=28 days and >28 days). This confirms other reports of adverse outcomes for this group of infants from a large national cohort.

3

IMPACT OF FEEDING METHODS ON BREATHING PATTERN IN PRETERM INFANTS

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BACKGROUND: In preterm infants, slow-infusion feeding (SF) is sometimes used to reduce apnea associated with bolus feeding (BF). It is not known if SF affects breathing pattern. The diaphragm electrical activity (EAdi) waveform allows quantification of the neural breathing pattern including respiratory effort and timing and can identify central apnea.

OBJECTIVE: To evaluate the effect of enteral feeding methods on neural breathing pattern in very low birth weight preterm infants.

METHODS: Non-ventilated preterm infants who were tolerating feeds of >=150ml/kg/d were eligible. A modified feeding tube with miniaturized

sensors was inserted for continuous EAdi measurement. After 15 min of baseline (BL) measurement, infants were randomized to either BF or SF (over 90 min), followed by a crossover to the other feeding method. Five 15-min epochs were analyzed: BL, 15 and 90 min after BF (BF15, BF90) or after SF started (SF15, SF90). EAdi was analyzed for neural inspiratory and expiratory times (Nti, Nte), neural respiratory rate (Nrr), EAdi phasic (peak inspiration) and EAdi tonic (end-expiration). A flat EAdi >5 sec was defined as central apnea.

RESULTS: Ten infants with a median (range) BW of 1056 (865-1210) g and GA 27 (25-30) wks were studied. At study entry, the median (range) age was 27 (17-48) d, and weight 1480 (1041-1815) g; all were receiving caffeine and 7 were on nasal CPAP. Individual responses to the different feeding methods were variable. There were no significant differences in EAdi timing, EAdi phasic, EAdi tonic, or apnea for the different epochs. [Figure]

Figure

	BL	BF_{15}	BF_{90}	SF_{15}	SF_{90}
Nti (msec)	275 (226;342)	310 (223;386)	287 (239;456)	231 (217;370)	300 (236;427)
Nte (msec)	766 (714;952)	861 (700;974)	824 (719;1048)	779 (659;1062)	829 (705;1087)
Nrr (per min)	61 (53;72)	61 (53;72)	58 (45;72)	65 (47;73)	57 (43;70)
EAdi phasic (a.u.)	29 (17;37)	30 (20;43)	37 (24;46)	24 (19;53)	30 (25;47)
EAdi tonic (a.u.)	7 (5;8)	6 (4;14)	5 (4;9)	6 (5;8)	5 (4;6)
Total apnea duration (s)	9.85 (0;19.4)	7.35 (5.9;19.7)	11.11 (5.2;17.3)	6.75 (0;33.9)	12.9 (11;28.5)

All Results expressed as median (quartiles); a.u., arbitrary units

CONCLUSION: In this pilot study of stable, non-ventilated preterm infants, neural breathing pattern does not appear to be affected by enteral feeding or the method of enteral feeds. SF does not appear to reduce the number or duration of apneas.

4
POSTNATAL VULNERABILITY PERIOD OF ABERRANT RESPIRATORY CONTROL IN RAT PUPS EXPOSED TO PRENATAL CIGARETTE SMOKE

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INTRODUCTION AND RATIONALE: Sudden infant death syndrome (SIDS) is the leading cause of infant death beyond the neonatal period with the peak occurrence at 8-16 w of life. Prenatal cigarette smoke (CS) exposure remains the principal risk factor for SIDS. Increased occurrence of SIDS in winter months suggests infections and thermal stress as additional risk factors for SIDS. Pendlebury et al (Am. J. Respir. Crit. Care Med. 2008) provided the first direct experimental evidence that prenatal CS exposure in combination with hypoxia and/or hyperthermia can lead to gasp-like breathing patterns and attenuated recovery from hypoxic challenge in 7 d old rat pups.

OBJECTIVE: The current study was designed to delineate the critical period of vulnerability for the destabilizing effects of prenatal CS exposure on respiratory control in rat pups during postnatal maturation.

EXPERIMENTAL DESIGN: Studies were performed on 95 time-dated, 14 d old rat pups from 21 pregnant rats (11 CS and 10 sham exposed). An unrestrained whole body plethysmograph was used to record respiratory patterns in unanesthetized spontaneously breathing rat pups under thermoneutral or hyperthermic temperatures and in hypoxic (10% O2, balance nitrogen) or hypercapnic (8% CO2, 21% O2, balance nitrogen) states. Breathing frequency, inspiratory time, expiratory time and rectal temperature were recorded.

RESULTS: Pup weight was lower at birth and on d 14 in the CS exposed group vs. the sham group ($P < 0.01$). During thermoneutral and hyperthermic hypoxia, a sustained increase in breathing frequency was observed in CS exposed group ($P < 0.05$), whereas frequency decreased below baseline values during the washout period in the sham group ($P < 0.02$). Rectal temperature decreased only in the sham group in response to thermoneutral hypoxia ($P < 0.03$). Baseline breathing frequency during hyperthermic hypercapnia was lower in the CS exposed group vs. sham group ($P = 0.04$). Breathing frequency remained elevated only in the sham group into the hyperthermic hypercapnic washout period ($P = 0.03$).

CONCLUSIONS: Prenatal CS exposure continues to have a profound effect on respiratory and thermoregulatory responses to hypoxia in the rat pup even at d 14. New evidence on the thermoregulatory response to acute hypoxia in the CS exposed group has significant implications on how such infants may lack the ability to defend against hypoxia, and provide insight into why these infants may be at greater risk for SIDS.

5
DO GLYCERINE LAXATIVES HAVE A ROLE IN THE NEONATAL INTENSIVE CARE UNIT? A SYSTEMATIC REVIEW

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BACKGROUND: Glycerine laxatives are often prescribed in the neonatal population. Indications for its use include: meconium evacuation to promote feeding tolerance and prevent hyperbilirubinemia. To-date, the literature regarding its effectiveness has not been systematically reviewed.

OBJECTIVE: To assess the effectiveness and safety of glycerine laxatives (suppositories or enemas) on feeding intolerance and hyperbilirubinemia in neonates.

DESIGN/METHODS: MEDLINE, EMBASE, Cochrane Library, Scopus and Web of science were searched for randomized/quasi-randomized controlled trials and observational studies. Quality assessment and data extraction were performed by two authors (VS, NC). When appropriate, data were analyzed using Rev Man 5.0 and meta-analysis performed using a fixed effects model. Results are presented as mean difference (MD) or relative risk (RR)/odds ratio (OR) with 95% confidence interval (CI).

RESULTS: Of the 5 eligbile studies, 2 studies [RCT (N=1) and observational study (N=1)] evaluated meconium evacuation and feeding tolerance in VLBW infants and 3 RCTs evaluated effect on hyperbilirubinemia in term infants. Outcome data for VLBW infants are presented below [Figure].

Studies comparing glycerine enema vs. no intervention in VLBW infants

Study author	Age of first meconium passage	Age to full enteral feeds	Sepsis
Haiden 2007	0.0 (-0.99, 0.99); p=1.0	-1.0 (-8.89, 6.89); p=0.80	N/A
Shim 2007	-2.3 (-3.06, -1.54); p<0.0001	-6.9 (-10.27, -3.53); p< 0.001	0.22 (0.06, 0.86); p=0.03

Results are MD or OR with (95% CI)

Haiden et al showed no difference in the time to pass first meconium or establishing full enteral feeds while Shim et al showed that the time to first meconium passage and full enteral feeding was statistically significantly shorter and the rate of sepsis lower in the glycerine enema group. The use of glycerine suppository (N=2 studies) and enema (N=1 study) had no effect on serum bilirubin in the first 2 to 7 days of life. There was heterogeneity in the timing and frequency of use of glycerine laxatives in the included studies. No difference in adverse events were reported.

CONCLUSIONS: There is inconclusive evidence regarding the effectiveness of glycerine laxatives for prevention of feeding intolerance in VLBW infants and further evaluation is needed. Glycerine laxatives cannot be recommended for prevention of hyperbilirubinemia.

6
IN PRETERM INFANTS THE TPN MODALITY CAN BE USED TO MODULATE THE INFLAMMATORY RESPONSE TO OXYGEN OBSERVED EARLY IN LIFE

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BACKGROUND: Due to its high unsaturated omega-6 fatty acid content the lipid moiety of TPN is thought to induce inflammation. Co-administration of parenteral multivitamins (MVP) with lipid emulsions (LIP) prevents lipid peroxidation in light exposed TPN, which may reduce oxygen-induced inflammation. However, this modality is associated with a 5-fold increase in hydroxynonenal, an oxidation product also known to stimulate inflammation.

HYPOTHESIS: Mixing intravenous multivitamins with lipids modulates the inflammatory effect of oxidants.

OBJECTIVE: To compare the systemic cytokine response to different modalities of TPN administration.

METHODS: Preterm infants were randomized to receive, from birth, TPN administered using 3 different modalities providing the same nutrient intake: AA = MVP+amino acid/dextrose solution exposed to ambient light + lipids provided separately (controls) (n=8); LE = MVP administered with LIP exposed to light with amino acid/dextrose provided separately (n=10); LP = MVP administered with LIP protected from light + amino acid/dextrose provided separately (n=8). Upon reaching full TPN infants were sampled (day 7 to 10 of life) for markers: of inflammation (IL-6 and IL-8, pg/mL) in plasma; of oxidant stress (redox potential of glutathione E, mV) in whole blood; and of protein oxidation (D-Tyrosine DiT, µg/g creat) in urine. Data (mean±SEM) from the 3 regimens were compared by logistic regression and ANOVA, in infants exposed to low (<0.25) vs high (>=0.25) FiO_2.
RESULTS: Patients (birth weight 754±32 g; gest. age 26.0±0.1 wk; low FiO2 0.22±0.01 and high FiO_2 0.32±0.02) in all 3 groups had similar clinical characteristics. DiT did not correlate with cytokines or FiO_2. Cytokine levels correlated positively (p<0.001) with FiO2 (IL-6: r= 0.53; IL-8; r= 0.56) and E (IL-6: r= 0.75; IL-8: r= 0.75). A similar interaction was found between FiO2 and TPN modality for IL-6, E and DiT in the AA group, while these markers remained unaffected by oxygen in the LE and LP groups.
CONCLUSION: Delivering light-exposed lipids separate from amino-acids and multivitamins may enhance the detrimental pro-inflammatory effect of oxygen. In view of the potential effects of both, oxidation and inflammation on clinical outcomes, the modality of TPN delivery could be used to prevent potentially harmful inflammatory effects of oxygen.

7
DOES HISTOLOGICAL CHORIOAMNIONITIS HAVE AN IMPACT ON THE NEURODEVELOPMENTAL OUTCOME AT 36 MONTHS ADJUSTED AGE IN VERY LOW BIRTH WEIGHT (VLBW) INFANTS?

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BACKGROUND: Histological chorioamnionitis (HCA) is associated with major brain injury in preterm infants. Previous studies on neurodevelopmental outcome associated with HCA in preterm infants yielded mixed results due to significant loss to follow up.
OBJECTIVES: To examine the effect of HCA on the neurodevelopmental outcome at 36 months adjusted age in preterm infants.
DESIGN: This is a retrospective cohort study. All infants with gestational age (GA) <= 28 weeks and or birth weight <= 1250 gms born between January 2000 and December 2003, who had placental histology reports and neurodevelopmental evaluation at 36 months adjusted age were included. Infants with intrauterine infection, major congenital and chromosomal anomalies were excluded. We compared the neurodevelopmental outcomes between infants exposed to and those unexposed to HCA. Multivariate logistic regression analysis was used to assess whether HCA is a predictor of cerebral palsy (CP) and neurodevelopmental disability.
RESULTS: A total of 278 infants (106 exposed to HCA and 176 unexposed to HCA) met inclusion criteria. There was no significant difference between the two groups except for GA (26.3 versus 28 wks) and caesarean section delivery (43% vs 71%). Infants in HCA group had increased rate of IVH (22.6% vs 8.7%) and sepsis (23.5% vs. 14%). Table 1 shows the comparison of neurodevelopmental outcome. Infants exposed to HCA had increased rate of CP (11.3% versus 3.4%, p = 0.01) and lower rate of survival without neurodevelopmental impairment (49% vs. 65%, p = 0.008). After controlling for potential confounders (gestational age, antenatal steroids, IVH, sepsis, mode of delivery), HCA was associated independently with CP (adjusted OR 3.3; 95% CI 1.06-10.3).
CONCLUSION: HCA is associated with increased risk of IVH and sepsis in the neonatal period and cerebral palsy at 36 months adjusted age in VLBW infants.

Table 1: Comparison of neurodevelopmental outcome between infants with or without histological chorioamnionitis

	Chorioamnionitis group n=106	No Chorioamnionitis group n=172	RR (95% CI)
Cerebral palsy (%)	12 (11.3)	3 (3.4)	3.24 (1.25, 8.38)
Cognitive delay*(%)	11 (10.4)	18 (10.4)	0.99 (0.48, 2.01)
Deafness (%)	4 (3.7)	3 (1.7)	2.16 (0.49, 9.47)
Blindness (%)	4 (3.7)	3 (1.7)	2.16 (0.49, 9.47)
Any disability (%)	13 (12.3)	19 (11)	1.11 (0.57, 2.15)

Cognitive score >2 SD below mean

8
COMPARISON OF OUTCOMES AMOUNG INFANTS ADMITTED TO NICUS IN CANADA DURING 2006-2007 AND 1996-1997

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BACKGROUND: It is plausible that advances in neonatal intensive care in the last 10 years have resulted in significant reductions in mortality and morbidities for very preterm infants. A concern is that improved survival might result in an increased number of infants with morbidities.
OBJECTIVE: To compare neonatal outcomes of infants born at < 28 weeks gestation during 2006-2007 (22 months period) and 1996-1997 (22 months period) admitted to the same 15 centers in the Canadian Neonatal Network (CNN).
DESIGN/METHODS: Demographic information, severity of illness on admission (using SNAP II), and perinatal risks were compared for baseline similarity. Rates of mortality, chronic lung disease at 36 weeks (CLD), significant brain injury, and ROP >stage 2 were compared using univariate and multivariable logistic regression analyses.
RESULTS: A total of 1866 infants were eligible in 2006-7 and 1897 in 1996-97 respectively. Baseline comparison revealed a higher number of infants in the 1996-7 cohort who were born vaginally, had not received antenatal steroids, and had higher SNAP II scores compared to the 2006-7 cohort. Results of univariate and multivariable analyses for important neonatal outcomes are presented in the table.

Outcome	2006-2007 N=1866 (%)	1996-1997 N=1897 (%)	OR (95% CI)	Adjusted OR* (95% CI)
Death in the NICU	14.7	17.2	0.83 (0.69, 0.98)	1.13 (0.92, 1.40)
Severe neurological injury (IVH>grade 2 or PVL)**	17.2	15.8	1.11, (0.93, 1.32)	1.49 (1.22, 1.80)
CLD	46.1	34.7	1.61 (1.39, 1.86)	1.88 (1.60, 2.20)
Stage 3≥ ROP	3.9	5.7	0.68 (0.50, 0.92)	0.75 (0.54, 1.05)
NEC	7.5	7.0	0.93 (0.72, 1.19)	0.90 (0.69, 1.17)

*Adjusted for GA, sex, mode of delivery, antenatal steroid and SNAP II score ** Severe IVH was defined differently in 1996-97 (grade 3 or higher) and in 2006-7 (ventricular enlargement / periventricular echogenecity or lucency

CONCLUSIONS: There was no significant change in adjusted risks of mortality or severe ROP between 10 years apart cohorts. There was an increase in CLD in 2006-7. The increase in neurological injury in the 2006-7 cohort could be due to differences in classification and improved rates of detection. The lack of improvement in survival and an increase in CLD are of concern. A similar comparison of longer-term outcomes is warranted.

POSTER SESSION
SÉANCE DE RÉSUMÉS PAR AFFICHES

9
CHARACTERISTICS OF MOTHERS CONSULTING A PAEDIATRIC CLINIC FOLLOWING THEIR CHILD'S DISCLOSURE OF SEXUAL ABUSE

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INTRODUCTION: Child sexual abuse is an important social problem, as 22.1% of women and 9.7% of men were sexually abused (SA) as children, according to a recent provincial survey. Previous studies showed that prevalence of SA was high in mothers of SA children and mother's level of stress influenced child's recovery following disclosure.

OBJECTIVE: The aim was to describe the profiles of mothers consulting following disclosure of their child's sexual abuse.

METHODS: 560 mothers of children aged 3-12 (35 boys and 525 girls) consulting a tertiary pediatric hospital following disclosure of SA answered questionnaires related to family relationships (Family Relationship Index), family violence, sources of stress in the children's lives (a 15-item version of the Source of Stress Inventory), perceived support given (4 items on a 5-point Likert scale), sense of culpability (3 items on a 5-point Likert scale), and psychological distress (adaptation of the Psychiatric Symptom Index). Statistical analysis was done using chi-square test and correlational analysis.

RESULTS: Mean age of mothers was 33 years (SD = 6.36). 63.9% of the mothers seen at first evaluation displayed clinical level of psychological distress at their first evaluation. Close to half of the mothers (45.7%) reported a history of child sexual abuse. Mothers of SA children were also experiencing other forms of trauma. In the last 12 months more than half reported sustaining minor psychological violence by their romantic partner and 26.1% severe psychological violence. 10% described severe physical violence as well. In comparison to mothers without a history of violence, mothers reporting psychological violence were more likely to achieve clinical levels of distress (70.1% vs 52.1% $p<.001$), as well as victims of physical violence (77.8% vs 60%, $p<.001$). The number of life events in the last 12 months was correlated with psychological distress ($r=.26$, $p<.001$). The level of distress was also correlated with their sense of empowerment ($r= -.23$, $p<.001$) and their level of culpability ($r=.25$, $p<.001$) related to the SA of their child.

CONCLUSIONS: In our sample, the rate of mothers who report a history of child SA is double the prevalence rate found in community samples. Mothers reporting psychological violence, physical violence or a high number of life events in the past 12 months were more likely to achieve clinical levels of distress. Because the level of distress is correlated with their sense of empowerment and their level of culpability, there is an urgent need to address these factors in order to relieve maternal distress in child SA, and therefore to influence child's recovery following disclosure.

10
P-KIC – PEDIATRICS FOR KIDS IN CARE

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BACKGROUND: Children coming into care have a high incidence of unmet physical, developmental & mental health problems. The Canadian Paediatric Society has recently underlined the unique position of Pediatricians as advocates for these very vulnerable children & has provided specific recommendations in this regard.

OBJECTIVES: P-KIC (Pediatrics for Kids in Care) is an innovative partnership between Calgary Child & Family Services, Calgary Health Region, Southern Alberta Child & Youth Health Network, & the Division of Community Pediatrics (Calgary) to meet the needs of, & improve outcomes for, children in care.

DESIGN: The P-KIC process has been designed to ensure close communication & collaboration between Child & Family Services personnel, Pediatricians, foster parents &, where appropriate, biologic parents, to facilitate timely (ideally 8 weeks from apprehension) & comprehensive Pediatric evaluations of children recently placed in care. This collaborative approach ensures the best interests of the child with respect to issues such as placement, permanency planning, medical, developmental & mental health treatment plans. Cases are actively managed by a coordinator who ensures that available data (birth details, health information, etc.) are collated & provided to the Pediatrician in advance of an assessment & that all relevant parties are either able to be present at the assessment or are in receipt of conclusions & recommendations. In addition, efforts have been taken to standardize the reporting process.

RESULT: A total of 327 children (0-18 years, 153 female, 174 male, mean age 6.3 years) have been seen through the P-KIC program since September 2008. Pediatric services have been provided by 12 community Pediatricians. The majority of children (85%) are less than 10 yrs old. Of the children assessed, 50% have required follow-up pediatric visits & most required referral to other services, which is consistent with the CPS prediction. The mean time to assessment was 14 weeks (range 8-16). The hope is that, with increased capacity, this time to assessment will consistently be at 8 weeks. Common diagnoses include speech & language delays, gross & fine motor delays, cognitive impairment, ADHD, Attachment Disorder, Anxiety Disorder & Depression.

CONCLUSION: Providing early comprehensive assessments for children in care helps caseworkers, foster parents, biological families & the justice system understand the child's needs & provide optimal support. By assuming both advocacy & service provision roles within a coordinated & collaborative program, Pediatricians can provide a pivotal role in the lives of our most vulnerable children. It is hoped that ongoing program evaluation will confirm that this unique P-KIC program & process translates into better care & long-term outcomes for foster children.

11
PATTERNS OF CHILD ABUSE IN CHILDREN WITH FETAL ALCOHOL SPECTRUM DISORDER (FASD)

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BACKGROUND: Children with an FASD diagnosis may be at an increased risk of abuse due to the coexistence of many of the risk factors for child abuse. Further, it has been reported that being a victim of physical, sexual abuse/domestic violence increases the risk of these individuals to have poor outcomes.

Studies have looked at the risk of child abuse by mothers who abused drugs, such as cocaine, in pregnancy. It is equally important to characterize the risk of child abuse in alcohol-exposed children. Although there are various reports of increased abuse in alcohol-exposed children, it appears that the patterns of this abuse have not been characterized previously.

OBJECTIVE: To describe patterns of abuse identified on referral in children who have an FASD and who have been referred to Winnipeg's Child Protection Center (CPC).

METHODS: This study was a retrospective chart review. Children seen at The Clinic for Alcohol and Drug Exposed Children (CADEC) between 2003 and 2007 who received a diagnosis of Fetal Alcohol Syndrome (FAS), partial Fetal Alcohol Syndrome (pFAS), Alcohol Related Neurodevelopmental Disorder (ARND) or labelled "At Risk" (ie. children who have been exposed but not yet diagnosed) were selected. These were crossmatched to the database of referrals at CPC. Data was collected on children who were seen at both CPC and CADEC.

RESULTS: Seventeen percent of children seen at CADEC had a referral initiated to CPC. Abuse was substantiated in thirty three percent. Children with ARND and "At Risk" were more commonly referred to CPC. Referrals initiated for physical and sexual abuse were seen to occur together more frequently, with females having more referrals for suspected sexual abuse and males for suspected physical abuse and developmental assessment. Further, eleven children had at least one referral for a parent-child assessment, twenty for a developmental assessment, and ten were in a CPC file because of a family member's involvement with CPC.

CONCLUSIONS: Children whose lack of dysmorphology may not

immediately identify them as having an FASD were more commonly suspected of suffering child abuse.
The differences in gender and referrals could be a function of externalizing behaviour in males, and greater vulnerability in females for sexual abuse.
The number of children cross represented in both systems underscore the importance of early diagnosis and appropriate support systems in homes caring for these children at risk.

12
ASSESSING THE NEED FOR PERINATAL PREPARATION ABOUT INFANT CRYING: A STEP TOWARDS CHILD ABUSE PREVENTION

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BACKGROUND: Abusive head trauma (AHT) is a preventable cause of morbidity and mortality in the pediatric population. Crying is a predictable infant behavior that can be challenging for caregivers to manage. Existing literature supports an association between caregiver frustration, triggered by infant crying (IC) and AHT.
OBJECTIVES: We examined caregiver preparation for and confidence in their ability to manage IC to identify gaps in prenatal education and identify a possible target for primary prevention of AHT. Participant knowledge about patterns of IC, dangers of shaking an infant, and appropriate caregiver behaviors were also assessed.
DESIGN/METHOD: Using a cross sectional study design, 110 first-time mothers delivering healthy singletons were recruited over a two month period. During the immediate post natal period we conducted a 20 minute face-to-face interview with each participant using a validated questionnaire. Prenatal preparation and confidence for management of IC scores were compared with scores for labor and delivery (LD) and feeding and nutrition (FN) - other topics addressed in prenatal education. Knowledge was measured using two composite scores: (1) a "crying knowledge" score based on answers about patterns of IC and (2) a "shaking knowledge" score based on answers about the dangers of shaking. Qualitative data regarding anticipated caregiver response to crying were categorized as safe or unsafe.
RESULTS: The mean preparation score (max=7) for IC (4.68) was significantly lower than the mean scores for LD (5.55) and FN (5.10) ($p<0.02$). Conversely, mean confidence levels (max=4) for management of IC (3.55) was significantly higher than for LD (2.59) and FN (3.36) ($p<0.002$). Participants were aware of the consequences of shaking (mean correct response rate=88.3%) but were less familiar with patterns of normal IC (mean correct response rate=66.8%). Higher IC preparation scores correlated with greater knowledge about patterns of IC ($p=0.05$), but not with increased knowledge about shaking. Only two thirds of participants demonstrated knowledge of safe walk away behaviors in response to IC.
CONCLUSION: First time mothers are less prepared for managing IC when compared with other domains of infant care, but nevertheless are confident in their ability to manage IC. Participants possessed greater knowledge about the dangers of shaking an infant than patterns of normal crying. These results demonstrate a need for enhanced education about patterns of IC and appropriate caregiver responses. An educational program to increase understanding of normal IC and equip caregivers with appropriate management strategies could potentially reduce frustration and incidence of AHT.

13
RESPITE CARE FOR CAREGIVERS OF CHILDREN WITH COMPLEX HEALTH CARE NEEDS: PHYSICIANS PERSPECTIVE

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BACKGROUND: It is recognized that caregivers now care for more and more children with complex medical problems at home. Care giving, especially to children with complex health care needs, is associated with negative health impacts. Providing adequate respite to caregivers can decrease the burden of providing care, reduce stress, anxiety and other health problems, boost morale and help keep family structure intact. Family physicians and pediatricians routinely care for these patients and their caregivers.
OBJECTIVES: We are unaware of any study looking into the physicians' perspective regarding respite for the caregivers. This study looks at physicians' awareness and knowledge about the availability and use of respite care by the caregivers of children with special health care needs, their practice of prescribing respite and their satisfaction regarding its outcome.
METHODS: We mailed a 14-item questionnaire to 200 randomly selected family physicians and all pediatricians and pediatric sub specialists practicing in our province, to be returned anonymously. A total of 280 questionnaires were sent. A reminder was sent approximately 8 weeks after the first letter. The Research Ethics Board of our institution approved the study.
RESULTS: 65 physicians returned the questionnaire, giving an overall return rate of 23.3%. Return rate of pediatricians were 47%. 72% routinely cared for children with complex health care needs. 81.5% felt respite provision was very important but 33.8% never referred the caregivers to respite providers. Stress reduction (66.6%), maintaining family harmony and structure (29.6%) and improvement of physical health (29.6%) were considered to be most important benefits of respite. 58.5% of physicians were not satisfied with the current state of respite provision and 73.5% felt that respite should be provided through legislative reform. 81% felt that government agencies have the primary responsibility to provide respite. Inadequate funding, lack of proper assessment and referral frameworks and inadequate availability were mentioned as the most important barriers to proper respite provision. On the other hand, inadequate knowledge and understanding, cost and guilty feelings were felt to be the most important reason for caregivers not accepting respite.
CONCLUSION: Physicians feel that provision of respite to caregivers of children with complex health care needs is very important and has positive health and social benefit to the caregivers, but a majority is unhappy at the current status of respite provision. Physicians need more knowledge in this area and there should be more accessibility to and availability of proper respite and this should be more easily affordable. Most physicians felt that governmental agencies should have the primary responsibility of funding respite.

14
RESPITE CARE FOR CHILDREN WITH COMPLEX HEALTH CARE NEEDS: CAREGIVERS' PERSPECTIVES

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BACKGROUND: Parents or other caregivers of children with complex care needs usually care for these children at home. Studies have shown that providing this care is associated with mental and physical health problems and family dysfunction for caregivers. Respite care is the shared care of a child with physical and/or cognitive disabilities, either at home or in a short term residential setting, in order to give the usual caregiver a break from routine caregiving, and provide the child with stimulation. Use of respite services has been shown to decrease stress and anxiety, somatic complaints and other health problems in caregivers, help keep family structure intact, reduce physician visits and hospitalization and delay institutionalization of children. However, many caregivers report not using respite services.
OBJECTIVE: We wished to assess caregivers' awareness and understanding of respite care services in our region, their perceptions of its availability, barriers to, and satisfaction with its use.
METHOD: A written questionnaire was mailed to 58 caregivers of children followed in a multidisciplinary clinic for complex patients at our Health Centre. Caregivers were provided with an addressed, stamped envelope, and answers were anonymous. A second mailing was sent approximately 8 weeks later. Approval was obtained from the Research Ethics Board at our health centre.
RESULTS: 25 surveys (43%) were completed and returned by caregivers. 75% of caregivers said they felt respite care was "important" or very important", however only 25% of respondents described themselves as "very aware" or "aware" of what services were available to them. Caregivers identified stress reduction and improvement in family function and

relationships and in caregivers' own health as the most important benefits of respite services. 75% of respondents had received some respite services in the preceding 12 months, but only 1/3 felt they had received all they needed. Barriers to use of respite care included lack of availability, cost, ineligibility because of their child's specific medical or behavioural needs, and concerns that their child would be at risk due to a respite carer's inexperience with managing their child's issues.

CONCLUSIONS: While caregivers of children with complex care needs in our region identify the need for respite, they also report significant barriers to their receiving adequate services. Exploring ways to remove these barriers will be important to improve quality of life for these children and their caregivers.

15
TIPPING THE SCALES: CANADA'S FIRST MEDICAL-LEGAL PARTNERSHIP

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The social determinants of health are well understood in paediatric medicine. Social conditions can influence a child's health directly or indirectly, and often have significant legal implications. Lawyers have been an underutilized ally in Canadian clinical care, despite their clear role in assisting patients with complex socioeconomic problems.

The objective of this study was to determine if legal support for low-income children treated at the Hospital for Sick Children could be effectively delivered through a pro bono legal advocacy, clinical-practice partnership. The outcome of this study would support whether the hospital should include a legal health program into clinical service.

The Family Legal Health Program consultation service was established in March, 2009. A referral pathway was made for patients of low income families with potential legal issues affecting their treatment. The program was advertised to clinicians, social workers, and nurses. A qualified triage lawyer responded to referrals through private, confidential consultation, and free legal assistance was provided where required. Legal assistance occurred in 4 forms: brief service, legal advice, referral to an outside legal service, or information.

Over a 6 month period (May to October, 2009), 169 consultations were made, for a total of 195 legal issues. The most commonly cited issue was family law (domestic violence, custody) (22.1%; 43), immigration law (16.9%; 33), health insurance (10.3%; 20), and housing/tenancy (8.2%; 16). Other legal issues included: consent law (capacity, power of attorney), welfare support, and employment. The provision of information was the most frequent outcome of consultation (35.7%; 71), followed by legal representation (43; 21.6%), referral to another legal service (43; 21.6%), and legal advice (21.1%; 42). All hospital departments made referrals, with higher numbers from: Transplant, Adolescent Medicine, and Cardiology. Social workers referred most frequently (145; 85.8%), followed by physicians (8; 4.7%) and nurses (6; 3.6%).

This study demonstrates that in a tertiary care paediatric institution, a significant population of low-income families seek legal counsel over issues directly or indirectly affecting their children's health. A pro bono hospital-based partnership with a qualified triage lawyer can effectively assist these families, most often through the provision of legal information. The Family Legal Health Program has been formally included as a clinical service for patients at the Hospital for Sick Children, in recognition of its vital contribution to the provision of high quality family-centred patient care. Ongoing study, formal legal issue identification training, and broader advertisement of the program will continue.

16
MANAGEMENT OF COW MILK ALLERGY IN THE UK

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OBJECTIVE: To determine how infants with cow milk allergy (CMA) are managed in the UK and the time taken to achieve symptom resolution.

METHODS: 1,000 infants with CMA were randomly selected from the Health Improvement Network (THIN) database, which ccomprises the longitudinal medical records of 5 million patients in the UK from the time they initially present to their GP. The records were analyzed for treatment patterns and outcomes over the first 12 months following initial presentation to a GP.

RESULTS: Patients who presented with a combination of gastrointestinal and atopic symptoms accounted for 55% of all patients, those with GI symptoms alone accounted for a further 22% and those with atopic symptoms alone a further 9%. Patients with acute IgE symptoms accounted for <10% of all patients. The age at the time of presentation was a mean 3.0 months. It took a mean 2.2 months to be put on a diet after initially seeing a GP, however it took a mean 3.6 months from the initial GP visit for the CMA diagnosis to be made. 60% of all infants were initially treated with soy, 18% with an extensively hydrolysed formula (eHF) and 3% with an amino acid formula (AAF). A mean 29% of patients were intolerant of an eHF. Time to symptom resolution from the initial GP visit was a mean 2.6 months, however this varied according to a patient's initial diet. Time to symptom resolution among patients initially treated with an eHF took longer than when initial treatment was with soy or an AAF because of the high intolerance rate. A mean 42% of patients were referred to a specialist physician, of which 52% were general paediatricians, 20% were accident and emergency physicians; 18% were hospitalised. The waiting time for a referral was a mean 3.7 months. Patients who saw a hospital physician had a mean 7.6 GP visits before the referral.

DISCUSSION: The distribution of symptoms in this large cohort and the intolerance to eHF is different to that previously reported. Differences may be due to previous estimates being derived from studies only involving patients who were referred to secondary care, with smaller sample sizes and shorter periods of follow-up.

CONCLUSION: Consensus guidelines are required for the management of CMA in order to shorten the time to treatment, time to diagnosis and time to symptom resolution and to decrease the consumption of healthcare resources.

17
CHALLENGES AND STRATEGIES IN MANAGING FOOD ALLERGY: A PATIENT AND ALLERGIST PERSPECTIVE

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Research has shown that outpatient management of food allergy is suboptimal. Few studies have compared allergists' and patients' perspectives on food allergy management. Our goal was to assess the educational experiences, learning needs, and confidence level of food allergic patients; and to examine allergists' teaching priorities, challenges, and strategies for managing these patients.

This is a 2 part observational study: an anonymous questionnaire completed by patients or caregivers in the clinic; and a qualitative interview with allergists. Using convenience sampling, patients were recruited from allergy clinics in Southern Ontario. Patients of any age with documented food allergy, who have been seen by an allergist were considered for inclusion. Outcomes included the learning needs of patients, and the management challenges faced by allergists and strategies to address them. Recorded allergist interviews were analyzed using content analysis of grounded theory methodology. Quantitative data were analyzed using descriptive statistics and frequency analysis.

Data were collected from 49 food allergic families (mean age was 8.5 years) and 5 allergists from community and academic centers in 4 cities. Sixty-one percent of patients were shown how to use an auto-injector with a trainer and 51% were asked to demonstrate its use. More than half of the patients did not feel very confident about when to give an auto-injector (51%) or how to administer it correctly (59%) even though on average, it was their 5th visit with the allergist. Regarding learning needs, the majority wanted more current research information on food allergy prevention and cure. Although some wanted more information on "support groups" (29%) and auto-injector practice (20%), 57% did not feel anything was missing from their visits. Allergists' top priorities were teaching allergen avoidance and management of acute reactions. Major challenges were ensuring correct technique and empowering people to use auto-injectors. Strategies included frequent follow up, practice with auto-injectors, and

providing website or CD information. Allergists indicated that anaphylaxis management needs to be incorporated into first aid courses and teacher/daycare provider training.
Both allergists and patients identified building confidence to use epinephrine auto-injectors as a priority. Recommendations for improvement included frequent practice during clinic visits with a trainer and advocating for training outside the clinic. Patients indicated the need for information on current research and for better social support. This would require allergists to be more proactive in linking families with reputable web resources and community support groups.

18
EMOTIONAL, BEHAVIOURAL AND ADAPTIVE OUTCOMES AT 5 YEARS OF AGE FOR CHILDREN AFTER COMPLEX CARDIAC SURGERY AT 6 WEEKS OF AGE OR YOUNGER

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BACKGROUND: There is increasing interest in understanding the emotional, behavioural, and adaptive outcomes for children requiring complex cardiac surgery (CCS) for congenital heart disease. Other research has indicated elevated rates of ADHD, aggression, social problems, depression and anxiety for these children. With our program's earlier surgical interventions, <= 6 weeks, children may function as well as the general population in emotional, behavioural and adaptive domains.
OBJECTIVES: To describe behavioural outcomes for boys and girls at age 5 after having CCS at <= 6 wk for single ventricle (SV) versus other anomalies (not-SV), and to explore predictive relationships of sociodemographic and treatment variables to behavioural outcomes.
DESIGN/METHOD: Prospective cohort of 96 surviving infants who underwent CCS at <= 6 weeks and were followed to age 5. Children with chromosomal anomalies, autism, moderate-severe neurosensory impairment or whose parents were unable to complete questionnaires were excluded. Parents completed the Behavior Assessment System for Children (BASC-2). Standard cut-off scores for abnormal outcomes were used: T-scores <= 0 for Externalizing Problems (e.g. aggression, hyperactivity), Internalizing Problems (e.g. anxiety, depression), and Behavioral Symptoms Index (BSI) and <= 40 for Adaptive Skills (e.g. social skills, activities of daily living).
RESULTS: Of 211 children born July 2000-December 2004, 48 have died or are too severely ill, 16 are missing questionnaire data, and 32 had earlier versions of the behavioural questionnaire. Of the 96 participating children, there were no significant differences between SV and non-SV anomalies groups on the 4 behavioural scores (multivariate Hotelling's T^2 test, p=0.59), nor were scores for males and females significantly different (p=0.65). Proportions of abnormal behaviours were similar to population norms (near 15%). Though 26% of the girls had abnormal scores for Internalizing Problems, this was not significantly different from norms. Having had CPR at any time pre-, during, or post-surgery was a significant variable in a logistic regression model predicting abnormal scores for Internalizing Problems (OR 9.65, CI95 1.26-115.77). Age at surgery (in days) was significant in a logistic regression model predicting abnormal scores for Externalizing Problems (OR 1.07, CI95 1.01-1.14). None of the chosen predictors was significant in logistic regressions for BSI or Adaptive Skills.
CONCLUSIONS: Behavioural outcomes at age 5 were not predicted by type of cardiac anomaly or by child's sex. The need for CPR and age at surgery were associated with later problems with internalizing and externalizing behaviours, respectively. The outcomes were similar to population norms, and are more encouraging than previous literature suggests.

19
WHICH INDICATIONS FOR TESTING ARE THE BEST PREDICTORS OF ABNORMAL FETAL ECHOCARDIOGRAPHY?

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BACKGROUND: Fetal echocardiography is routinely used in the prenatal detection and evaluation of congenital heart abnormalities. As the vast majority of scans are negative, stronger clinical predictors of fetal heart disease would be beneficial in predicting which patients should be scanned.
STUDY DESIGN AND PARTICIPANTS: This study was a retrospective chart review of every fetal echocardiograph (FE) performed at 3 tertiary care fetal cardiology centres from 2004 to 2008, inclusive. Each chart was reviewed for indications for referral and for findings on FE. The prevalence of abnormal FE findings was compared between the various indication groups.
RESULTS: 517/1927 (26.8%) of fetal echocardiographs performed during the study period had abnormal results. There were a total of 22 distinct indications that were given as reason for referral to FE; of these, only 2 were strong predictors of abnormal FE results: 1) a cardiac abnormality seen on screening ultrasound; and 2) a previous abnormal fetal echocardiograph.
CONCLUSIONS: Our study findings agree with previous similar studies. Most indications for FE that are currently used, including high referral indications of maternal diabetes and echogenic foci in the heart on screening ultrasound, led to very few diagnoses of congenital heart disease on fetal echocardiography.

20
QUALITY OF LIFE EFFECTS OF SEVERE CONSTIPATION AND ENCOPRESIS IN CANADIAN CHILDREN

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BACKGROUND: Chronic Constipation is one of the most common reasons for children to visit Pediatricians and Pediatric Gastroenterologists. The required treatments are long term and sometimes not curative. The relatively few published Pediatric studies have demonstrated negative effects on the quality of life for the families and children with severe constipation and encopresis. There are no previous studies focusing on the quality of life consequences of severe constipation in Canadian children and their families.
OBJECTIVE: To assess the effects of severe chronic constipation and encopresis on the quality of life of Canadian children and their families.
DESIGN/METHODS: Parents of children attending a multidisciplinary referral clinic for constipation and encopresis completed questionnaires describing their children's constipation. Sixty questionnaires were completed and the results analyzed. 63% of the patients were male. The questions focused on the quality of life of the child and family and their experiences with the treatments they received. Duration of constipation and treatment were also analyzed. A five point rating scale was used to assess the effects on the children and their families. The effects on quality of life were rated from no effect to very severely. Comments by parents were grouped by theme and analyzed.
RESULTS: 73% of children had been constipated for greater than two years. 81% of parents rated the effects on their children as severe or very severe. They rated the effects on the family as severe or very severe in 83% of cases. The children had been treated for their constipation in only 63% of cases prior to attending the clinic. The most common effects on the children included fear, anxiety and embarrassment. Fatigue, poor appetite and school absences were also common. Parents described stress, constant worry, frustration and helplessness. Social interactions were limited and there was family and sometimes marital discord. Parental concerns were often not taken seriously and considered a nuisance at times. Physicians were described as needing to be better informed of the impacts of severe constipation in children.
CONCLUSIONS: The negative quality of life effects on parents and children with chronic constipation and encopresis are significant and

under recognized. The stress, suffering and anxiety are often underestimated and taken lightly by the physicians treating them. Education of physicians and awareness of these effects are needed. Large scale prospective studies would provide more valuable information and assist in addressing this important issue.

21
LONG TERM SAFETY, EFFICACY AND PATIENT SATISFACTION IN CANADIAN CHILDREN TREATED FOR CONSTIPATION WITH POLYETHYLENE GLYCOL 3350

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BACKGROUND: Chronic constipation and encopresis in children often requires long term treatment. Patient compliance can therefore present a challenge. Polyethylene Glycol 3350, (PEG 3350), is a tasteless, odorless powder when dissolved in any liquid and has been a major advance in constipation treatment. Most studies have focused on short to medium term treatment and efficacy. Long term follow up for greater than 2 years and patient satisfaction is lacking in the Pediatric literature. There are no published studies on the treatment of Canadian children using PEG 3350.
OBJECTIVE: To determine the long term safety, efficacy and parental and patient satisfaction in Canadian children treated for constipation with PEG 3350.
DESIGN/METHODS: Questionnaires were completed by parents of children attending a multidisciplinary constipation/encopresis clinic who were treated with PEG 3350 for a minimum of 6 months. A total of 60 patients were enrolled. Success rates of treatment, side effects and patient satisfaction were measured using a 5 point scale. In addition the comments documented by parents were analyzed and grouped by theme. Any treatments prior to starting PEG 3350 were also analyzed.
RESULTS: 63% of patients were male. Prior treatments were of little or no help in 79% of cases. 58% of children had side effects on their prior treatments and these were moderate or severe in 34%. Treatment duration with PEG 3350 was for greater than 2 years in 47% of children. A daily dose of 20 grams or more was required in 42% of cases and 30 grams or more in 20%. All 60 patients reported improvement on treatment. Of these 90% improved a great deal and 25% of parents considered their children cured. The only significant side effect of PEG 3350 was diarrhea in 21% of cases which resolved with dose adjustments. 93% of parents were satisfied or very satisfied with PEG 3350 and 98% said they would recommend PEG for other children with constipation. Many parents described life changing effects for their children with PEG 3350. Some parents were concerned with respect to the necessity for long term treatment.
CONCLUSIONS: PEG 3350 is very safe and effective and results in high long term success rates in treating severe constipation in Canadian children. Side effects are minimal and patient and parent satisfaction is extremely high. Dosage should be tailored based on individual response. Factors which enable predicting successful weaning off PEG 3350 and long term follow up into adolescence and adulthood require further study.

22
RETROSPECTIVE ANALYSIS OF PRESCRIBING TRENDS IN PAEDIATRIC ASTHMA CARE

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BACKGROUND: Prescribing practices can be influenced by marketing advice from manufacturers. For example, manufacturers indicate that a leukotriene receptor antagonist may be an alternative to inhaled corticosteroid or short-acting beta agonist for childhood intermittent asthma, despite the lack of this recommendation in present best practice guidelines.
PURPOSE: To determine if prescribing patterns for new patients with childhood asthma in a level two regional paediatric asthma center were appropriate for the asthma severity index, as outlined by the Global Initiative for Asthma (GINA) guidelines.
METHODS: All new patients assessed in the Regional Paediatric Asthma Center from Jan 1, 2008-Dec 31, 2008 were retrospectively reviewed by one author (BL). The asthma severity at initial presentation was scored using GINA standards (from lowest to highest: intermittent, mild persistent, moderate persistent and severe persistent). Newly prescribed pharmacologic therapy was recorded on a data collection form. Additional information included: age, sex, co-morbidity, presence of a drug plan, smoking in household status, use of inhaler device, prednisone use in last 12 months, emergency visits in the last 12 months and hospital admission for wheezing in the last 12 months. Excluded from the analysis were those who had been seen previously by a team member from the asthma centre. Data were analyzed descriptively using SPSS statistical software (v.17.0 Chicago, USA).
RESULTS: Two-hundred and sixty-seven new patients were considered and 139 were included. Mean (standard deviation) patient age and asthma severity were 5.5 (4.2) years and 2.4 (0.8), respectively. Mode asthma severity was 'moderate persistent' (3 out of 4). Of new patients with 'intermittent asthma', 52% received inhaled corticosteroids alone, 44% received a short-acting beta agonist, and 4% received a leukotriene receptor antagonist. New patients with 'moderate persistent' asthma received mostly inhaled corticosteroids (96%), however one new patient received a short-acting beta agonist alone and two patients (3%) received a leukotriene receptor antagonist.
DISCUSSION: Newly prescribed pharmacological therapy was adequate for the severity of asthma encountered. A small number of new patients received a prescription for a leukotriene receptor antagonist, or short-acting beta agonist alone, despite lack of current guidelines recommending this practice based on severity. Future discussion within the centre will debate the usefulness of available therapies.

23
FETAL ALCOHOL SPECTRUM DISORDER DIAGNOSTIC TELEMEDICINE PROGRAM: MEASUREMENT OF COST AND CLIENT SATISFACTION

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BACKGROUND: Fetal Alcohol Spectrum Disorder (FASD) is the leading neuro-developmental disability among Ontario's children. Early diagnosis can increase a child's potential for optimal cognitive, behavioral, motor, and social development. Ontario cannot meet the demand for diagnosis of FASD in Northern Communities. As a result, there has been an increase in referrals to a Toronto FASD Clinic. Despite a government travel subsidy, families have described attending the Toronto clinic stressful and costly.
OBJECTIVES: 1) To measure the cost of conducting an FASD assessment via the Telemedicine Program versus the Toronto clinic; 2) to measure caregiver/client satisfaction of the 2 methods.
METHODS: Telemedicine program was developed by the Toronto FASD Diagnostic Clinic in collaboration with 2 centres in Thunder Bay, and North Bay. A protocol for referral to the FASD Telemedicine clinic, and a methodology for conducting specialized developmental assessments of children <= 7.3 years were developed. Health and social service professionals from each of the 2 sites were educated on how to facilitate both a diagnostic clinic and a developmental testing session via Telemedicine. A validated 10-item Likert scale was used to measure caregiver and client satisfaction: Telemedicine Program versus the Toronto clinic. Incremental cost analysis was used to measure costs of the Telemedicine clinic versus the Toronto clinic.
RESULTS: Since August 2007, 92 children and youth, aged 2 to 21 years (mean = 10.2), participated in the Telemedicine Program. Sixty-eight (68) of the 92 clients were diagnosed within the Fetal Alcohol Spectrum. Participants in the study included 49 caregivers and 9 youth assessed in the Telemedicine Program, and 46 caregivers and 10 youth from Thunder Bay/North Bay seen in the Toronto clinic. Average cost savings of $1,280.00 per patient was demonstrated when the Telemedicine Program versus the Toronto clinic was used. Those who had attended the Telemedicine Program demonstrated a higher level of satisfaction compared to those evaluated in the Toronto clinic ($8.8 \pm 0.$ vs 6.7 ± 1.2, $p < 0.05$). There were no significant differences in age, gender, education level, family income level, city of residence, ethnicity, or whether a diagnosis was or was not obtained between the 2 cohorts.

CONCLUSIONS: Diagnosis of clients via Telemedicine was found to be cost effective, and demonstrated a higher level of satisfaction when compared to diagnosis at a Toronto clinic. Findings support increasing diagnostic capacity by using Telemedicine in other Northern Communities.

24
THE EFFECT OF CAFFEINE ON THE DEVELOPING BRAIN

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BACKGROUND: Caffeine is a commonly used medication for the treatment of apnea of prematurity. Despite studies indicating a benefit of caffeine for the premature infant, controversy remains about the long term and subtle effects of caffeine on the immature and still evolving brain of the newborn.

OBJECTIVE: To determine the long term behavioral and neuropathological effects of clinically relevant doses of caffeine, as used for apnea of prematurity, on the immature rat brain.

DESIGN/METHODS: Rat pups at P3 (equivalent to 26-28 weeks gestation) were injected subcutaneously (sc) with 20mg/Kg caffeine citrate, as a load, and subsequently on days P4-P7 with 15mg/Kg. Control pups received identical volumes of sc normal saline.

On P4 through P21, rat pups underwent a battery of early behavioral reflexes. Long term behavior was determined using Object Recognition on P63, and the Morris Water Maze on P160. Separate Groups of rat pups were euthanized on P4, P8, P21, and P160 to examine the neuropathology for evidence of neuroglial cell death.

RESULTS: There was no mortality during the course of the study. Analysis of behavior shows no difference between the caffeine and the control groups for any of the early or long term behavioral tests.

Analysis of FloroJade-B stain at P4 shows that caffeine caused statistically significant neuronal cell death in the: nucleus accumbens, globus pallidus, substantia nigra, thalamus, hypothalamus, CA1. At P8, the analysis shows no statistical difference between the 2 groups in any of the previous brain regions. Anti-NeuN at P21 shows a statistically significant neuronal cell loss in CA1 and Hypothalamus regions in the caffeine group, while at P160, the analysis shows no statistical difference between the 2 groups. Analysis of Anti-Neurofilament-M at P8, P21 and P160 shows no statistical difference between the 2 groups.

CONCLUSIONS: Our results indicate that the use of caffeine, in a manner similar to that utilized for the treatment of apnea of prematurity, has no significant effect on functional outcome in our newborn rat pups.

While analysis of the neuropathology shows that caffeine caused neuronal cell death at P4, and neuronal cell loss at CA1/ Hypoth. regions at P21, there is no long-lasting effect on neuropathological outcome.

These findings are consistent with current clinical studies, and indicate that caffeine may be a safe medication for use in preterm infants.

25
THE ACUTE CARE OF AT-RISK NEWBORNS (ACORN) PROGRAM IMPROVES LEARNER OUTCOMES IN RURAL CHINA

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BACKGROUND: Developed in Canada, the Acute Care of at-Risk Newborns (ACoRN) is an educational program that integrates assessment and intervention for the stabilization of at-risk and unwell newborns. It is being evaluated for neonatal health care providers in Zhejiang Province, PRC. Data are being presented on learner outcomes from courses held in China.

OBJECTIVE: To study the impact of ACoRN on knowledge and self-confidence with respect to neonatal stabilization in Chinese health professionals.

DESIGN/METHODS: Following an initial instructor course, a team of Chinese ACoRN instructors provided instruction to professionals from several county hospitals. ACoRN materials were translated into Chinese. A questionnaire (14 questions) administered pre- and post-course evaluated learner confidence using Likert scales (range: "not at all confident" to "very confident"), and knowledge using 40 multiple choice questions (MCQ) with 4 common stabilization scenarios (see table for categories). Mean pre- and post-scores were compared using Student's t-test. Effect size was estimated using Cohen's d.

RESULTS: From April to September 2009, 121 practitioners participated in courses. Trainees showed improvements in both confidence and knowledge scores. p-values were <0.01 and Cohen's d was >0.6 in all but one field, demonstrating a significant medium to large effect size.

CONCLUSIONS: Learners in rural facilities showed increased knowledge and confidence after an ACoRN course. We conclude that ACoRN training has potential for significant impact on rural newborn care in China: this premise will be tested when data on practice and patient outcomes become available later in 2010.

--Confidence: "I am confident that I can..."--
Identify sick newborn.
Decide what tests a sick baby needs.
Decide what treatments a sick baby needs.
Identify babies who have central cyanosis.
Determine whether a baby has respiratory distress.
Decide if a baby needs support with ventilation or CPAP.
Identify a baby who has signs of shock.
Start treatment with intravenous fluids
Distinguish seizures in a baby from jitteriness
Keep a sick baby at a stable temperature
Identify babies who need measurement of blood glucose
Decide which babies need treatment for low glucose
Identify early signs of infection in a baby
Speak with parents about their sick baby
--Knowledge--
SCENARIO A: Grunting term baby
SCENARIO B: Preterm with respiratory distress
SCENARIO C: Jaundiced term baby
SCENARIO D: Normal term baby

26
TRANSCUTANEOUS BILIRUBIN SCREENING PROGRAM: NOMOGRAM FOR TERM AND NEAR-TERM INFANTS

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BACKGROUND: Jaundice is frequent in the neonatal period. Guidelines recommend that prior to discharge at 48±12 h of life, all newborns be assessed for jaundice. Transcutaneous (Tc) point-of-care device is a precise method of screening which identify neonates that will require measurement of blood bilirubin. Buthani in 1999 published a nomogram, including blood samples and Tc measurements, based on the hour-specific bilirubin values divided into risk zones of hyperbilirubinemia. Values above >= 70th percentile (P) are in a risk zone, values below the 40th P are without risk and if bilirubine is between 40th and 70th P, the risk is only of 2.2%.

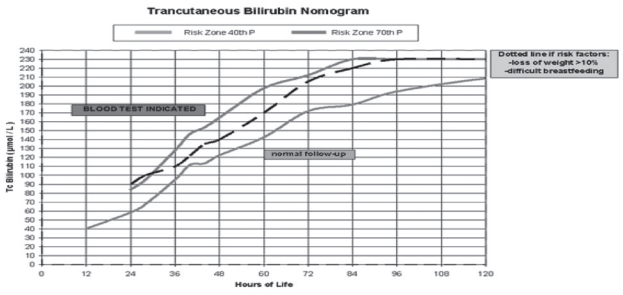
OBJECTIVE: To produce an hour-specific nomogram using a bilirubinometer in a normal newborn population, 1) to avoid unnecessary heel pricks and 2) to identify infants with risk of severe hyperbilirubinemia.

METHODS: A cross-sectional study including patients' >= 34 weeks of gestational age and >= 2000 gr of weight. Infants were selected during 5 weeks (summer 2008). All newborns had a universal screening for jaundice before discharge with paired serum and Tc bilirubin (BiliCheck) performed within 2 h of the designated time. To be in the low risk zone for hyperbilirubinemia of the American Academy of Pediatrics and Canadian Paediatric Society nomograms, we took reference values of bilirubin concentration obtained at different postnatal ages: 130 umol/L at 24 h, 150 umol/L at 36 h, 200 umol/L at 48 and 220 umol/L at 72 h of life.

RESULTS: From 347 eligible infants, we enrolled 139 healthy newborns. Our paired-measures (blood/serum bilirubin versus Tc) were analysed with a linear regression. From this plot, in according to different serum values from the mentioned nomogram and trying to have the lowest false negative results, cutoff decisions of Tc readings were chosen for different postnatal ages: 90 umol/L at 24 h, 110 umol/L at 36 h, 140 umol/L at 48 h and 200 umol/L at 72 h of life. Results were plotted on a nomogram, and two

curves were obtained at the 40th and 70th P predicting high risk track for severe hyperbilirubinemia.

CONCLUSION: We provide data for Tc bilirubin levels during the first 5 days of life in healthy newborn population. This Tc bilirubin nomogram could be a useful tool to avoid unnecessary heel pricks and its complications, and to identify neonates requiring additional blood sample evaluation to eliminate a risk of hyperbilirubinemia.



27

EVALUATION OF NEONATAL RESUSCITATION USING HIGH FIDELITY SIMULATION AND AN INTERPROFESSIONAL TEAM

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INTRODUCTION: Neonatal resuscitation competency requires a combination of medical knowledge and teamwork behaviors. Traditional models of teaching neonatal resuscitation typically focus on skill acquisition within uniprofessional educational opportunities. Residents often feel unprepared to lead arrest teams despite having successfully completed resuscitation courses.

OBJECTIVE: Evaluate neonatal resuscitation performance of pediatric trainees during a simulated neonatal resuscitation scenario using an interprofessional team.

METHODS: In this study, 13 senior pediatric residents were asked to demonstrate neonatal resuscitation during a simulated neonatal megacode with 3 nurses and 1 respiratory therapist using a high-fidelity mannequin (Laerdal SimBaby®). Performance was assessed on video review by two independent neonatologists using: two previously developed neonatal behavior checklists and the traditional AAP NRP megacode evaluation score sheet. Resident feedback was obtained through a standardized questionnaire.

RESULTS: All pediatric residents evaluated had previous NRP certification at the time of the study, but none within 18 months of the study date. Only 3 had previous high-fidelity experience. NRP scores and behavior scores for each resident and team did not vary significantly between raters. 6 of 13 residents did not receive a passing grade for the NRP megacode. A poor NRP megacode score did not correlate consistently with poor team or individual behavior scores. Teamwork behaviors (communication, information sharing, collaboration) could be identified even in residents with poor NRP scores. Residents rated the experience more highly than the allied health professionals (33.5+1.5 vs 30+1.0, $p<0.001$ (score out of 35)), although both valued the experience.

CONCLUSIONS: This pilot study successfully demonstrates the ability to use the high-fidelity mannequin in teaching neonatal resuscitation. The use of an interprofessional team and a high-fidelity manikin may allow teamwork and leadership skills to be evaluated separately in a more realistic fashion.

28

IMPLEMENTATION OF A DELAYED CORD CLAMPING (DCC) PROTOCOL FOR PRETERM INFANTS AND DELIVERY ROOM PRACTICE

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BACKGROUND: DCC in preterm babies for >30s may reduce brain injury, number of transfusions, and sepsis. The implementation of DCC requires evaluation.

OBJECTIVE: We describe a quality improvement (QI) initiative applying DCC for 45s to babies born <33 weeks gestational age (GA).

DESIGN/METHODS: Prior to instituting the protocol, the regional interprofessional Neonatal Resuscitation Committee (a QI committee) ensured that obstetric and neonatal staff were inserviced on the rationale and process for DCC using educational sessions, posters, FAQ documents, and process mapping. An audit process was established using chart review. From May 2008 to Apr 2009, DCC was implemented for all babies born 28 to 32 weeks GA unless contraindicated (adding babies <28 weeks GA in Dec 2008). Using Plan, Do, Study, Act cycles, control charts of DCC rates were fed back to the QI committee. Periods with low compliance were reinforced with further education.

Outcomes included C-section (CS), GA, birthweight (BW), 5-min Apgar (5APG), delivery room ventilation (DVENT), admission temperature (TEMP), blood pressure support (BPS), first hemoglobin (HBG), highest bilirubin (BILI), and number of transfusions (TRAN).

RESULTS: Of 274 babies (mean GA 29.5 (range 24 to 32) weeks), 204 (74%) were eligible for DCC: of these 123 (60%) had DCC. Ineligible babies were more likely to be delivered by CS, be lighter, and have lower 5APG. There was no significant difference in demographic or outcome measures between eligible babies with or without DCC (see Table). Monthly compliance rates for DCC in eligible babies ranged from 18 to 93% (mean 58%, standard deviation 44%).

Mean value (or number) of perinatal factors comparing eligible babies with or without DCC.

	DCC (n=123) (standard deviation or frequency)	No DCC (n=81)	p-value
GA	29.7(2.0)	29.7(2.2)	0.5*
BW	1450(400)	1420(430)	0.8*
CS	63(51%)	41(50%)	0.9†
5APG	7.7(1.7)	7.8(1.4)	0.2*
DVENT	32(26%)	25(31%)	0.7†
TEMP	36.7(0.6)	36.6(0.6)	0.6*
BPS	11(9%)	12(15%)	0.3†
HBG	166(19)	162(22)	0.1*
BILI	175(44)	173(49)	0.3*
TRAN	0.3(1.2)	0.4(1.1)	0.5*

(*t-test;†Chi-square)

CONCLUSIONS: DCC in eligible babies born <33 weeks gestation had a 60% compliance rate, requiring audit and reinforcement. DCC appears practical, safe, and applicable, and has minimal impact on early neonatal outcomes. Longer term evaluation of morbidity and mortality is needed.

29

ORGANIZATIONAL FACTORS UNDERLYING BREAKTHROUGH OUTCOME IMPROVEMENT IN CANADIAN NICUS USING EPIQ: LESSONS FOR LEADERS

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BACKGROUND: The Canadian Neonatal Network (CNN) includes all Canadian tertiary level NICUs. Variation in practice and outcomes is known to exist. A randomized cluster trial of the Evidence based Practice for Improving Quality (EPIQ) conducted between October 2002 and September 2005 was associated with improved neonatal outcomes in Canadian NICUs.

OBJECTIVE: To examine critical success factors and barriers to improvement operative in Canadian NICUs during the EPIQ study.

DESIGN/METHODS: A retrospective survey was conducted of sixteen team members and eleven physician leaders of the project using a tool derived from the literature. Qualitative interviews were conducted with six site investigators and exploratory description and naturalistic inquiry were used to explore emerging themes.

RESULTS: Investigators and team members agreed that EPIQ had a high utility, was effectively implemented, that teams, communication and leadership were effective, and that systems supported quality improvement. Sharing of information and expertise between centres was viewed as key to

success, but competition and peer pressure were not evident. The collaborative nature of the project was perceived as key to success. Respondents identified the need for training and resources in quality improvement. Investigators indicated that EPIQ had been a major learning opportunity for their NICUs, many of which redesigned their Quality management structure and processes as a result of involvement in EPIQ.
CONCLUSIONS: EPIQ improved NICU outcomes across participating Canadian centers. EPIQ established credibility for quality improvement in NICUs, generated organizational learning, and was congruent with the values of academic physicians and staff. Leadership, organizational structure, resources and processes all contributed to improvement. Collaborative networks or communities of practice can provide structure and validation for change. Better communication between clinicians and senior leaders is required. Our next project, EPIQ-2, builds on what we have learned and will provide enhanced coordination, resources, communication and feedback to participating NICUs.

30
ROUTINE TERM CEREBRAL MRI IN PREDICTING NEURODEVELOPMENTAL OUTCOMES OF PRETERM INFANTS

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BACKGROUND: Several cerebral MRI markers have been recently reported as having significant correlations with developmental outcomes in preterm infants. It is currently unclear whether the routine characterization of white matter abnormalities in premature infants at term by MRI leads to improved predictions regarding their prognosis.
OBJECTIVE: To systematically review the evidence in the literature about the clinical usefulness of routine term brain MRI in predicting the neurological outcomes of preterm infants.
DESIGN/METHODS: Pubmed search in the Clinical Query section using the words brain MRI preterm infants and prognosis. The search yielded 154 articles. Inclusion criteria were: cohort studies in preterm infants gestational age (GA) < 34 weeks and otherwise unselected; cerebral MRIs performed at or near term; standardized neurodevelopmental assessments at 18 months corrected GA and beyond.
RESULTS: Of the 154 articles, 13 articles met our inclusion criteria. Positive correlations with abnormal development were found with a wide variety of cerebral MRI markers notably parenchymal lesions and cysts, ventriculomegaly, T1 hyperintensity signals, white matter injury (WMI) scores, apparent diffusion coefficient (ADC), diffuse excessive high signal intensity (DEHSI). The wide variety in the types and locations of markers studied, the timing and type of test used to assess outcomes and the statistical analyses employed for correlations hindered comparison between studies. Seven articles provided sufficient data to permit positive and negative predictive values (PPV and NPV) calculations for abnormalities found on MRI. PPV ranged between 10%-43% for moderate/severe developmental delay, and up to 60% (n=6 with CP) to 82% for CP. The NPV ranged between 74%-100%. One study did not find any advantage of term cerebral MRI over baseline neurological examination.
CONCLUSIONS: Many abnormalities which have been described have a PPV for an abnormal outcome of less than 50%, casting doubt on their usefulness for families or for orienting follow up or intervention programs. The higher NPV might be useful to reassure parents (and perhaps delay follow-up appointment?) but once again, without certainty. The relatively higher PPV for CP may be of value but is based on very small numbers of affected babies. Cerebral MRI at term age is an interesting tool for research on neurodevelopmental consequences of prematurity. However, for routine clinical practice its usefulness is unproven. We found no research indicating this test helped neither parents nor preterm infants at the present moment, this should be indicated at the moment of the exam, which is not always benign in fragile babies prone to apneas with sedation.

31
WHY DON'T WE LIKE PREEMIES?

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BACKGROUND: We have previously shown a relative devaluation of neonates compared to older patients (pts).
OBJECTIVE: To explore the reasons behind this devaluation.
DESIGN/METHODS: Questionnaire and semi-structured interviews.
QUESTIONNAIRE: Scenarios of pts needing resusc:

- 24wk preterm, term baby with brain AV malformation, 2mth with meningitis, 50y with mutiple trauma: all 4 with 50% survival; if survive: 50% normal, 25% major disability.
- Multiply impaired 7y old with cerebral palsy, deafness, learning disability, hyperactivity with new head trauma: 50% survival, 50% chance recovery back to baseline.

Respondents were asked whether they thought resusc was in pt's best interest (best int), if they would accept comfort care at family's request, and how they would rank pts in a triage situation.
INTERVIEWS: How do you evaluate best interests? How did you rank these patients? Why are your answers for the preterm different?
RESULTS: Answers from 35 pediatric residents (80% resp rate).

Percent positive answers					
	24wk	term	2mth	7y	50y
Best Interest	80	89	97	91	83
Accept comfort care	97	74	20	46	31

QUESTIONNAIRE: Despite thinking that resusc was in the best int for the majority of pts, respondents accepted comfort care much more often for neonates.
RANKING: 1st: 2mth, 2nd: 7y, 3rd: term, 4th: preterm, 5th: 50y.
INTERVIEWS: Evaluation of best int (themes mentioned by < 10% of residents not included): 56% of respondents said they evaluated best int according to pt's outcomes, 40% to survival, 43% to family's evaluation of the best int, 25% because prior functioning is known, 14% on the pt's age, 14% nature of treatment.
"I placed the 2 mth old first because": 51% because of personhood/attachment, 47% less sequelae, 31% normal child before, 16% prior functioning known, 13% uncertainty in outcomes.
"I placed the 7y before other pts because": 23% good quality of life, 23% not very disabled, 30% personhood/attachment.
"I ranked the preterm after other pts because": 55% personhood/attachment, 29% outcomes, 16% nature of treatment, 13% family's best int, 13% going against nature.
CONCLUSIONS: The best interest principle was not followed for neonates. Moreover, the preterm infant was often ranked after older patients with similar outcomes.
This devalution of preterm infants seems to be due to his lack of personhood, how residents perceive their outcomes and to family preferences. A seriously disabled child is seen as more worthy of resuscitation by the same residents.

32
IRON STATUS IN LOW BIRTH WEIGHT PRETERM AND NEAR-TERM INFANTS

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BACKGROUND: Iron deficiency (ID) in infancy is common and has been linked to poor school performance and abnormal behaviour. Risk factors for ID are known to include prematurity or low birth weight (BWT), yet larger preterm and near-term infants (>30 weeks and/or 1500-2500g) have been infrequently studied. Current recommendations state that all preterm babies less than 2000g should receive iron until 12 months of age.
OBJECTIVE: Determine the iron status in the first 18 months of life for LBW infants admitted to the NICU, to provide relevant recommendations regarding iron supplementation at discharge.
METHOD: This study used a prospective, longitudinal design to monitor the iron status and growth of infants with BWT between 1500-2500g. In

keeping with guidelines from the AAP, infants less than 2000g at birth were prescribed 2-3 mg/kg/day of supplemental elemental iron daily for 12 months. Growth, diet and iron indices were tracked at discharge, 6, 12, and 18 months of age. ID was defined as serum ferritin less than 20 mcg/L.

RESULTS: Of 121 infants (68 male, 53 female) currently enrolled, 67 infants received iron at discharge (GA 33.2±1.8wks, BWT 1.74±0.16kg), 54 infants did not receive iron (GA 34.7±2.1wks, BWT 2.18±0.13kg). Six, 12, and 18-month data were available for 58, 41, and 23 infants respectively. At 6 months, the iron group had significantly higher ferritin, hemoglobin and MCV levels (55.3±29.6µg/L, Hgb 123±8.6g/L, MCV 79±3.7fL) compared to the non-iron group (21.0±15.3µg/L, Hgb 112±19.8g/L, MCV 72±9.7fL; p<0.01). Seven of 20 non-iron infants developed ID, with two having ID anemia (IDA). Six of these seven were breastfed exclusively at 6 months. At 12 months, there were no differences in ferritin levels between the iron group (37.8±14.7µg/L) and the non-iron group (38.2±29.5µg/L, p=0.95). At 18 months, ferritin levels in the iron group (51.2±26.8µg/L) were higher than the non-iron group (25.4±9.0µg/L) but this difference was not significant (p=0.25). IDA was not seen in either group at 12- and 18-months. No differences were noted with respect to weight, length, and head circumference.

CONCLUSIONS: Supplementing LBW preterm and near-term infants improves iron indices at 6 months of age, but the clinical relevance remains to be seen. Iron guidelines for these infants may need to be reviewed, especially in breastfed infants.

33
A NEW CALCULATION TO DETERMINE INSERTION LENGTHS FOR NEONATAL VENOUS AND ARTERIAL UMBILICAL CATHETERS

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INTRODUCTION: The placement of central umbilical catheters in neonates is one of the more common procedures done in Neonatal Intensive Care Unit (NICU). The catheters are used for drawing blood samples, measuring blood pressure, and administering fluid and medications.

The current practice of determining the length of the catheter insertion varies widely among centers and even amongst practitioners within one center. They include calculations as well as measurements then plotted on a graph to determine appropriate length. None have been validated in the neonatal population. Most are cumbersome and difficult to remember especially in a resuscitation situation. There are numerous complications of improper length in the literature.

METHODS: All babies requiring an umbilical catheter admitted to the NICU at Kingston General Hospital in Kingston, Ontario in 2007 were enrolled (N=38). Our method was utilized and success was determined with abdominal radiograph by the physician available. It was then confirmed with the Radiologist. The method, accuracy, acute complications or difficulties and level of efficiency of the procedures were documented on a worksheet along with epidemiological information regarding the babies (i.e. weight, gender and gestational age). Some details regarding practitioners were also recorded including level of training and field. Successful placement of line would be defined by whether or not the catheter required adjustment after X-ray confirmation.

RESULTS: The success for umbilical arterial catheters (UAC) was 68% and for umbilical venous catheters (UVC) was 63%. All incorrectly placed lines were inserted too far at an average distance of 2cm for UAC's and 1cm for UVC. There were no complications and the formula was felt to be easy to use and an improvement on current practice.

CONCLUSIONS: This study is a first in attempting to validate a method for determining umbilical catheter length in neonates. The method is easy to use and has reasonable success rates.

34
IS EARLY STRATIFICATION OF GASTROSCHISIS PATIENTS POSSIBLE?

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BACKGROUND: Despite improvement in mortality rates in the past years, gastroschisis (GS) is a congenital abdominal wall defect with significant morbidity and prolonged length of hospital stay. Incidence is rising worldwide. There are subgroups of GS patients who have significantly different outcomes. Variables examined in order to identify early predictors of outcome and create risk stratification include prenatal ultrasound, associated birth defects, maternal age, smoking and drug use, birth weight, type of closure, bowel appearance at surgery.

OBJECTIVE: To evaluate early clinical risk stratification to predict outcome in patients with gastroschisis (GS).

DESIGN/METHODS: The Canadian Pediatric Surgery Network (CAPSNet) is a national pediatric surgical database which includes GS patients in 16 centers across Canada. Using the CAPSNet database for patients born between May 2005 and April 2009, various predictors of outcome were evaluated by linear regression analysis, with days of parenteral nutrition (PN) as the dependant variable.

RESULTS: Data from 367 GS patients was analyzed, and characteristics are presented in Table 1. No correlation was found between days on PN and maternal age, illicit drug use, gestational age, birth weight, gender, inborn/outborn status, prenatal doppler, arterial cord gas, resuscitation at birth, fluid volume given in first 6 hours, SNAP II score in first 12 hours and time to surgical closure. The most significant correlation (p<.008) was found between days on PN and a qualitative assessment of the bowel for necrosis, made at birth by the surgeon. There was also a significant correlation (p<.03) between days on PN and cardiopulmonary resuscitation at birth (CPR), though it was only required in 11/367 patients. Another correlation was found between days on PN and associated congenital anomalies (p<0.018).

Maternal age	23±5
Maternal ethnicity - Caucasian	37%
Illicit drug use	15%
Gestational age	36±2
Birth weight	2561g±471
Male	54%
Outborn	11%
Arterial cord pH	7.26±0.7
Resuscitation at birth	68%
Time to closure < 6 hr	50%
Time to closure >24 hr	37%
PN days	41±47

mean ±SD

CONCLUSIONS: Clinical assessment of bowel necrosis performed at birth was the most useful variable that correlated with the duration of PN in GS patients, a proxy for poor outcome. This tool, used to describe bowel appearance, requires further trials and validation.

35
IMPACT OF A MULTIDISCIPLINARY TEAM ON THE OUTCOME OF GASTROSCHISIS

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BACKGROUND: The treatment of gastroschisis (GS) patients remains controversial and challenging, with significant morbidity despite improved mortality. Multidisciplinary teams have been shown in the past to improve integration of expert management, communication with patients and families, continuity of care and patient outcome. This has not been studied for GS.

OBJECTIVE: To compare outcomes of GS patients managed by a multidisciplinary team (Team) versus a non-standardized approach (no Team).

DESIGN/METHODS: The Canadian Pediatric Surgery Network (CAPSNet), a national surgical database, collected data on all GS patients born May 2005 to April 2009. All centers (n=16) were asked about

management of GS based on the presence or absence of a Team. Bivariate analysis was performed. Outcome variables were included in a linear regression with the presence or absence of a Team as the main explanatory variable.

RESULTS: Characteristics of the patients in the 2 groups are described in Table 1.

Outcomes are presented in Table 2.

Table 1:

	Team (7 centers, n=205)	No Team (9 centers, n=192)
Maternal age	23±5	23±5
Maternal drug use	15%	15%
Outborn	17%	8%
Gestational age	36±2	36±2
Birth weight	2552g±547	2551g±560
Male	56%	54%
Associated congenital anomalies	26%	30%
Resuscitation at birth	75%	63%
CPR at birth	2%	4%
Bowel necrosis at birth	17%	11%
Illness severity (SNAP II) score in first 12 hours	8±11	12±14
Illness severity (NTISS) score to 42 days	22±7	23±6

mean±SD

Table 2:

	Team (7 centers, n=205)	No Team (9 centers, n=192)	p-value
Ventilation (days)	5±8	5±6	NS
PN (days)	47±51	34±33	0.003
First enteral feed (days)	22±52	15±12	NS
Conjugated bilirubin >10 at discharge	19%	22%	NS
Length of stay	57±59	44±49	0.018
Deaths	5	10	NS
Deaths in patients with bowel necrosis	3/33	6/21	NS

mean±S.D

Patients from centers with a Team had significantly more days on parenteral nutrition (PN) and longer lengths of stay (LOS) than patients with no Team. For patients with bowel necrosis at birth, there were deaths in 9% of the Team vs 28% of the no Team group.

CONCLUSIONS: GS patients in centers with Teams have significantly more PN days. The patients in both groups had comparable illness severity, however there were more deaths in the no Team group, particularly for patients with bowel necrosis at birth. This warrants further investigation.

36
HIGH FLOW – LOW LEVEL OF EVIDENCE – WHAT ARE WE DOING?

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BACKGROUND: Respiratory distress syndrome is common among premature infants. Many of these infants may require respiratory support for days to weeks due to respiratory disease. In recent years, a new treatment modality, heated humidified high-flow nasal cannulae (HFNC) has become available. HFNC has become increasingly popular, although the exact role of HFNC has not yet been clearly established, and review of the current literature demonstrates limited systematic evaluation in a clinical setting.

OBJECTIVE: To survey the attitudes and practices in academic NICUs in United States regarding the extent of use of HFNC, indications and flow settings that are being use.

DESIGN/METHODS: A questionnaire regarding use of HFNC was electronically distributed to all (97) Neonatal Perinatal Medicine Fellowship Training Program Directors in the United States during 2008.

RESULTS: Fifty eight (60%) Program Directors responded to the questionnaire. Of these 40 (69%) reported using HFNC and 18 (31%) not using this modality. Reported starting flows ranged from 1 to 6 L/min and maximal flows from 2 to 8 L/min (Table). The indications for HFNC varied between units and were: as a substitute for CPAP, after extubation, presence of nasal injury, as a weaning strategy from CPAP and as the preferred mode for treatment of apnea of prematurity. No adverse effects of HFNC were reported in the material reviewed for our survey.

Starting, minimum and maximum flow use in different centers

Starting flow (n=39)*		Minimal flow (n=37)*		Maximal flow (n=36)*	
L/min	#of units	L/min	#of units	L/min	#of units
1-2	17	0.5	4	2	6
3-4	21	1	16	3	3
3-6	1	1.5	4	4	9
		2	13	5	5
				6	8
				7	3
				8	2

*n = number of responses to this question

CONCLUSIONS: The findings of our survey suggest that the use of HFNC is widespread despite lack of evidence of efficacy from large clinical trials. The indications for HFNC and the initial, minimal and maximal flows varied widely among the centers. As neonatologists, we seek to use therapies which are proven to be effective and yet expose our patients to the least risk. However, in the history of neonatology, enthusiasm frequently has trumped evidence in the introduction of new modalities. This report supports the need for well designed randomized controlled clinical trials to evaluate the efficacy and safety of HFNC for a variety of clinical indications.

37
THE LITTLE PRINCE AND HIS ROSE: COMPARISONS BETWEEN MODES OF DEATH IN THE NICU AND THE PICU

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BACKGROUND: 80% of pediatric deaths occur in ICUs, the majority because life sustaining treatments (LST) are withdrawn (WD) or withheld (WH). Most end-of-life studies do not make the distinction between WD LST from moribund children and WD/WH LST from physiologically stable children for quality-of-life considerations.

OBJECTIVE: Compare modes of death in the PICU and the NICU.

DESIGN/METHODS: Chart review: all deaths in the delivery room (DR), the NICU and the PICU at Ste-Justine Hospital (Montreal, Canada) over 2 y (2008-09).

RESULTS: NICU deaths (n=77), average GA = 34wks (43% <29wks), average BW = 1765g; average day of life at death = 15. 1y Dx: 36% congenital malformation (13% heart); 13% asphyxia; 9% resp insufficiency; 9% IVH, 9% NEC.

PICU deaths (n=68), Age: 41% <1y old, 35% 1-10y; 24% >10y. 60% had pre-existing serious conditions that contributed to their death. Average days in PICU before death: 13 days. 1ry Dx: congenital malformation 29% (heart 25%), trauma 10%, neoplasia 7%, intracranial hemorrhage 7%, infection 6%.

Categorization of deaths in PICU and NICU

Intervention	Physiology	PICU %	NICU %	NICU vs. PICU
Neither WH nor WD (died with CPR)	unstable	6	7	NS
Withhold CPR, not WD (died on ventilator)	unstable	51	5	p<0.05
WH + WD (moribund children)	unstable	27	35	NS
WH + WD (for QOL reasons)	stable	16	53	p<0.05

Dying on the respirator was the most common way to die in the PICU and the least common in the NICU.

Withdrawal of LST for quality-of-life considerations was the most common cause of death in the NICU (53% in the NICU vs 16% in PICU). This difference would be even more striking if DR deaths were included (22 deaths followed WH NICU, of which 11/22 = prems at 23-25wks GA).

Unstable physiology at time of death was much more common in the PICU (82% vs 47% in NICU). The average length of PICU stay was 13 d in these patients (16% of them <48h) vs 18 d for NICU pts. 58% of unstable deaths in the PICU occured in children with preexisting medical conditions.

CONCLUSIONS: Modes of death are strikingly different in the NICU and the PICU.

A greater proportion of deaths with stable physiology in the NICU may suggest: 1. That neonatologists & parents are more inclined to WD or WH life sustaining treatments before babies reach unstable physiology; 2. That PICU physicians & parents are more inclined to WD life sustaining

treatments when children become unstable; and 3. That parents & physicians are more willing to WD or WH life sustaining treatments for neonates for QOL considerations, as compared to older children.

38
INTERNATIONAL COMPARISON OF TRIAGE FOR CRITICALLY ILL PATIENTS: CHILDREN FIRST, ADULTS AND NEONATES LAST

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BACKGROUND: The medical and ethical literature suggests that triage decisions for critical patients are usually based on analyses of death, disability or both.

OBJECTIVE: Is the relative devaluation of neonates that we previously demonstrated present in different cultures?

DESIGN/METHODS: Responses to 8 scenarios of critical patients needing resuscitation were sought in 7 countries.

- 24wk preterm, term baby with brain AV malformation, 2mth old with meningitis: each with 50% survival. Among survivors, 25% risk of serious + 25% risk of mild disability.
- Multiply impaired 7y old with cerebral palsy, deafness, learning disability, hyperactivity with new head trauma: 50% survival, 50% risk to recover back to baseline, 50% risk to further deteriorate.
- 13y with acute leukemia and CNS involvement: 5% survival and 20% disability.
- 35y with brain cancer: 5% survival, 100% probable serious sequelae after surgery.
- 50y with multiple trauma: 50% survival, 50% serious abnormal outcomes.
- 80y with moderate dementia and a new stroke: 50% survival + 50% return to baseline.

RESULTS: 2127 physician respondents, mostly neonatologists (70% response rate) in Australia, Canada, Ireland, Netherlands, US, Argentina, Norway.

- Would you resuscitate the patient? For all scenarios (except for the 80y old), over 70% of respondents in all countries would. Exception: in the Netherlands, 28% would resuscitate the 24wk infant, same as for 80y old.
- In what order would you resuscitate the patients if all needed intervention at the same time? In all countries the 2mth and 7y old were resuscitated 1st. The neonates came in 3rd, 4th or 5th position in every country except in NL, where the 24wk was ranked 7th.

Ranking of incompetent patients: 5 first patients to be resuscitated

order of pts	Aust	Can	Ire	NL	Norway	US
1st	2mth	2mth	2mth	2mth	2mth + 7y	7y
2nd	7y	7y	7y	7y	2mth + 7y	2mt
3rd	24wk	24wk	24wk	term	50y	24v
4th	13y	13y	13y	14y	24wk	tem
5th	term	term	50y	35y	term	13y

CONCLUSIONS: In triage situations, neonates are devaluated compared to older children with similar outcomes. Impairment (or potential for) does not seem to influence triage decisions in children. On the contrary, a multiply impaired child is ranked in 1st or second position in all countries, always in front of neonates. Responses were remarkably consistent amongst countries, suggesting that differences between cultures and healthcare do not explain this phenomenon.

39
EFFECTS OF PERMISSIVE HYPERCAPNEA, ACIDOSIS, AND HYPOTENSION ON OUTCOMES OF PRETERM INFANTS <28 WEEKS GA

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BACKGROUND: Neonatologists have adopted practice of permissive hypercapnea, hypotension, and acidosis in the management of extreme preterm neonates. Tolerance of high PCO_2 as long as pH remains normal and low BP in the management of preterm neonates is practised to minimize the adverse side effects of aggressive ventilation and aggressive treatment of hypotension. However, the effects of these approaches on neonatal outcomes are still unknown.

OBJECTIVE: To compare respiratory and hemodynamic profiles of preterm infants <28 weeks gestational age (GA) during first 3 days of admission with mortality and development of significant morbidities.

DESIGN/METHODS: Population: 254 preterm neonates <28 weeks GA born between July 2004 and June 2009.

EXPOSURE: Patient profiles on blood pH, PCO_2 and mean BP were compiled and averaged over the following time scale: <6 hours, 6-24 hours, day 2, and day 3.

OUTCOME: Mortality or any of 3 morbidities: chronic lung disease at 36 weeks, or severe neurological injury (grade 3 or 4 ICH or PVL) or severe ROP (>stage 2).

GROUPS: Group 1: Infants without any morbidities; Group 2: Infants who developed 1 or 2 morbidities; and Group 3: Infants who either died or developed all 3 morbidities.

ANALYSIS: Repeated measures ANOVA was used for comparison between groups.

RESULTS: There were 73 patients in group 1; 125 patients in group 2; and 56 patients in group 3. Demographic characteristics and results of pH, PCO_2 and MBP in the first 3 days are given in the table.

Neonatal profile of pH, PCO2 and MBP during first 3 days

Characeristics	Outcome group 1 n=73	Outcome group 2 n=125	Outcome group 3 n=56
GA Mean ±SD	25 ,1	25 ,1	24 ,1
Birth Weight (g) Mean ,SD	856 ,170	785 ±152	686 ±131
Mean pH <6h	7.31*	7.29*	7.25**
Mean pH 6-24h	7.33*	7.32*	7.28**
Mean pH D2	7.31*	7.30*	7.25**
Mean pH D3	7.30**	7.28**	7.26**
Mean PCO2 <6h	46*	49	52*
Mean PCO2 6-24h	43	44	46*
Mean PCO2 D2	43	46	49*
Mean PCO2 D3	44	47	48*
Mean MBP <6H	33*	33	32
Mean MBP 6-24h	38*	36	37
Mean MBP D2	40*	39	37
Mean MBP D3	41*	39	39

* P<0.05 compared to group 3, **p<0.05 between all groups

CONCLUSIONS: Neonates who died or developed all 3 morbidities had lower pH, higher PCO_2 and lower MBP during the first 3 days after birth. We caution clinicians to the possibility of adverse outcome of so called permissive approach. Further prospective studies of long-term outcome assessment of such approach are needed.

40
IMPACT OF A DEDICATED NURSING TEAM FOR PERIPHERALLY INSERTED CENTRAL CATHETER PLACEMENT IN PRETERM INFANTS

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BACKGROUND: Peripherally inserted central catheters (PICCs) are a much-utilized tool in the management of infants in the neonatal intensive care unit (NICU). Many NICUs have developed nurse-based PICC teams. While these teams appear successful, quantitative data on outcomes of these programs in this population is limited.

OBJECTIVE: To complete a quantitative investigation within one center, comparing outcomes when physicians were responsible for PICC placement with outcomes after inception of a nurse-based PICC team.

DESIGN/METHODS: A retrospective chart review including neonates with birth weight < 1000 g or gestational age < 29 weeks was conducted. Data were analyzed for a 2-year period: July 2007-June 2008 during which time PICCs were placed by physicians and July 2008-June 2009 when PICC placement was done by a dedicated nursing team. Outcome measures included: % of patients in whom PICCs were inserted, not attempted or were unsuccessful, number of attempts, day of life (DOC) of PICC

insertion, mean duration of PICC, total number of catheter days, infection rates (positive blood cultures at > 48 hours or age) and umbilical venous catheter (UVC) use and duration.
RESULTS: Overall, there were 97 candidate patients during the 2-year study period. The nurse-based team inserted significantly more PICCs (nurse 55.2% vs physician 33.3% p = 0.004). This is primarily due to physicians making significantly less attempts at placement (nurse 25.9% not attempted, physician 59.0%, p < 0.001). Also, DOL of PICC placement was considerably earlier under the nursing team, averaging 4.3 days at placement compared with 8.3 days under physicians. For all patients, infection rates were almost identical between groups, at 41.4% for nurses and 38.5% of physicians. Within the subset of those with PICCs, the rates were 31.3% and 23.1% respectively. In those with PICCs, the number of infections/1000 catheter days was also similar (nurse 19.8/1000, physician 15.3/1000). In addition, patients with PICCs acquired infections at a later DOL than those with (Kaplan-Meir, p = 0.03). Finally, mean duration of UVCs was shorter after inception of the nurse-based team at 5.9 days vs 7.6 days for physicians.
CONCLUSIONS: Establishment of a nurse-based PICC team has resulted in significantly more PICCs being placed earlier in life with no adverse effects on patient outcome.

41
DIFFERENCES IN RISK FACTORS ASSOCIATED WITH SEVERITY OF BRONCHOPULMONARY DYSPLASIA AND NEURODEVELOPMENTAL OUTCOMES AT 36 MONTHS ADJUSTED AGE

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BACKGROUND: Risk factors (RFS) associated with bronchopulmonary dysplasia (BPD) are known from previous studies but their relationship with severity of BPD is unknown. Advances in neonatal ventilation and NICU practices have changed the severity of BPD and associated RFS profile.
OBJECTIVE: To determine RFS associated with severity of BPD and their impact on neurodevelopmental(ND)outcomes at 36 months adjusted age (AA).
DESIGN/METHODS: This was a prospective cohort study of all surviving babies of <=1250 g admitted to a regional NICU from 1995-2004 who were followed up at 36m AA. Demographic risk factors and ND disabilities information were collected. Infants with BPD were categorized as mild BPD (MBPD), moderate BPD (MOBPD) and severe BPD (SBPD). MBPD was defined as oxygen dependence at 28 days of life, MOBPD at 36w PCA and SBPD at 36w PCA plus discharge home on oxygen. ND disabilities were considered present if a child had any of: cerebral palsy, cognitive scores >2SD below the mean, blindness or deafness. Outcome data was compared using multivariate logistic regression.
RESULTS: Of 1148 liveborn babies, 960 survived to 36m AA and 884 (92%) were seen. Infants in No BPD, MBPD, MOBPD and SBPD group were 258, 113, 134 and 379 respectively. CPAP was the common RFS for all three BPD groups. The other RFS associated with SBPD were BW 750g (OR 2.0, 95% CI 1.1-3.6), GA 27-28 wks (OR 2.0, 95% CI 1.2-3.4), diuretics (OR 1.81, 95% CI 1.06-3.10), prolonged hypoxia (OR 3.13, 95% CI 1.7-5.7), CPAP (OR 1.65, 95% CI 1.04-2.61), duration of ventilation >7d (OR 5.3, 95% CI 2.6-11.2) and maxPIP >=20cm (OR 1.8, 95% CI 1.2-2.7). Severe ROP and blood transfusion were the main RFS associated with moderate BPD. Severe ND disability in no BPD, MBPD, MOBPD, SBPD groups was 5.3%, 8.1%, 15.5%, 19.6% respectively (p<0.0001). RFS associated with severe disability are shown in the table 1.

Table 1:

Outcomes	p value	OR (95%CI)
Postnatal steroids	<0.001	2.5 (1.4-4.3)
IVH grade III & IV	<0.001	8.3 (4.0-17.4)
ROP stage >=3	<0.001	2.7 (1.5-4.9)
PDA	<0.001	8.4 (2.7-25.6)

CONCLUSIONS: Gestational age, birthweight, PIP >=20cm, CPAP, prolonged ventilation and hypoxia were the main risk factors associated with SBPD compared to CPAP and blood transfusion for both mild BPD and moderate BPD. Infants in severe BPD group had significantly higher neurodevelopmental disabilities compared with other groups.

42
DOES SURGICAL LIGATION OF PATENT DUCTUS ARTERIOSUS IMPACT LANGUAGE, VOICE, BEHAVIORAL & COGNITIVE OUTCOMES AT 36 MONTHS ADJUSTED AGE IN ELBW INFANTS?

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BACKGROUND: Surgical ligation of patent ductus arteriosus (PDA) is a common procedure in ELBW (<=1000g) infants. Surgical factors and severity of associated symptoms before and after surgery could affect long term outcome. It is not known whether PDA ligation affects language, voice, behavioral or cognitive outcomes.
OBJECTIVE: To examine the impact of PDA ligation on language, voice, behavioral and neurodevelopmental (ND) outcomes in ELBW infants at 36 months adjusted age(AA).
DESIGN/METHODS: A cohort of ELBW infants born 2000-2004 were assessed through a Perinatal Follow-up Clinic. Demographic information, language, voice, parents' rating of behavior and ND disabilities at 36 months adjusted age were compared between children with PDA ligation (LG) and without ligation (NLG). Composite morbidities (ROP stage >=4, brain injury, or oxygen at 36w AA) were also compared. Cut scores for delayed language and borderline cognitive functioning were >=1SD below the mean. ND disability was defined as cognitive score of >=2SD below the mean or any of cerebral palsy, blindness, or deafness. Groups were compared using univariate statistics and multivariate logistic regression, controlling for other neonatal variables.
RESULTS: Of 361 live born babies, 271 survived to 36m AA and 232 were seen. LG (n=81)and NLG (n=151) groups had mean BW of 729.3g (SD 145.4) and 813.8g (SD 132.5) (p<0.01) and gestational age 25.3w (SD 1.8) and 27.3w (SD 2.1) (p<0.01), respectively. Mothers were younger in the LG group (p<0.01) and their infants had more hypotension, sepsis, NEC, BPD, IVH grade III & IV, ROP stage 3 (p<0.05) and composite morbidities (p<0.0001). Language disabilities, voice quality and behavior ratings were not different between groups. In the LG group, 40.3% had borderline cognitive scores (p<0.01) and 25.3% had ND disability (p<0.01). Composite morbidities, not PDA ligation, were the most predictive factor for borderline cognitive scores (OR 2.13, 95%CI 1.20-3.76).
CONCLUSIONS: At 36 months adjusted age, language disabilities, voice quality and behavior ratings were not different between LG and NLG groups. However, there was a trend towards poor outcomes for expressive language abilities and voice quality in the LG group. Language development should be monitored and treatment provided as required. ELBW infants with ligated PDAs had increased rates of borderline cognitive function and risk for ND disability.

43
NEONATAL CHOLESTASIS IN A TERTIARY NORTH AMERICAN NEONATAL INTENSIVE CARE UNIT: A 4 YEAR EXPERIENCE

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BACKGROUND: There are limited published data regarding the causes, course and treatment of neonatal cholestasis in infants admitted to neonatal intensive care units (NICU).
OBJECTIVE: To describe patients' characteristics, investigations, etiologies found and the use of specific medication in cases with cholestasis in our tertiary level NICU.
DESIGN/METHODS: A charts review of all the patients who developed cholestasis in between January 2004 and December 2007. Cholestasis was defined as two consecutive conjugated bilirubin values >33 mol/L.

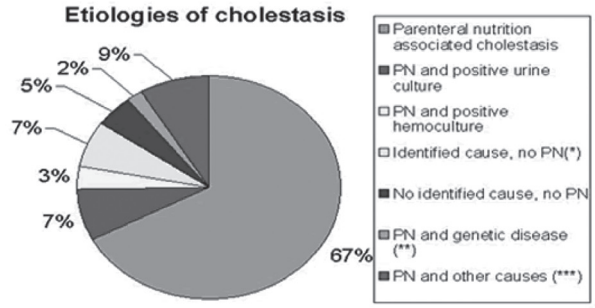
RESULTS: Patients with cholestasis during the studty period were 149 (3.4% of all admissions).
Patients characteristics are shown in the following table:

- Investigations included liver enzymes in 100% of patients, abdominal ultrasound in 73.8%. TORCH screen in 19.3% and Scintigraphy or liver biopsy in 6.7% of cases.

The differents etiologies presented in the following figure:

Median gestational age, weeks (IQR)	29.8 (26.5-36)
Median birth weight, g (IQR)	1072 (802-2610)
Median length of hospital stay, days (IQR)	76 (33.5-107.5)
Respiratory distress syndrome, n(%)	93 (62.4%)
Bronchopulmonary dysplasia, n(%)	67 (45%)
Pharmacologic treatment of patent ductus arteriosus, n(%)	75 (50.3%)
Necrotizing enterocolitis, n(%)	30 (20.1%)
Parenteral nutrition (PN), n(%)	132 (88,6%)
Median age at minimal full enteral feeding (120 mL/kg/day), days (IQR)	35 (23-47.5)

*Table 1.



* Identified causes: positive urine culture (2), biliary tract atresia (1), biliary tract atresia, choleductal cyst and neonatal sclerosing cholangitis (1), inspissated bile syndrome (3), galactosemia (1), congenital hypothyroidism and positive urine culture (1), congenital rubella and positive urine culture (1).

** Genetic disease: Down's syndrome (1), cystic fibrosis (1), progressive familial intrahepatic cholestasis (1).

*** Other causes: multiple viral infections (5), adenovirus infection and positive urine culture (1), histiocytosis X and positive urine culture (1), neonatal idiopathic hepatitis and positive urine culture (1), biliary tract atresia (1), fetal alcohol syndrome (1), multiple hemangiomas (1), heart failure (1)

Ursodiol was used as treatment for cholestasis in 50.3% of patients. Cholestasis had resolved in 80.5% of patients before discharge. Of patients with cholestasis 9.4% died during hospitalization.
CONCLUSIONS: In our NICU, neonatal cholestasis primarily affected premature, low birth weight infants. Cholestasis was attributed to PN in most cases. Half of our patients received ursodiol as treatment. The majority of cholestasis (80.5%) resolved before discharge.

44
DOES APPROACH OF WEANING FROM CPAP INFLUENCE NEONATAL OUTCOMES IN PRETERM INFANTS?

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BACKGROUND: Continuous positive airway pressure (CPAP) is shown to be effective in reducing the need for intubation, treatment of apnea and possibly reducing chronic lung disease in preterm infants. Even though widely used, to-date there is limited information regarding the optimal approach of weaning infants from CPAP.
OBJECTIVE: To compare the effectiveness of two approaches of weaning CPAP on the duration of: 1) weaning infants off CPAP completely, 2) hospital stay, 3) time to achieve full enteral feeds, and 4) short-term neonatal morbidities (NEC, PDA, sepsis, ROP and IVH) between groups.
DESIGN/METHODS: Retrospective cohort study of infants 32 weeks and/or 1500grams requiring CPAP for the year 2007 were eligible. Infants were grouped into 2 based on the approach of weaning: 1) Cycling - off CPAP for 4 hrs/day with gradual increase in the duration off CPAP, and 2) Non-cycling - wean CPAP directly to room air or supplemental oxygen. The primary outcome was the duration on CPAP. Univariate tests were used to examine the characteristics of the sample population and the association between outcomes and groups. Multivariate regression analyses were performed to account for differences between groups.
RESULTS: Of the 172 eligible infants, 24 were excluded [death (N=4), received CPAP for < 48 hours (N=8) and transferred to other site before weaning (N=12)]. 88 infants were in the Cycling group and 60 infants in the Non-cycling group. Demographics and outcome data are presented below.

Table 1: Demographics and outcome data

Variables	Cycling group(N=88)	Non-cycling group (N=60)	P value
GA at birth (wks)	27.6 (1.5)	28.1 (1.9)	0.06
Birth weight (g)	955 (210)	1058 (258)	0.008
Duration of CPAP (days)	38 (6, 73)	21 (2, 48)	< 0.0001
CGA off CPAP (wks)	35 (32, 41.6)	33 (28, 40.4)	< 0.0001
Duration of hospital stay (days)	66 (31, 136)	49 (22, 143)	< 0.0001

Results are mean (SD) or median (range)

No significant differences in the time to achieve full enteral feeds or short-term neonatal morbidities were noted between groups. Regression analysis revealed that the mode of weaning accounted for the differences in the duration of CPAP.
CONCLUSIONS: The use of cycling to wean preterm infants from CPAP is associated with prolonged need for CPAP and hospital stay. Therefore, Cycling is not recommended as a mode of weaning from CPAP.

45
DESCRIPTION OF TOTAL FLUID INTAKE CALCULATION ACCORDING TO WEIGHT FOR PRE-TERM INFANTS IN A NEONATAL INTERMEDIATE AND INTENSIVE CARE SETTING

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BACKGROUND: Total fluid intake (TFI) is conventionally calculated using birth weight (Birth Weight TFI Calculation, BWTC) from day 0 to 7 of life. Following day 7, TFI calculations are generally based on the infant's current weight (Current Weight TFI Calculation, CWTC). No existing research provides evidence to account for this approach to TFI calculation, or examines the possible outcomes associated with this practice in pre-term infants.
OBJECTIVES: Were to ascertain: (1) the proportion of infants whose TFI prescription was changed on day 7 from a BWTC to a CWTC; (2) the proportion of infants whose TFI prescription was changed from BWTC to CWTC before they surpassed their birth weight; (3) the mean relative change in TFI that occurs with a change from BWTC to CWTC; (4) the difference in day 14 weight between infants whose TFI calculation was switched from BWTC to CWTC before and after birth weight was surpassed; and (5) the current practice of TFI calculation amongst pediatricians and neonatologists in Canada.
RESEARCH DESIGN & METHODS: A retrospective review was conducted of TFI prescriptions for neonates 32-35 weeks admitted to the Level II/Level III intensive care unit of a tertiary care hospital from April 1, 2007- March 31, 2008. As well, an electronic survey was sent to pediatricians and neonatologists in Canada to investigate fluid management for 32-35 week neonates. Approval from the hospital research ethics review board was granted.
RESULTS: Data on 178 infants with a mean age of 33.7 weeks (SD=1.08) and mean birth weight of 2159.3 grams (SD=519.1) were analyzed. Almost two-thirds (60.7%) had their TFI calculation switched to CWTC on day 7. Most (80.3%) infants had a CWTC prescription before they surpassed their birth weight. The mean relative change in TFI was 10cc/kg/day (SD=5.45) for infants switched on day 7 from BWTC to CWTC. There was a statistically significant difference in the proportion of weight gained by day 14 between those that had TFI switched before versus after birth weight was surpassed ($p < 0.001$). 67% of the survey respondents (40% response rate) reported changing from birth weight to current weight for the calculation of TFI after the infant has surpassed birth weight.

CONCLUSION: This is the first descriptive study demonstrating the discrepancy within and between institutions in the calculation of TFI for preterm infants. The significant difference in weight gain on day 14 as well as the potential impact of the relative change in TFI on this result warrants further investigation.

46

FEED MIXTURES OFTEN EXCEED OSMOLALITY RECOMMENDATIONS IN PRETERM INFANTS

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BACKGROUND: Hyperosmolar feeds have been associated with necrotizing enterocolitis. For preterm infants, a feed osmolality of less than 425mOsm/kg H_2O has been recommended. Although preterm formula and fortified breastmilk have an osmolality below this cut-off, medications and vitamins with high osmolality are routinely mixed into milk prior to feeding. The extent to which these additions increase total osmolality is largely unknown.

OBJECTIVE: Determine the osmolality of feeds after the addition of commonly prescribed medications, vitamins and minerals and compare them to recommendations.

DESIGN/METHODS: To mimic a clinical situation, a 1000g infant feeding 160mL/kg/d (13mL q 2) was used as a reference. Commonly prescribed medications and vitamins at typical doses were mixed into 13mL of either Enfamil 24kcal/oz preterm formula or breastmilk with Enfamil human milk fortifier (1 package:25mL). Osmolality was determined by freezing point depression using the Advanced Micro-Osmometer Model 3300.

RESULTS: The majority of medications and/or other additives mixed with feeds resulted in an osmolality that exceeded recommendations (Table). Addition of vitamin preparations or Phenobarbital produced the greatest osmotic load.

Osmolality of feeds combined with common additives

Additive, volume	Breastmilk with fortifier	Preterm formula	Exceeds recommendations
None	362±14*	310±5	No
Tri-Vi-Sol® (400IU Vitamin D, Vitamin A 1500IU, Vitamin C 30mg/1mL) 1 mL	962±9	930±13	Yes
Iron (15mg elemental iron/mL) 0.13mL	442±8	387±6	Yes/No
D-Vi-Sol® (400IU Vitamin D) 1 mL	891±7	867±9	Yes
D drops® (400IU Vitamin D) 0.03mL	376±5	323±5	No
Caffeine (10mg/mL) 1mL	345±3	310±2	No
NaCl (2.5mmol Na/mL) 0.27mL	451±5	435±4	Yes
NaCl (2.5mmol Na/mL) 0.4mL	505±3	476±2	Yes
Phenobarbital (5mg/mL) 1mL	1176±7	1235±9	Yes
Poly-Vi-Sol® (fat and water soluble multivitamin) 1mL	1034±16	1000±6	Yes
Lasix (10mg/mL) 0.1mL	399±8	368±4	No
Poly-Vi-Sol® 1mL + NaCl 0.4mL + Fe 2mg	1219±3	1201± 11	Yes

***expressed in mOsm/kg H20 (mean±SD)**

CONCLUSIONS: Hyperosmolar feed mixtures are commonly fed to preterm infants. To increase safety, efforts should be made to minimize feed osmolality.

47

DOES HISTOLOGICAL CHORIOAMNIONITIS HAVE AN IMPACT ON THE DEVELOPMENT OF BRONCHOPULMONARY DYSPLASIA IN PRETERM INFANTS?

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INTRODUCTION: The relationship between histological chorioamnionitis (HCA) and bronchopulmonary dysplasia (BPD) in preterm infants is controversial. Published studies on the association between HCA and BPD have yielded mixed results. Previous studies that showed an increase in BPD with chorioamnionitis were done before the use of surfactant and antenatal steroids became widespread, and adjustment for gestational age was not done.

OBJECTIVES: To examine the effects of HCA on the development of BPD in infants born at <29 weeks of gestation.

METHODS: We conducted a retrospective cohort study. All infants born at <29 weeks' gestation and admitted to the regional tertiary care NICU during 2000-2003 were eligible. Infants with major congenital anomalies or chromosomal abnormalities and those without placental histology were excluded. BPD was defined as requiring supplemental oxygen or assisted ventilation at 36 weeks corrected gestational age. We compared the BPD rates between infants exposed to and not exposed to HCA. Multivariate logistic regression analysis was carried out to analyze for the effects of HCA after controlling for potential confounding variables.

RESULTS: Of the 289 eligible infants, 136 (47%) were exposed to HCA. The mean gestational age (SD) of infants with HCA was significantly lower than those without chorioamnionitis [25.5 (1.6 wks) vs 26.3 (1.5 wks), $p < 0.001$]. Infants in the HCA group were more likely to be born vaginally and receive a complete course of antenatal steroids. There were no significant differences in the incidence of respiratory distress syndrome, culture proven sepsis or postnatal steroid therapy between the two groups. The risk of BPD was significantly decreased in infants exposed to HCA (RR 0.86; 95% CI 0.76-0.98). The mortality rate was similar between the two groups (19.1% vs 19.6%). Infants exposed to chorioamnionitis had a decreased risk of the combined outcome of BPD/death (RR 0.89; 95% CI 0.80-0.98). After adjusting for confounding variables (gestational age, antenatal steroids, PDA and sepsis), HCA was independently associated with a decreased risk of BPD (adjusted OR 0.27; 95% CI 0.11-0.62) and BPD/death (adjusted OR 0.27; 95% CI 0.12-0.63).

CONCLUSIONS: In preterm infants born at less than 29 weeks of gestation, exposure to HCA is associated with a significant decrease in the risk of both BPD and the combined outcome of BPD/death.

48

BRADYCARDIAS AND/OR APNEAS: THEIR RELATIONSHIP TO NECROTIZING ENTEROCOLITIS IN THE VERY LOW BIRTH WEIGHT INFANT

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BACKGROUND: Bradycardias and/or Apneas (B/A) in preterm infants may cause mesenteric hypo-perfusion and intestinal ischemia and thus be a trigger for NEC.

OBJECTIVE: To see if there is an increase in the number of B/A the five days prior to the development of NEC, making them possible risk factors for NEC.

DESIGN/METHODS: We performed a case-control study among preterm infants with a gestational age (GA) < 30 weeks who were admitted to the NICU at the Royal Victoria Hospital in Montral, between 2001 and 2007. 38 infants had NEC stage II or greater as defined by Bell (excluding spontaneous perforation). These infants were matched with 76 control infants by GA, birth weight and gender. The day of NEC diagnosis was recorded as day 0 in the NEC group, and the corresponding age (in postnatal days) was noted. Using the nursing notes in the charts, we manually reported the number of B/A for the five days preceding day 0. An apnea was defined as a respiratory pause lasting more than 15 seconds. A bradycardia was defined as a heart rate of less than 85 beats per minute. NEC risk factors were also evaluated.

RESULTS: The characteristics of the NEC and control groups are summarized in table 1.

Table 1 Characteristics of NEC patients and control infants

	NEC(n=38)	Controls(n=76)	P
GA	27.2(26.4-29.8)	27.8(27-29.8)	0.38
Male(%)	60	60	-
Birth weight	1069(845-1320)	1058(877-1268)	0.85
Day of first feed	3(2-4)	2(2-3)	0.35
Advancement feed first 10 days (cc/k/d)	6.6(0.3-10.1)	7.6 (0.1-11.2)	0.25
Totally or partially breastfeed(%)	68.57	86.84	0.002
PDA(%)	62.53	42.11	0.06
Days of Ampicillin prior NEC	4(3-5)	3(1-5)	0.64
Duration of ruptured membranes(h)	0.2(0-22)	0.8(0-62.7)	0.40
Apgar at 5 minutes	8(7-9)	8(7-9)	0.77

(Median Values and Lower-Upper quartile)

No significant difference was noted in the number of B/A prior to day 0. On day 0, the NEC group had significantly more episodes of bradycardias (mean 4.1) and apneas (mean 3.3) when compared to the control group (mean 2.2 and 2.0, and p-value 0.04 and 0.07, respectively).

CONCLUSIONS: The number of B/A is stable during the five days preceding a diagnosis of NEC and only increases on the day of its diagnosis. This suggests that B/A are manifestations of NEC rather than risk factors for it. A further study involving continuous cardiorespiratory monitoring and it's correlation to mesenteric flow before development of NEC would be needed.

49

THE EFFECTIVENESS OF MATERNAL GABAPENTIN THERAPY AT THE TIME OF DELIVERY ON NEONATAL PAIN RESPONSE DURING INTRAMUSCULAR INJECTION

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BACKGROUND: Gabapentin has been increasingly investigated as part of a multimodal strategy to reduce post-operative pain from surgery. In a randomized controlled trial, we demonstrated that, when administered to parturient women prior to Caesarean section, gabapentin effectively reduced post-operative pain. Further, it crosses the placenta and is transferred to the fetus. However, it is not known whether placental transfer is sufficient to reduce pain response in neonates from intramuscular injection of vitamin K.

OBJECTIVE: To evaluate the effect of maternal gabapentin administration on pain in neonates undergoing intramuscular injection of vitamin K.

DESIGN/METHODS: Randomized, double blind, placebo-controlled single centre trial in the Labour and Delivery Unit at Mount Sinai Hospital, Toronto, Canada. Mothers were randomized to receive gabapentin (600 mg) or placebo orally 1-2 hours prior to Caesarean section. Neonates were videotaped during vitamin K injection and pain response was assessed using percent facial grimacing score. Univariate tests were used to examine the characteristics of the sample population. Pain scores were compared between groups using Student t-test. A p-value of < 0.05 was considered significant.

RESULTS: Forty five women with singleton pregnancies participated in the trial. Of the 45 neonates, 22 were randomized to gabapentin group and 23 to placebo group. Baseline infant characteristics did not differ between groups. Outcome data are presented below [Figure]. The incidence of adverse events, defined as feeding problems and intensive care unit admissions, did not differ between groups. One infant required admission to the neonatal intensive care unit with transient tachypnea of the newborn unrelated to maternal gabapentin use.

Percent facial grimacing scores for intramuscular injection procedure

Phase	Gabapentin group (N=22)	Placebo group (N=23)	P-value
Baseline	22 (30)	30 (31)	0.37
Cleaning	40 (40)	36 (37)	0.77
Procedure	61 (37)	65 (34)	0.73
Recovery	59 (36)	36 (39)	0.08

Data are presented as Mean (SD)

CONCLUSIONS: Maternal administration of gabapentin prior to delivery did not alter neonatal pain response during intramuscular injection of vitamin K. There were no reported adverse events.

50

MATERNAL COCAINE USE AND EFFECTS OF INTERVENTION FOR REDUCING OR ELIMINATING COCAINE USE ON PREGNANCY OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSIS

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BACKGROUND: Use of cocaine is suspected to be associated with LBW, PTB and SGA births. Postulated mechanisms for adverse outcome include direct effect of cocaine on fetal growth, placental abruption and adverse social circumstances. Interventions to reduce/prevent adverse outcomes in cocaine using mothers have been attempted; however, effectiveness of such interventions is unclear.

OBJECTIVE: To systematically review the impact of maternal antenatal cocaine use on pregnancy outcomes and to evaluate effectiveness of interventions for mothers using cocaine.

DESIGN/METHODS: Medline, Embase, CINAHL and secondary references in relevant studies were searched. English language studies of antenatal cocaine exposure and pregnancy outcomes were included. Meta-analyses were performed using the random effect model and unadjusted odds ratio (OR) and mean difference were calculated with 95% CI. MOOSE criteria were followed.

RESULTS: Thirty-one studies of low to moderate risk of bias were included. Results of cocaine use and its impact are reported in the table.

Neonatal outcomes of mothers using cocaine

Outcome	Results	
LBW	# of studies	19
	Participants	38796
	Risk in women who used cocaine	32.5%
	Risk in women who did not use cocaine	10.7%
	OR (95% CI)	3.66 (2.90, 4.63)
PTB	# of studies	24
	Participants	39860
	Risk in women who used cocaine	32.1%
	Risk in women who did not use cocaine	12.8%
	OR (95% CI)	3.38 (2.72, 4.21)
SGA	# of studies	14
	Participants	28098
	Risk in women who used cocaine	24.2%
	Risk in women who did not use cocaine	10.3%
	OR (95% CI)	3.23 (2.43, 4.30)

Gestational age was reduced by 1.5 weeks (95% CI 1-2 weeks; 13 studies, 4272 participants) and BW was reduced by 490g (95% CI 420-562g; 18 studies, 6855 participants) among cocaine users.

Ten cohort studies of intervention were identified. Studies used various strategies to improve prenatal care utilization, rehabilitation and counselling. Five studies revealed improved prenatal care utilization, improved BW and reduction in LBW births.

CONCLUSIONS: Prenatal cocaine exposure was significantly associated with LBW, PTB and SGA births. Small sample sized cohort studies have reported effectiveness of intervention programs in reducing some of these outcomes. Intervention using a comprehensive program of rehabilitation, prenatal care utilization and counselling should be evaluated further for effectiveness.

51

PHYSICAL ABUSE OF WOMEN AND PREGNANCY OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSES

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BACKGROUND: Physical abuse of women of childbearing age has been suggested as a precursor for infant being born LBW, PTB or SGA. Postulated mechanisms for adverse outcome among abused women include psychological stress, actual physical trauma leading to abruption of placenta, adoption of risky behaviours and unintended pregnancies.

OBJECTIVE: Systematically review the risk of infant being LBW/PTB/SGA among mothers who had history of physical abuse prior to or during pregnancy.

DESIGN/METHODS: Medline, Embase, CINAHL, and bibliographies of identified articles were searched for English language studies reporting on physical abuse and pregnancy outcomes. Quality of the studies was assessed based on criteria for sample selection, exposure assessment, confounder, analytical, outcome assessment and attrition biases. Meta-analyses were performed using random effect model and unadjusted odds ratio, adjusted odds ratio and 95% confidence interval were calculated. Criteria of MOOSE statement were followed.
RESULTS: Thirty studies were included. Most of them had moderate risk of bias due to lack of adjustment of confounders. Results of meta-analyses are reported below.
CONCLUSIONS: Physical abuse of women of child-bearing age is associated with a significantly increased risk of LBW and PTB. Identification of at risk women during antenatal assessment should become a mandatory step to improve maternal and infant outcomes.

Pregnancy outcomes among women with history of physical abuse

Outcome	Results	History of Physical abuse vs. no history of abuse
LBW	# of studies	20
	Participants	4869315
	Risk in women who were abused	15.6%
	Risk in women with no history of abuse	5.8%
	OR (95% CI)	1.75 (1.39, 2.21)
	AOR (95% CI)	11 studies; 1.62 (1.32, 1.92)
PTB	# of studies	12
	Participants	4858746
	Risk in women who were abused	19.0%
	Risk in women with no history of abuse	9.7%
	OR (95% CI)	1.94 (1.54, 2.46)
	AOR (95% CI)	4 studies; 1.48 (1.23, 1.77)
SGA	# of Studies	4
	Participants	20881
	Risk in women who were abused	14.7%
	Risk in women with no history of abuse	8.0%
	OR (95% CI)	1.57 (0.90, 2.77)

OR=Odds ratio; CI=Confidence Interval; AOR=adjusted odds ratio

There was no difference in birth weight between mothers exposed to physical abuse and those who were not (MD 23g, 95% CI -20, 66g).

52
USE OF T-PIECE RESUSCITATOR IN THE DELIVERY ROOM: IS IT FEASIBLE, SAFE AND EFFECTIVE?

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BACKGROUND: Current NRP guidelines recommend the use of T-piece resuscitator to provide effective ventilation in neonates. Advantages include provision of: 1) consistent and reliable inflating and positive end-expiratory pressures; 2) free-flow oxygen; and 3) continuous positive airway pressure. Disadvantages include: 1) occurrence of air leak syndrome due to prolonged inspiratory time; 2) difficulty in feeling the compliance of the lung; and 3) difficulty in making changes to the inflating pressure while performing resuscitation.
OBJECTIVE: To determine the feasibility, safety and effectiveness of using T-piece resuscitator in providing effective ventilation in the delivery room and for transport in infants < 32 wks gestation.
DESIGN/METHODS: Prospective observational study for the period April-October 2009. T-piece resuscitator was introduced in our unit in April 2009. Practical training in its use was provided to all medical and nursing staff and respiratory therapists providing resuscitation. Guidelines for its use during initial resuscitation and for transport of infants from the resuscitation room into the NICU were developed by the Neonatologists using a consensus approach. Using a pre-specified data collection form, information regarding its use during resuscitation and transport of infants < 32 wks was collected. Data were analyzed and results are presented using descriptive statistics.
RESULTS: Of the 221 infants < 32 wks gestation born during the study period, 168 required resuscitation. Complete data were available for 131/168 (78%) infants. The mean (SD) GA and BW of the study population was 28.2 (2.4) wks and 1.1 (0.37) kg respectively. T-piece resuscitator was used in 127/131 (97%) of infants during resuscitation. Reasons for non-use were: congenital diaphragmatic hernia (N=1) and non-availability of resuscitator circuits (N=3). Bag-mask ventilation (BMV) was provided in 18/131 (14%) infants. Reasons for use of BMV were: non-responders to T-piece resuscitator (N=15) and personal preference (N=3). Compliance with guidelines was reported in 82%. 76% of the infants required intubation and ventilation. T-piece resuscitator was used to transfer infants to NICU in 68%.The operators were able to generate the settings within 3 minutes in 79%. Pneumothorax was reported in 1 infant.
CONCLUSIONS: T-piece resuscitator can be used safely and effectively to provide ventilation during resuscitation and transport in infants < 32 wks gestation.

53
MATERNAL MARITAL STATUS AND PREGNANCY OUTCOMES: A SYSTEMATIC REVIEW AND META-ANALYSES

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BACKGROUND: Marital status is suggested as a determinant for LBW, PTB or SGA births. Psychological support, a reduction in risky behaviours and increased social acceptance are postulated mechanisms for decreased risks in married women.
OBJECTIVE: To systematically review the risk of a LBW/PTB/SGA births among married and unmarried women and within unmarried group perform subgroup analyses based on cohabitant or single statuses.
DESIGN/METHODS: We searched Medline, Embase, CINAHL, and bibliographies of identified articles for English language studies that reported pregnancy outcomes among married and unmarried (cohabitant and single) mothers. Two reviewers independently assessed the quality of published studies for biases in sample selection, exposure and outcome assessment, confounders, analytical methods, and attrition. Meta-analyses were performed using a random effect model. Pooled unadjusted and adjusted odds ratios (UAOR and AOR), 95% confidence intervals (CI) and population attributable risks (PAR) were calculated.
RESULTS: Twenty-one studies of low-moderate risk of bias were included. Results of meta-analyses are reported in table.
CONCLUSIONS: Risks of LBW/PTB/SGA births were increased among unmarried mothers compared to married mothers. Subgroup analyses revealed higher odds for adverse outcome among single mothers than cohabitant mothers. This information is important to understand social context of pregnancy outcomes.

Outcome	Results	Married vs. Unmarried	Married vs. Single	Married vs. Cohabitants	Cohabitants vs. Single
LBW	# of studies	14	10	8	8
	Participants	1342583	581204	725138	355026
	UAOR (95% CI)	1.46 (1.25, 1.71)	1.65 (1.44, 1.88)	1.29 (1.25, 1.32)	1.38 (1.11, 1.71)
	AOR (95%CI)	1.17 (1.08, 1.27)	1.39 (1.17, 1.65)	1.15 (1.05, 1.27)	N/A
	PAR	14.8	8.0	10.6	1.9
PTB	# of studies	11	9	7	7
	Participants	1103266	572413	733900	356716
	UAOR (95%CI)	1.22 (1.14, 1.31)	1.52 (1.36, 1.70)	1.15 (1.08, 1.23)	1.39 (1.23, 1.56)
	AOR (95%CI)	1.30 (1.16, 1.46)	1.40 (1.29, 1.50)	1.14 (1.03, 1.27)	N/A
	PAR	8.1	6.7	4.2	6.1
SGA	# of studies	7	5	4	4
	Participants	880006	510672	667043	344238
	UAOR (95%CI)	1.45 (1.32, 1.61)	1.70 (1.47, 1.97)	1.36 (1.30, 1.42)	1.26 (1.19, 1.35)

54
VENTILATOR ASSOCIATED PNEUMONIA RATE AMONG EXTREMELY LOW GESTATIONAL AGE INFANTS: A SINGLE CENTER CLINICAL AUDIT

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BACKGROUND: Ventilator Associated Pneumonia (VAP) in preterm newborns is understudied. A CDC algorithm for VAP exists, however, has never been validated in the preterm population. This is a first attempt to

document the rate of VAP and characteristics of preterm infants who are diagnosed with VAP in our NICU.
OBJECTIVE: To determine the incidence of VAP in infants born <28 wks GA in the NICU using the CDC algorithm for clinically defined pneumonia for infants and to describe those patients diagnosed with VAP.
DESIGN/METHODS: This is a prospective cohort study of infants admitted to one Level 3 NICU in Vancouver, Canada from May 2009 to October 2009. All patients ventilated for >48 h were eligible for screening using the CDC algorithm for VAP. Of particular interest to the study, where patients born <28 wks gestation. Demographic characteristics were collected in addition to clinical variables. The VAP rate was calculated by: number of VAP / number of ventilator days × 1000.
RESULTS: 87 patients admitted to our Level 3 NICU were ventilated >48 hours in 6 months in 2009; 35 were <28 wks GA. These patients had a mean GA of 25.5 +/- 1.2 weeks, mean birth weight of 797 +/- 205 g and 60% were male. 4/35 fulfilled CDC criteria for VAP. Two patients had a single organism cultured from an endotracheal aspirate (E. Coli). Details of the cases can be seen in Table 1. The VAP rate was 3.4 cases of VAP/1000 ventilator days.

Table 1. Case Series of VAP Among ELGA Infants

GA (wk)	BW (g)	Gender	Most Responsible Diagnosis	Duration of Ventilation (days)	Time of Diagnosis (days)	Duration of Ventilation Prior to diagnosis (days)	Septic Episode (Y/N)
25	679	M	RDS, BPD, ROP	65	36	36	Y
25	775	M	RDS, BPD	74	33	33	N
27	1065	M	RDS, BPD, Subglottic Stenosis	142	97	73	Y
27	910	M	TTTS, RDS, BPD	48	43	6	N

CONCLUSIONS: The CDC algorithm has not been validated for the preterm population. Our rate of VAP is relatively higher than published reports [1] . Patients with VAP all had an underlying diagnosis of BPD and were chronically ventilated. Efforts should be made to validate a diagnostic tool specifically for preterm and term newborns.
REFERENCE:
1. Edwards JR, Peterson KD, Andrus ML, et al. National Healthcare Safety Network Report. Am J Infect Control 2008;36:609-26.

55
A MINIATURE OF THE ELDER? THE REALITY OF VAP IN NICU

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BACKGROUND: The CDC algorithm for clinically defined pneumonia for infants 1 year has limitations for neonates. The development of a valid, reliable diagnostic tool is necessary in addressing neonatal Ventilator Associated Pneumonia (VAP). In this study, we propose a modified VAP diagnostic tool (VAP-DT) that incorporates clinical, laboratory and radiographic patient characteristics.
OBJECTIVE: To determine the incidence of VAP in the NICU, using both the CDC algorithm and the proposed VAP-DT.
DESIGN/METHODS: This was a prospective cohort study of infants admitted to one Level 3 NICU in Vancouver, Canada from May 2009 to October 2009. Patients ventilated for >48 h were screened for VAP using the CDC algorithm for VAP and the proposed VAP-DT. VAP-DT was developed in accordance with pre-existing literature and discussions with neonatologists, infection control specialists and radiologists. The VAP rate was calculated for the CDC confirmed cases and VAP-DT confirmed cases by: number of VAP / number of ventilator days X 1000.
RESULTS: There were 87 patients admitted to our Level 3 NICU who were ventilated for >48 hours in 6 months in 2009. These patients had a mean GA of 31.4 +/- 5.9 weeks with a predominance of <28 weeks GA (n=35). Mean BW was 1797 +/- 1082 g and 52% were male infants. Five patients developed VAP fulfilling the CDC criteria, 9 cases fulfilled VAP-DT. VAP rate stratified by BW can be seen in table 1.

Table 1. Ventilator Associated Pneumonia Stratified By Birth Weight

BW (g)	Number of VAP*	CDC Diagnosed	VAP-DT Diagnosed	Ventilator Days	VAP Rate (CDC/VAP-DT)
<750	4	1	4	554	7.2 (1.8/7.2)
750-1000	3	2	2	472	6.4 (4.2/4.2)
1001-1500	1	1	1	226	4.4 (4.4/4.4)
1501-2500	0	0	0	133	0 (0/0)
>2500	2	1	2	350	5.7 (2.9/5.7)

VAP cases were predominantly preterm (<1000 g). The VAP rate according to CDC was only 2.9/1000 ventilator days while the rate was 5.7 if CDC and VAP-DT were used in combination.
CONCLUSIONS: The VAP rate calculated by using the VAP-DT is higher than that generated by the CDC criteria; we believe that it may more accurately reflect the true rate of VAP in this population. This is the first proposed tool for the diagnosis of VAP in newborns that commonly have underlying lung pathology and long-term ventilation needs. Ongoing validation of this tool is necessary.

56
INFORMATION NEEDS OF PHYSICIANS RECEIVING LEVEL III NICU (L3) GRADUATES

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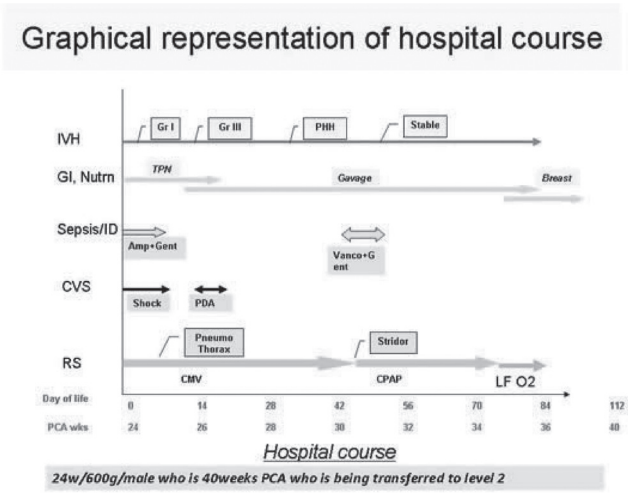
BACKGROUND: Information needs of physicians are likely to be dependent on the value of information in understanding the patient and making decisions about the provision of care or performing tasks efficiently.
OBJECTIVE: To determine the information needs (content, granularity) and document format preferences of L2 physicians for a L3 NICU discharge summary (DS) to provide high quality care in L2 NICU.
DESIGN/METHODS: A qualitative study was conducted from 2006 to 2009. Based on literature review, document analysis (30 L3 DSs) and participant observation (more than 12 months in 3 L3) a questionnaire and 3 standard templates (traditional major headings, graphical representation of hospital course, structured problem description) were designed. Semi-structured interviews (n=3) and a focus group (n=5) with L2 physicians were conducted. Templates for the DS were used to stimulate discussion. Audiotapes were transcribed, analyzed qualitatively and results were triangulated to identify emerging themes.
RESULTS: The traditional major headings of DS information were valued. Three additional themes emerged as important major headings for inclusion in the L3 DS; social and parenting issues, information communicated to parents and prognosis. Information under these categories helped L2 physicians in being sensitive to family needs, avoid miscommunication and build trust and rapport necessary for ongoing care. The granularity of information under major heading was considered pertinent, if it helped L2 physicians in understanding the basis of diagnosis, severity of illness, prognosis or enabled them in ongoing management of the infant and family. An organ system oriented problem list, structured problem description, detailed narrative limited to ongoing issues, standardized provincial L3 DS with predefined categories, discharge details resembling order sets, graphical presentation of L3 NICU hospital course, incorporation of information from multiple sources into L3 DS and provision of pertinent information under major headings were some of the document formatting preferences. Good formatting was considered as important by L2 physicians to ensure instant and easy accessibility to pertinent information, avoid errors from missing information and consistently align L2 care plans with L3 plans. An example of graphical presentation of L3 hospital course and discharge details is provided.



CONCLUSIONS: L2 physicians have specific information needs and formatting preferences for a L3 DS. Identified information needs in this study will be helpful in designing a standardized provincial L3 DS.

57

LABORATORY AND CLINICAL OUTCOMES OF A REGIONAL TRANSCUTANEOUS BILIRUBINOMETRY (TCB) PROGRAM

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BACKGROUND: TcB is effective in neonatal hyperbilirubinemia (NH) screening. A regional TcB screening program using Konica Minolta JM-103 jaundice meters was implemented in normal nurseries and postpartum community clinics in Calgary in Jun 2007 for healthy infants 35 weeks gestation using a locally developed nomogram.

OBJECTIVE: To assess the impact of the Calgary TcB Program on:

1) Rate of initial post-nursery total serum bilirubin (TSB) draws;

2) Distribution of initial post-nursery [TSB];

3) Phototherapy (PT) readmission rates;

4) Age at readmission for PT.

DESIGN/METHODS: 1) Retrospective analysis of [TSB] data for the 8 month periods pre- and post-program implementation.

2) Retrospective analysis of birth and PT rates for the 12 month periods pre- and post-program implementation.

RESULTS: Laboratory utilization and TSB characteristics:

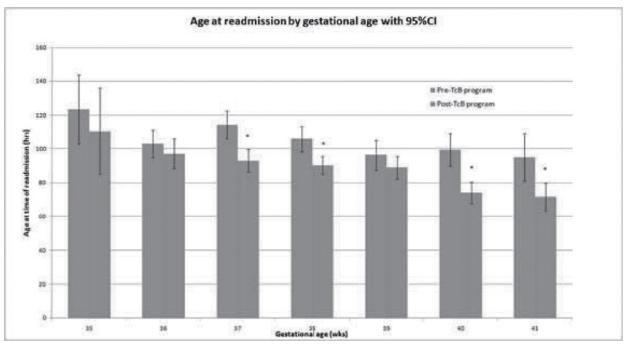
1) Significant reduction in proportion (59%; 48.3 vs 19.8/1000 live births) and number (52%; 516 vs 247) of infants requiring TSB draws post-nursery discharge ($p<0.0001$).

2) Significant reduction in initial [TSB]: 246±6 mol/L (14.4±0.4mg/dL) vs 225±8 mol/L (13.2±0.5mg/dL) ($p<0.0001$).

IMPACT ON PT READMISSIONS:

1) No change in PT readmission rates.

2) Significant reduction in age at readmission for infants with gestational age 37, 38, 40 and 41wks ($p<0.05$).



CONCLUSIONS: Regionalized TcB provides positive outcomes on laboratory utilization with earlier PT readmission and no increase in PT rates.

58

COMPARISON OF FINDINGS ON HEAD ULTRASOUND SCANS (U/S) WITH EARLY ADVANCED MAGNETIC RESONANCE IMAGING (MRI) IN PRETERM BRAINS

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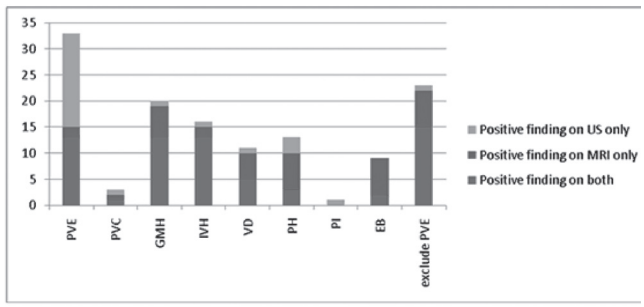
BACKGROUND: The early determination of brain injury in preterm newborns is required to accurately prognosticate and guide therapy. Bedside U/S is widely used because of the ease of ascertainment but increasingly recognized as inaccurate even when performed at regular intervals over the first couple of weeks of life although absence of any abnormality has a lowered risk (25%) of abnormal outcome. MRI scans carried out at term corrected age are highly correlated with outcomes at 2 yrs corrected age, but earlier MRI has not proved useful.

OBJECTIVE: To study the brain of preterm newborns <32 wks gestational age (GA) using advanced MRI techniques compared to routine head U/S within the first 2 weeks of life.

METHODS: All infants <32 wks GA admitted to the tertiary outborn NICU had routine head U/S performed. Consented infants were also scanned using a 1.5T MRI and compatible incubator, within their first 2 weeks. Those with U/S and MRI carried out within 2 days were enrolled and their scans compared for lesions.

RESULTS: 40 infants met criteria; GA 28.5 (sd), bwt 1159.85 (sd), 19 male, 7 multiple births, all had RDS, 11 required inotropes, 16 had significant PDA, 8 had NEC. Mean Apgar scores were 5.37 and 6.97. 4 infants died. Brain lesions were classified as periventricular (PV) echoes, PV cysts, germinal matrix bleed (GMB), intraventricular hemorrhage (IVH) grade 2-4, ventricular dilatation (VD), parenchymal focal bleeds (PB), parenchymal infarcts (PI) and extra-axial bleed (EB). U/S and MRI were both normal in only 7 infants. MRI was better at showing EB while U/S showed significantly more PV echoes, the significance of which is unclear. VD, GMB and IVH were strongly correlated (using phi-coefficients) but PB, PV echoes were not.

CONCLUSIONS: Significant discrepancies in lesion identification between U/S and early MRI exist. All infants require follow up to determine the value of the early MRI in predicting outcomes.



59

THE INCIDENCE AND TIME OF PRESENTATION OF NECROTIZING ENTEROCOLITIS IN NEONATAL INTENSIVE CARE UNITS ACROSS CANADA

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BACKGROUND: Necrotizing enterocolitis (NEC) is one of the leading causes of morbidity and mortality in preterm infants. Significant variation in the incidence of NEC has been reported amongst neonatal intensive care units (NICUs). Traditionally, NEC is described to occur in enterally fed infants at several weeks of age. Early presentation of NEC may be associated with different risk factors compared to late presentation.

OBJECTIVE: To examine the risk adjusted variation in the incidence of

NEC and to identify the timing of presentation of NEC in a national population based cohort of infants 32 weeks admitted to member NICUs of the Canadian Neonatal Network (CNN).
DESIGN/METHODS: This population based cohort study included all infants with gestational age 32 weeks admitted into participating NICUs in the CNN between January 2003 and December 2007. We compared the risk adjusted incidence (adjusted for GA, Apgar score, SNAP score, gender, cesarean section, outborn, SGA) of NEC among the NICUs within the CNN. Early NEC was defined as onset <14 days of age and late NEC as onset 14 days. Common perinatal and neonatal risk factors were compared. Multivariate logistic regression model was used to examine the factors associated with early NEC.
RESULTS: Of the 13,208 eligible infants, 656 (4.9%) developed NEC. There was no difference in the risk adjusted incidence of NEC among 25 NICUs. Early NEC was seen in 282 (2.1%) and late NEC was seen in 374 (2.8%) infants. The mean (SD) age of onset was 7.5 (3.1) and 31.8 (17.8) days in early and late onset NEC, respectively. Early NEC infants were larger in birth weight, greater in gestational age, had higher 5 minute Apgar score, lower SNAP II score and fewer ventilation days on univariate analysis. Multivariate logistic regression analysis showed narcotic use in the first 3 days was associated with increased risk of early NEC. Cesarean section delivery and PDA treated with indomethacin (after 24 hours of life) was associated with lower risk of early NEC.
CONCLUSIONS: Though there is no variation in the adjusted incidence of NEC across CNN centres, there appears to be two time points for NEC presentation. In this study, early NEC, presenting at a mean of 7.5 days, was associated with use of narcotic in the first 3 days. Further studies are required to characterize the underlying pathology and etiology of this early NEC.

60
POSTDISCHARGE GROWTH VELOCITY IN ELBW INFANTS AND NEURODEVELOPMENTAL OUTCOMES AT 3 YEARS OF AGE

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BACKGROUND: Achieving adequate growth, defined as maintaining in-utero growth rates during the postneonatal period is challenging in the tiniest preterm infants. However, it is extremely important since studies have suggested that growth velocity in the NICU can affect neurodevelopmental outcome.
OBJECTIVE: To determine the relationship between growth velocities from NICU discharge and in the first years of life and neurodevelopmental outcome at 3 years of age.
DESIGN/METHODS: Between 1997 and 2005, 613 infants less than 29 weeks gestation or less than 1250 grams at birth were admitted to the tertiary care NICU in Calgary, Alberta, Canada and survived to 1 year of age. These infants were enrolled in the Perinatal Follow-up Clinic for longitudinal, multidisciplinary assessment until age 3 to 5 years. These assessments included growth parameters measured at 4, 8, 18-21 and 36 months adjusted age. At 8 months, all infants were assessed by a dietitian focusing on feeding problems and suboptimal growth. Modeled on the method of Ehrenkranz et al, post discharge growth velocities for intervals between each assessment point were divided into quartiles.
RESULTS: Infants with early (birth to 4 mo adjusted age) weight gain velocity in the lowest quartile were more often female, small for gestational age, had more ventilation days, more parenteral nutrition days, delay in establishing enteral feeds, patent ductus arteriosus and postnatal steroid treatment Disability rates, cerebral palsy and cognitive delay (>2SD below mean), were highest in the infants from the lowest weight velocity quartile at 4 months of age. Feeding problems were also more frequent in infants in the lowest weight velocity quartile although they had the highest energy and protein intakes exclusive of breast feeding, consistent with intervention by dietitians to increase caloric intake. Infants frequently changed growth velocity quartiles during the first year of life. Being in the lowest growth velocity quartile at 4 months was associated with poorer later growth in length, but not weight or head circumference.
CONCLUSIONS: Slower early postneonatal discharge growth velocity was associated with poorer neurodevelopmental outcome at 3 years of age.

61
ROLE MODEL IN SEXUALITY AND THEIR IMPACT ON SEXUAL HEALTH OF ADOLESCENTS

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PURPOSE: According to studies assessing the impact of parent-adolescent communication on adolescent sexual health, good communication around sexual health issues is associated with responsible behavior. As part of a teen sexuality survey, we studied the impact on adolescent sexual health of sexuality-role models, as this topic has not been previously studied.
METHODS: In 2005, an online national survey of 1171 teens 14-17 y.o. and 1139 mothers of teens 14-17 y.o. was conducted; samples were representative. The questionnaire included among other topics: communication with parents/general or sexuality-related issues, family functioning, sexuality-role models, STI knowledge and sexual behaviors. Statistics done with Chi square and Anova.
RESULTS: 27% of teens are sexually active and 76% of these use condom at their last intercourse. They know an average of 5.8 out of the 9 STI listed, and had a mean score of 15% for questions on major STI consequences. In a multiple choices question, 45% choose their parents as their sexuality-role model, friends (32%) and 4 types of celebrities (each 15%), while 33% had none. However, mothers believe sexuality-role models of their teens are friends (75%), celebrities (50%) and themselves (50%). For the analysis on role models, we considered 3 groups: parents (45%), choices excluding parents (22%) and none (33%). When considering teens who admit their parents to be sexuality-role model as compare to the 2 other groups, with statistically significant differences both for boys and girls, they are from families with better functioning and better communication on general/sexual health topics. More are very comfortable talking about sex with both parents and they discuss more sexuality topics with them. Less adolescents who choose their parents as role-model are sexually active, have an early sexual debut, have occasional partners (girls only), more have favourable attitudes towards abstinence and their knowledge about STI consequences (boys only) is better. There was no statistical difference between the 3 groups for condom use at last intercourse, and other STI knowledge items (self-evaluation of knowledge, STI frequency, means to get infected).
CONCLUSION: The study shows that in families with good sexual health communication, more teens consider their parents as sexuality-role model. These adolescents have more positive attitudes towards sexual health issues and in some aspects more responsible behaviors. However, parents seem to underestimate this role and their impact. Increasing communication between parents and teen around sexual health issues could be beneficial.

63
QUALITY OF CARE INDICATORS FOR CHILDREN AND YOUTH WITH SPECIAL NEEDS: A REVIEW OF THE LITERATURE

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RATIONALE: A performance/Quality indicator is a quantitative measure that can be used to monitor and evaluate the quality of patient care and support service activities. There is growing interest in the use of such indicators as quality improvement tools.
OBJECTIVE: To perform a systematic review, and targeted grey literature scan, to identify performance/quality indicators for children and youth with special needs (CYSN) applicable to the health, education and social services sectors.
METHODS: MEDLINE, CINAHL, PsycINFO, ERIC, EMBASE, Social Services Abstracts, Social Work Abstracts, and Education Index Full Text were searched up to May 2007, as were 26 governmental and 36 organizational websites (grey literature scan). Articles were included in our review if they were published in 1986 or later, were in English, focused on the CYSN population, and described a health, education or social services performance/quality indicators. Data were extracted by one reviewer and a random sample of papers checked by a second reviewer.

RESULTS: Indicators and themes were extracted from 31 publications totaled 1042. This list was reduced to 264 using the selection criteria that the indicator had to be either "measurable" or "potentially measurable". A group consensus process was used to shorten the list further to 187 based on the following criteria: the indicator had to reflect the British Columbia service delivery goals for CYSN and it had to have face validity. The group sorted the 187 indicators into 16 common quality domains (e.g., availability/accessibility, appropriateness, client-centredness, etc). We found that most indicators related to the quality domains client-centredness and availability/accessibility. Table 1 shows some examples.

Table 1. Examples of quality of care indicators

Quality Domain	Themes	Example
Availability/Accessibility	Availability of services	Percentage of parents of CYSN who have specialty care available in their region
	Waiting time	time members wait for an appointment to see a medical specialist or receive a specialized service or piece of equipment
	Utilization pattern	Percentage of clients attending first appointment
	Treated prevalence	Percentage of children in need served
Client Centredness	Parent participation	Family members participate in team decision-making regarding health care services and the development of the health care plan.
	Child participation	Arrangements in place to ensure that children and young people are able to contribute to annual reviews / case discussions

CONCLUSIONS: Our findings should be relevant and helpful to managers and researchers planning a quality improvement initiative who require a list of indicators relevant to CYSN.

64
WHAT OUTCOME MEASURES ARE USED WITH CHILDREN AND YOUTH WITH CEREBRAL PALSY? A SYSTEMATIC REVIEW OF THE LITERATURE

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RATIONALE: Various outcome measures have been used with children and youth with Cerebral Palsy (CP). Content comparison of CP outcome measures is challenging because of the varying use of concepts.
The objective of this systematic review was to identify all outcome measures such as standardized questionnaires, instruments and parameters used in the literature with children and youth with CP, to determine their frequency of use, and subsequently to link the content of these measures to the new Classification of Functioning (ICF).
METHOD: We conducted a systematic literature review. MEDLINE, EMBASE, PSYCINFO, CENTRAL, CINAHL were searched by an experienced librarian. Inclusion criteria were: children aged 2-18 years, CP, English language, 1998-2008, and study designs consistent with intervention studies (i.e. RCTs, before and after, etc) and observational studies. Screening and data extraction were conducted by two independent reviewers.
RESULTS: From the 629 citations retrieved, 207 papers were included. The majority of the studies were conducted in the USA (29%), Canada (10%), and Australia (10%). The mean age was 8.6 years (SD ±3.3). Sixty-two percent of the studies were intervention studies. The majority of the studies used multiple outcome measures. Overall, 120 questionnaires/instruments and 268 parameters were identified. The majority of the standardized questionnaires focused on quality of life and health related quality of life. Table 1 shows the frequency of the most commonly used outcome measures.

Table 1. Frequency of most common reported outcome measures

Name	Times reported	%
Questionnaires/Instruments		
Gross Motor Function Measure	85	24%
Pediatric Evaluation of Disability Inventory	32	9%
Child Health Questionnaire	15	4%
Goal Attainment Scaling	12	3%
Quality of Upper Extremity Skills Test	11	3%
†Total times reported	351	100%
Parameters		
Range of motion	50	9%
Spasticity	42	8%
Muscle tone	26	5%
Gait	21	4%
Anthropometric data	19	4%
§Total times reported	534	100%

†comprehensive list not shown, only top 5 questionnaires shown.
§comprehensive list not shown, only top 5 parameters shown.

CONCLUSION: Based on questionnaires/instruments, the most common themes studied in CP were related to functional skills, quality of life and activity participation. Based on parameters, the most common outcome measures were related to muscle tone, mobility, and growth.
NEXT STEPS: we are planning to use the new ICF-CY as a framework for the content comparison of the most commonly used outcome measures in CP.

65
SPEEDING UP CLINICAL DECISION MAKING WITH UNATTENDED SLEEP-SCREENING-STUDIES (LEVEL-III-STUDIES)

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BACKGROUND: Children with craniofacial conditions (CC) are high-risk for developing sleep disordered breathing (SDB), resulting in serious sequelae. The significance of clinical daytime symptoms (e.g. cognitive impairment, hyperactivity) might be missed or underestimated as most patients have underlying conditions which are associated with developmental delays and challenging behavior. Polysomnography is the gold standard for diagnosing SDB, but waiting lists up 12 months are common.
OBJECTIVES: 1. To investigate feasibility of unattended Level-III-sleep studies in children with CC. 2. To improve recognition of SDB in CC patients
METHOD: All patients had history of CC, they were on the waiting list or already patients of the Interdisciplinary Craniofacial Clinic. Medical history, including the impact of SDB on QoL, and physical examination was taken in all patients. 11 studies in 10 patients (5 preschool, 5 school aged) were conducted at home (7x) or in a hotel setting (4x); at home the montage was done by parents, in the hotel by team members. Data were obtained with an Embletta 100P device through the measurement of nasal airflow thoracic and abdominal breathing efforts, oxygenation and heart rate, movements and positioning.
RESULTS: Loss of signal occurred in 5/11 due to technical set up, in 7/11 due to montage, in 4/11 due to missing attendance. Still, a better clinical understanding of sleep disordered breathing could be achieved in all studies: 2 patients with significant SDB, but without any hypoxemia were referred urgently to respirology for a CPAP trial; 2 patients were prioritized in the waiting list due to paradox breathing; all other patients were revisited by pediatricians, ENT or orthodontists with various consequences.
DISCUSSION: Though initially asymptomatic, patients with CC may develop SDB anytime. Clinical symptoms may be not clear enough to be recognized as sleep related by parents or staff and thus may remain unreported for a long time. Unattended Level-III-studies are a tool to screen for such unrecognized SDB. To our knowledge our study is the first to apply this screening tool in pediatric patients with CC. Despite initial data collection challenges, assessments could be optimized after developing teaching material which visualized the montage for parents. Results of our pilot

project suggest that home based sleep screening studies are helpful in triaging patients for appointments in the interdisciplinary clinic and for further respirological assessments.

66
DUCHENNE MUSCULAR DYSTROPHY: ACCURATELY PREDICTING LOSS OF AMBULATION

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BACKGROUND: Duchenne muscular dystrophy (DMD) is the most common muscular dystrophy of childhood, affecting 1 in 3500 live male births. It causes progressive muscle wasting and loss of function culminating in wheelchair dependency and death at a young age. The transition to wheelchair is a significant milestone in this disease and accurate prognostication of this event would facilitate the transition for both patients and families.

OBJECTIVE: It was our objective to develop and validate a method of evaluation of children with DMD capable of reliably predicting time to loss of ambulation.

DESIGN: This retrospective study followed 22 boys in our comprehensive neuromuscular clinic. Boys were assessed at six-month intervals from the time of diagnosis. Muscle strength and performance on timed motor tests were evaluated, along with other typical assessments, including anthropomorphic data and range of motion values. Motor tests evaluated time required to stand from seated on the floor, ascend four standard stairs, descend four standard stairs, and walk ten meters.

RESULTS: Boys who take longer than 7 seconds to ascend four standard stairs, 9 seconds to walk 10 meters, or cannot extend the knee against gravity are likely to become wheelchair dependent in one year. Conversely, boys who can ascend four stairs in under 4 seconds, walk 10 meters in under 6 seconds, or take less than 2 seconds to stand from seated on the floor have a mean of four years until wheelchair dependency.

CONCLUSIONS: This study suggests that wheelchair dependency can be prognosticated through timed motor testing and strength testing at any point in the progression of DMD. It suggests that loss of ambulation is most related to loss of hip flexion or knee extension strength. Our results are applicable both to boys who have taken steroids and those who have not.

67
SATISFACTION WITH CARE RECEIVED IN A PEDIATRIC EMERGENCY DEPARTMENT

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BACKGROUND INFORMATION: Children and families frequently utilize the pediatric emergency department (PED) for non-urgent health care problems. The population of English as a second language (ESL) families utilizing the PED appears to be significant. Immigrant and refugee children, who are often part of ESL families, are known to be at high risk of having unmet health care needs. Little is published about this group of children and families and why they utilize the PED.

Other studies, done primarily in adults, have shown that ESL patients have a poorer understanding of their discharge instructions than English speaking (EL) families. Limited data exists on whether this is also true for families in which the child is the patient. It is not know whether physician language of communication affects comprehension. In order to provide optimal health care services to ESL families and their children we need to understand their patterns of healthcare utilization and their ability to comprehend their encounters in the PED.

OBJECTIVES: This study will determine families' level of understanding of their child's medical situation. The child's medical situation will be defined as the child's medical problem, diagnosis, and discharge instructions. This study will also determine the level of satisfaction of families who present to the PED. The understanding and satisfaction with care received in the PED of ESL families will be compared to the understanding and satisfaction of EL families.

METHODS: Data will be collected from families with children, ages 0-18, through the use of questionnaires written in their first language. The surveys will comprise of the Medical Interview Satisfaction Scale (MISS-21) and of additional questions developed by the investigators of this study. The MISS is a validated satisfaction scale used to assess patient satisfaction with individual doctor-patient consultations.

Based on data collected by Alberta Health Services Translation and Interpretation Services, the most commonly spoken languages of ESL families that present to the ACH PED are known. Consent forms and questionnaires have been translated into the six most commonly spoken non-English languages based on the original consent form and questionnaire created in English.

RESULTS AND CONCLUSIONS: Results and conclusions from this study will be presented at the conference. Policy implications will be discussed.

68
THE TREATMENT OF PEDIATRIC GASTROENTERITIS – A SURVEY OF NORTH AMERICAN PEDIATRIC EMERGENCY PHYSICIANS

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BACKGROUND: Gastroenteritis is common in North America, however very little is known about the therapeutic interventions administered to children in the emergency department setting.

OBJECTIVE: The objective of this survey was to evaluate current gastroenteritis therapy as reported by pediatric emergency care providers and to compare practice patterns between Canadian and American physicians. We wished to determine if the evidence-based guidelines relevant to oral rehydration therapy are followed, and to better understand the current usage of antiemetics, probiotics and intravenous rehydration.

DESIGN/METHODS: A cross-sectional, Internet-based survey of Canadian PEM physicians and members of the Pediatric Emergency Medicine Collaborative Research Committee (PEM CRC) was conducted. Participants were included in the analysis if they were attending physicians and provide care to patients < 18 years of age in a North American emergency department. Survey domains included demographics, oral rehydration, method of intravenous rehydration, antiemetic, probiotic and disposition medication use.

RESULTS: 359 individuals were invited to participate; 239 (67%) responded, and 4 did not meet eligibility criteria. Of the 235 eligible respondents, 222 had complete surveys. Canadian PEM physicians report initiating oral rehydration therapy the majority of the time in children with moderate dehydration more often than PEM CRC members (76% vs. 47%; $P < 0.001$). However, they administer antiemetic agents to children with moderate dehydration and intractable vomiting less often (45% vs. 67%; $P = 0.001$). Canadian PEM physicians report administering smaller intravenous fluid bolus volumes ($P < 0.001$), over longer time periods ($P = 0.001$), and repeat the fluid boluses less frequently ($P < 0.001$) than their PEM CRC colleagues. The use of probiotics in children with frequent diarrhea is routinely recommended by 15% of respondents in both groups.

CONCLUSIONS: Practice variation in the treatment of children with acute gastroenteritis exists by location of practice. Although probiotic use remains uncommon, PEM physicians frequently administer ondansetron to children with dehydration and intractable vomiting. Nonetheless, many dehydrated children receive intravenous rehydration with the rate and volume of fluids administered varying by geographic location.

69
INCREASING USE OF ONDANSETRON AND ITS RELATIONSHIP TO INTRAVENOUS REHYDRATION RATES IN CHILDREN WITH ACUTE GASTROENTERITIS

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BACKGROUND: Despite evidence that ondansetron use reduces the frequency of vomiting, need for intravenous rehydration and hospitalization; guidelines continue to recommend against its use in pediatric gastroenteritis.

OBJECTIVE: To determine if increasing use of ondansetron is associated with improved clinical outcomes.
DESIGN/METHODS: A retrospective cohort study was conducted at The Hospital for Sick Children (Toronto, ON). Eligible children included those <18 years of age who presented to the emergency department (ED) between July 2003 and June 2008 and were diagnosed with gastroenteritis. 20% of all eligible patients were selected at random for chart review. The primary outcome was the correlation over time between the proportions of children administered ondansetron and those that received intravenous rehydration. A time trend analysis comparing 2003-05 vs. 2006-08 was conducted using intravenous rehydration as the outcome. A structural model was built using unobserved components and the explanatory variable - ondansetron. Secondary outcomes included length of stay, ED revisits and need for intravenous rehydration upon revisit.
RESULTS: 22,125 potentially eligible visits were identified and 4,425 charts were reviewed. There was a trend towards increasing acuity during the 5 year period as reflected by lower CTAS scores (P<0.001). Over the course of the 5-year study period, there was a reduction in the use of intravenous rehydration. from 27% to 13% (P<0.001) and an increase in ondansetron utilization from 1% to 18% (P<0.001). The time series analysis revealed that seasonality was a major determinant in intravenous rehydration rates, and that there were statistically significant downward trends and downward level breaks (all P<0.001). The porportion of children administered ondansetron was a negative predictor of the need for intravenous rehydration (P<0.001). A reduction in the mean length of stay occurred over this time period (8.6 hours to 5.9 hours; P=0.03). During the week following the index visit there was a reduction in return visits to our ED (18% to 13%; P=0.008), and need for intravenous rehydration (7% to 4%; P=0.02).
CONCLUSIONS: Ondansetron use has increased significantly. This is associated with reductions in intravenous rehydration and ED revisits and a shorter length of stay for children with gastroenteritis. The selective use of ondansetron in the treatment of children with gastroenteritis results in improved clinical outcomes.

70
A PROSPECTIVE ASSESSMENT OF PRACTICE VARIATION IN THE TREATMENT OF PEDIATRIC GASTROENTERITIS

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BACKGROUND: Patient level data exploring the impact of practice variation and resource utilization on outcomes in children with gastroenteritis is unknown.
OBJECTIVE: The primary objective was to determine if significant variation exists in the frequency of intravenous rehydration administration. Secondary objectives included analyzing the variation in ondansetron administration, hospitalization, and revisit rates.
DESIGN/METHODS: We conducted a prospective cohort study of consecutive children who presented to 11 Canadian emergency departments (EDs). Eligible children were aged 3-48 months and had gastroenteritis (3 watery stools in a 24-hour period within 72 hours prior to the ED visit). Clinical and historical features were collected via a survey conducted following triage; information regarding investigations, treatments, and disposition were abstracted from the medical record; a follow-up call two weeks later provided information on future health care visits.
RESULTS: 647 of 694 eligible children were enrolled. All children had a chart review completed and 455 (69%) participated in the ED interview. Of these 455 patients, 398 (89%) had telephone follow-up. The mean age of all participants was 2112 months. The number of children enrolled per site ranged from 24-139. Overall, 24% of children were treated with intravenous rehydration (range per hospital was 7-80%; P<0.001) and 14% were administered ondansetron (range 0-38%; P<0.001). No other antiemetics were administered. Logistic regression analysis revealed that the greatest predictor of intravenous rehydration was a history of bilious emesis (OR 6.9; 95% CI 1.6-29.4). Other predictors included the presence of vomiting in the 48 hours prior to ED arrival and hospital where care was provided. The hospitalization rate was 5% (range 0-12%) and varied between institutions (P=0.02). Children who received intravenous rehydration at the index visit were more likely to see a health care provider in the subsequent 2 weeks (29% vs. 19%; P=0.04) and to revisit an ED (20% vs. 9%; P=0.003).
CONCLUSIONS: In this cohort, the use of intravenous rehydration and ondansetron varies dramatically. Use of intravenous rehydration at the index visit was associated with the color and presence of vomiting in addition to the site where care was provided. Knowledge translation efforts should focus on improving the care provided to children with gastroenteritis.

71
ABUSIVE VERSUS NONABUSIVE HEAD INJURY IN CHILDREN: A SYSTEMATIC REVIEW

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BACKGROUND: Abusive head injury is the leading cause of death from trauma in infancy. Previous studies have shown that up to 1/3 of abusive head trauma is initially misdiagnosed as accidental. By systematically identifying characteristic clinical and radiological features of abusive and nonabusive traumatic head injury we may be able to improve recognition of abuse.
OBJECTIVE: To systematically review comparative studies of children with abusive and nonabusive head injuries.
DESIGN/METHODS: We searched electronic databases, Cochrane Central Register of Controlled Trials, conference proceedings, and reference lists to identify all comparative studies of children aged <= 6 years with abusive or nonabusive head injury. Only studies in which head-injured children were admitted to hospital and that compared historical features, physical exam features, or imaging findings were eligible. 2 reviewers assessed studies for inclusion, extracted data, and assessed trial quality. Study quality was assessed, in part, on the criteria used to define the two cohorts and the level of bias related to these criteria.
RESULTS: 485 citations were identified, 29 studies were included in the review. Study sample sizes ranged from 16 to 16831 children and mean age of included children ranged from 3.2 to 72 months. 12 studies were prospective. There was variability in the methods by which head injuries were deemed to be abusive - 1 study relied on determination by single MD, 1 required admission of abuse, 5 relied on multidisciplinary assessment, 6 relied on discharge diagnosis, and 16 used a combination of criteria (e.g. witnessed abuse, history inconsistent with developmental stage). Inconsistency in definition and reporting of clinical and imaging characteristics as well as in some cases high statistical heterogeneity presented challenges to meta-analysis. Notwithstanding these important limitations, there were 3 characteristics where odds ratios (OR) for abusive versus nonabusive head injuries could be combined: SDH (pooled OR 10.5, 95% CI 7.2 to 15.2, 19 studies), metaphyseal fractures (12.7, 95% CI 2.9 to 55.3, 3 studies), and long bone fractures (3.7, 95% CI 1.8 to 7.7, 8 studies).
CONCLUSIONS: This systematic review highlights the need within the child abuse research literature for greater consistency in the criteria used to identify head injuries as abusive or nonabusive as well as greater consistency in examining and defining characteristics that may be associated with these injuries.

72
UTILIZATION OF DIAGNOSTIC IMAGING AFTER IMPLEMENTATION OF A CLINICAL PATHWAY FOR SUSPECTED PEDIATRIC APPENDICITIS

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BACKGROUND: The diagnosis of appendicitis in the pediatric population can be complicated, leading to the recent trend in the reliance on Diagnostic Imaging (DI) studies. However limitations to the use of DI in the pediatric population include increased radiation exposure in Computed Tomography (CT), variable after-hours availability, increased triage-to-operating room times, inconclusive scans and high health care costs. The sub-set of children with a high probability of appendicitis likely do not

require DI studies. We recently implemented a Clinical Pathway for Pediatric Appendicitis, including recommendations on the utilization of DI.
OBJECTIVES: To assess the utilization of DI in children with suspected appendicitis after the implementation of a Clinical Pathway for Pediatric Appendicitis.
METHODS: Post-implementation data was collected prospectively from the administrative databases from our Emergency Department (ED), Surgical and DI services for all children aged 3 to 17 years who had a DI study and/or who underwent appendectomy between March 1 and September 30, 2009. We calculated the proportion of children with abdominal complaints who underwent imaging studies, the proportion of children having appendectomies who had imaging studies, the proportion of studies performed after hours (22h) and the average triage to DI time.
RESULTS: Our ED saw 22,951 children during the post implementation study period, 3971 (17.3%) of whom had abdominal complaints. 320 children (8.1% of abdominal complaints) had an Ultrasound (U/S) to rule out appendicitis. Appendectomy was performed 148 children. Of these, 87 (58.8%) had an imaging study. 81 (54.7%) of children had an U/S while 6 (4.1%) had a CT. Negative appendectomy rate was 8.1% (12/148). The average triage to DI time for children who had appendectomy was 5.92 hours. After-hours imaging occurred in 7 (8.0%) children.
CONCLUSIONS: Ultrasound makes up the vast majority of DI studies in suspected appendicitis at our centre. CT scans, known to have high radiation risk in children, are infrequently utilized. A significant proportion of children who have an appendectomy do not have any imaging studies, while our negative appendectomy rate remains low. After hours imaging studies occur infrequently, as children who present after hours and require imaging are often kept in the department until regular hours.

73
CAN PEDIATRIC EMERGENCY DEPARTMENT NURSES USE A MODIFIED ALVARADO SCORE TO ACCURATELY PREDICT APPENDICITIS?

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BACKGROUND: As part of a regional initiative to improve the provision of timely care for children presenting to the Pediatric Emergency Department (PED) with suspected appendicitis, we developed a Pediatric Appendicitis Pathway. The implementation of the pathway included the introduction of an Advanced Nursing Directive (AND). Using a modified Alvarado Score, nursing staff may initiate core interventions for children with suspected appendicitis, including laboratory investigations and fluid management, prior to physician assessment.
OBJECTIVES: To determine whether Pediatric Emergency Department nurses can use an Advanced Nursing Directive based on a modified Alvarado Score to accurately predict appendectomy.
METHODS: Using a prospective cohort of children aged 3 to 17 years presenting to our PED with abdominal complaints between March 1 and September 30, 2009 we collected Quality Assessment data regarding the implementation of our Regional Pediatric Appendicitis Pathway. The presence of an AND form in the PED health record identified the children to be included in this study. Data concerning the individual criteria of the AND, the overall AND assessment and the child's clinical course during both the PED visit and subsequent admission were retrieved from the health record. Accuracy, Sensitivity, Specificity, Negative- and Positive-Predictive Values (NPV, PPV) were calculated.
RESULTS: 446 AND forms were completed by nursing staff. Of these, nurses assessed 164 children as meeting AND criteria for appendicitis while 282 did not meet criteria. 66 of those who met criteria went on to have an appendectomy. 26 children who did not meet criteria had an appendectomy. 105 children who met criteria went on to have further investigation through diagnostic imaging and/or surgical consult. Nurses were accurate 72.2% of the time using the AND. The AND had a sensitivity of 71.7% and specificity of 72.3%, while the NPV and PPV were 90.8% and 40.2% respectively.
CONCLUSIONS: Using an evidence-based Advanced Nursing Directive, Pediatric Emergency Nurses were able to predict appendectomy with good accuracy. Nurses were most accurate in predicting which children with abdominal pain were unlikely to require appendectomy and could wait for physician assessment. Using an AND, nurses in our PED are empowered to initiate interventions that may lead to improved patient care and efficiency in the PED.

74
CONGENITAL ANALBUMINEMIA: A SASKATCHEWAN CASE SERIES

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BACKGROUND: Congenital analbuminemia (CAA) is characterized by the absence of serum albumin. Typically albumin is the most abundant protein in the circulatory system and provides 80% of the colloid osmotic pressure. Albumin is responsible for carrying heavy metals, ions, fatty acids, metabolites, bilirubin, vitamins, hormones and drugs through circulation. Given these important roles, it is unexpected that survival without albumin is possible. However, the body appears to compensate by numerous mechanisms. The worldwide prevalence of CAA is estimated at 1 in 1,000,000. There are 43 cases of CAA reported internationally, but there is very little information known about the impact of the absence of albumin.
OBJECTIVE: We have identified a population in Saskatchewan with a high incidence of CAA. Our intent is to review these cases and consider the impact of CAA on morbidity and/or mortality.
DESIGN/METHODS: A health records search of admissions coded for hypoalbuminemia E88.0 was conducted (between 2001 - 2007). Records identified were reviewed to identify cases with CAA (defined as albumin <10g/L or protein electrophoresis with albumin ~0g/L). In addition clinic charts coded for CAA from Medical Genetics were reviewed (and corresponding health records obtained) to identify cases. If available, maternal health records were obtained to review prenatal and delivery histories for each case. Through our search, we identified twelve cases of CAA in Saskatchewan. We reviewed these cases and described the associated clinical characteristics. Data collection included antenatal/obstetrical history, birth history, placental pathology, frequency of respiratory tract infections, frequency of hospitalization, complications during hospitalizations, comorbid conditions, laboratory investigations (protein electrophoresis, albumin level, immunoglobulins, vitamin D, serum electrolytes, serum TG and cholesterol), clinical signs/symptoms suggestive of analbuminemia and cause of death (if applicable).
RESULTS: Congenital analbuminemia may predispose to preterm delivery, small for gestation infants and/or hydropic placentas. The cases had frequent admissions to hospital, primarily for respiratory tract infections. There were a high number of admissions to intensive care.
CONCLUSION: Our case series demonstrates that among hospitalized patients, there is an increase in morbidity and possibly mortality associated with congenital analbuminemia. We are not able to make any conclusions on the long term risks of congenital analbuminemia. This review provides support for a longitudinal study of this population of patients. The review also raises the question whether screening for CAA in at-risk populations could improve morbidity and mortality.

75
BARRIERS TO HIGH RISK MATERNAL TRANSFER < 32 WEEKS GESTATION

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BACKGROUND: Infants < 32 weeks gestation born in community rather than tertiary hospitals are more likely to die or suffer major morbidity. In Ontario, despite a regionalized system for perinatal care, more than 30% of preterm births occur in non-tertiary hospitals; the outborn rate is now 38%.
OBJECTIVE: Identify the reasons why high risk mothers deliver outside of the tertiary setting at gestational ages (GA) < 32 weeks and if differences between community Level I, Level II, and advanced Level II hospitals exist.

DESIGN/METHODS: A retrospective chart review of all outborn deliveries < 32 weeks gestation within a major urban center from 2003-2007. GA was divided into GA-1 (23-24 weeks), GA-2 (25-26 weeks), GA-3 (27-28 weeks), and GA-4 (29-31 weeks). Reasons for non-transfer were categorized into: no Level III bed available in a) the city; or b) region or province; c) transfer cancelled due to labour advancing or maternal/fetal instability; d) labour advanced or maternal/fetal instability; e) elected to deliver.

RESULTS: Twenty of 21 hospitals enrolled. Of the 841 deliveries identified by database, 511 (60.8%) were analyzed. In-utero transfer was sought in 30.9% of the deliveries, with similar rates across every level of care and each GA. For deliveries where transfer was attempted, 72.2% failed because of lack of a tertiary bed, within the city (37.7%) or province (62.3%); request for transfer was cancelled in 27.9%. The primary cited reason for non-transfer was 'Active Labour' (57.2%), median time to delivery 1.3 hrs (range 0-79.7 hrs), across all GA groups and hospital level. 17.0% of births were categorized as 'Elected Delivery', median time to delivery 35.3 hrs (range 6.1-860.3 hrs). A higher proportion of 'Elected Delivery' was within GA-4 ($p < 0.001$).

CONCLUSIONS: Enhanced awareness of poor outcomes associated with outborn status, even at 29-31 weeks, should encourage attempts to transfer. Lack of tertiary capacity in NICUs should not prevent admission of high risk mothers. Counseling mothers on early signs of labour may result in earlier presentation. A specialized transport service might promote transfer of mothers even in advanced stages of labour. A more aggressive approach for transferring mothers with threatened preterm labour is needed.

76
CARBOXYHEMOGLOBIN LEVELS IN UMBILICAL CORD BLOOD OF WOMEN WITH PREECLAMPSIA AND INTRAUTERINE GROWTH RESTRICTION

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BACKGROUND: Preeclampsia (PE) and intrauterine growth restriction (IUGR) are pregnancy specific disorders that have common as well as distinct pathophysiologies. Both are associated with abnormal placentation. Carbon monoxide (CO), a known vasodilator, is produced endogenously from degradation of heme, catalyzed by the enzyme heme oxygenase (HO). The HO-CO system is thought to play a role in vasomotor control and is widely expressed in the placenta. Women with PE have lower end tidal CO levels as compared to normotensive controls. CO has been shown to reduce placental perfusion pressure and trophoblast apoptosis. Carboxyhemoglobin (COHb) levels are valid markers of CO levels.

OBJECTIVE: We tested the hypothesis that COHb levels in the cord arterial blood of women with PE and normotensive IUGR (<10th percentile for birthweight) are lower as compared to normotensive controls without IUGR.

DESIGN/METHODS: We prospectively analyzed COHb levels in the cord arterial blood of women with PE, normotensive IUGR and normotenisve pregnancies without IUGR. Exclusion criteria included cigarette smoke exposure, hemolytic disorders, a positive direct anti-globulin test, chronic hypertension, fever and any significant medical illness. COHb was measured using the ABL 7000 blood gas analyzer. Statistical analysis was performed using one way ANOVA and Chi^2 or Fisher's exact test as appropriate.

RESULTS:

Characteristics of the Study Groups

Variable	Normotensive (n=38)	PE (n=38)	IUGR (n=32)	P Value
Maternal age (yrs)	31±0.9	30.4±0.8	29±0.9	NS
Gravidity	2.24±0.2	2.13±0.2	2.22±0.2	NS
Parity	0.89±0.2	0.65±0.2	0.91±0.2	NS
Systolic blood pressure (mmHg)	115±1	148±2	112±2	0.001[a]
Diastolic blood pressure (mmHg)	71±1	98±1	69±2	0.001[a]
Gestation (weeks)	38±0.3	36±0.4	36±0.4	0.01[b]
Birth Weight (gm)	3209±131	2592±116	2169±78	0.02[c,d]
Hemoglobin (g/L)	159±3	170±2	160±3	0.02[a]
Carboxyhemoglobin (%)	**0.79±0.12**	**0.38±0.06**	**0.50±0.08**	**0.01[e]**

NS= non-significant, Data are presented as mean ± SEM

[a] PE vs normotensive & IUGR

[b] Normotensive vs PE & IUGR

[c] Normotensive vs PE & IUGR

[d] PE vs IUGR

[e] **PE vs normotensive**

CONCLUSION: We observed lower cord COHb levels in women with PE as compared to normotensive controls but not in normotensive IUGR pregnancies. Our data suggests that the HO-CO system may play an important role in the pathogenesis of PE but different mechanisms may exist in normotensive IUGR pregnancies.

77
EXPLORING THE EXPERIENCE OF ACUTE ITP THROUGH NARRATIVES OF CHILDREN WITH ITP, THEIR PARENTS, AND HEALTH CARE PROFESSIONALS

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BACKGROUND: Treatment options for typical, acute immune thrombocytopenic purpura (ITP) include IVIG, steroids, anti-D, and observation. The decision is preference-sensitive; there is no clearly superior option, and families' values may be considered in making an informed choice. Understanding the experience of acute ITP is essential for informing the development of a patients' decision aid that will help families actively participate in the decision making process.

OBJECTIVE: To explore the experience of diagnosis, treatment, and outcomes for children with ITP, their parents, and health care professionals, towards the broader goal of developing a decision aid.

DESIGN/METHODS: We conducted six focus groups comprising two groups each of children (N=7), parents (N=16), and professionals (N=10), recruited from a large urban children's teaching hospital. Thematic analysis was employed whereby team members examined transcripts and developed a codebook, allowing for systematic coding of the data. Rigor was assured by multiple investigators' involvement in each stage of the process. The NVivo 8 software package was used to assist in data management.

RESULTS: Analysis of the data yielded three dominant themes. 1. Emotions: anxiety and fear were pervasive throughout the parents' and children's dialogues, relating to all aspects of their ITP experience. 2. Communication: positive, negative, and ideal communication strategies regarding diagnosis and treatment permeated all accounts. 3. Decision making: parents described variations in levels of participation in decision making, while professionals acknowledged a discrepancy between the ideal goal of parental involvement and the current practice of directed recommendations.

CONCLUSIONS: The emotional impact of ITP, communication issues, and participation in decision making are important aspects of the ITP experience. These themes should be considered by health care professionals when caring for children with acute ITP, and will inform the development of a patients' decision aid.

78
PLASMA REDUCED PLATELETS: THE CONCENTRATED TRUTH

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Platelets are often administered in pediatric medicine to neonates and children under going chemotherapy. In the neonate population there is a desire to reduce the volume of platelet product, while for older children plasma matched platelets may not be available urgently and removal of plasma is required in order to prevent recipient hemolysis. The process of plasma reduction varies among pediatric centers, and there is a divide as to whether it reduces the total count of platelets transfused. In order to evaluate the efficacy of the method of plasma reduction used at the IWK, a list of all neonates and children who received plasma reduced platelets between June 1, 2008 and June 1, 2009 was complied. Platelet counts before and after transfusion of plasma reduced platelets were recorded and compared to changes in platelet counts when the same children received standard platelets. In children under one year of age, it was found that plasma reduced platelets increased platelet recovery compared to standard platelets while in children over the age of one there was no difference in platelet recovery. This difference can be attributed to plasma-reduced platelets having an increased platelet count when compared to the same volume of standard platelets. Older children received a greater volume of standard platelet compared to plasma reduced platelet product, since the plasma reduction process results in a limited volume of product. From these results, there is evidence that plasma reduction can increase platelet recovery compared to standard platelets in volume restricted neonates. As well, plasma reduction does not produce an inferior product if mismatched platelets are required for urgent platelet administration to children undergoing chemotherapy.

*To validate these results, a complete companion study evaluating the efficacy of plasma reduction on platelet count in vitro was also preformed, which demonstrated that plasma reduction did not decrease platelet count and resulted in increased platelet concentration.

79
DECISION MAKING IN THE MANAGEMENT OF CHILDREN HOSPITALIZED WITH ACUTE ITP: UNDERSTANDING CHILD, PARENT, AND HEALTH CARE PROFESSIONAL PERSPECTIVES

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BACKGROUND: Hospitalists may consider that the treatment options for typical, acute immune thrombocytopenic purpura (ITP) (IVIG, steroids, anti-D, and observation) are preference-sensitive. That is, there is no clearly superior option, and families' values may be considered in making an informed choice. Understanding the experience of acute ITP is essential for informing the development of a patients' decision aid that will help families actively participate in the decision making process.

OBJECTIVE: To examine decision making in acute ITP, as perceived by children with ITP, their parents, and health care professionals, with a goal toward development of a decision aid.

DESIGN/METHODS: We conducted six focus groups comprising two groups each of children (N=7), parents (N=16), and professionals (N=10), recruited from a large urban children's teaching hospital. Thematic analysis was employed whereby team members examined transcripts and developed a codebook, allowing for systematic coding of the data. Rigor was assured by multiple investigators' involvement in each stage of the process. The NVivo 8 software package was used to assist in data management.

RESULTS: Findings revealed the complexity of decision making in the management of children with acute ITP. All groups experienced the recommendation of IVIG as first line therapy. Professionals recognized the discrepancy between their practice of directed recommendation and that of option presentation and parental involvement, acknowledged as ideal. Influences on their decision making included: making the "easiest" decision (IVIG), institutional culture, and personal experience and comfort. Parents felt that the method of treatment decision to which they were exposed reflected its perceived urgent nature. Children articulated their desire to be more fully informed about the diagnosis of ITP and treatment options.

CONCLUSIONS: Children, parents, and professionals endorse the importance of shared decision making. There is a need for enhanced communication and a patients' decision aid to objectively help families understand the treatment options and make informed value-based choices.

80
DO ALL CHILDREN WITH COMPLICATED PNEUMONIA NEED A PROCEDURAL INTERVENTION?

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BACKGROUND: Current guidelines recommend that all children with complicated pneumonia need an invasive procedure to effect drainage. It is unknown whether some subgroups can be safely managed conservatively with antibiotics alone.

OBJECTIVES: To compare the outcomes of children with complicated pneumonia managed conservatively to those managed with a procedure [chest tube (CT) +/- fibrinolytics or video-assisted thorascopic surgery (VATS)].

DESIGN/METHODS: Children with ultrasound-confirmed complicated pneumonia (parapneumonic effusions with loculations and/or septations) were recruited to a single-center prospective observational study (10/08 – 10/09). The primary outcome was hospital length of stay (LOS); secondary outcomes included readmissions, complications (pneumothorax, bronchopleural fistula, bleeding), and 1 month parameters [persistent effusions, parent- and child-reported quality of life (Peds-QL), school/work loss, and normalized spirometry (FEV1 >80% predicted)]. Bivariate comparisons were made between those treated conservatively and those treated with a procedure for outcomes and co-interventions (vancomycin, multiple antibiotics, opiates) using Chi squared, Fisher's exact, or independent t-tests, as appropriate. A stepwise multivariate linear regression adjusted for age, sex and significant ($p<.05$) co-interventions.

RESULTS: Fifty children were recruited (54% male); median age was 3.8 yrs (8 mo – 17 yrs). All effusions had septations; 43 (86%) were multiseptated and loculated. 18 children were treated conservatively, 26 received a CT with fibrinolytics, 5 a CT alone and 1 VATS. At admission, those treated conservatively were less likely to have an oxygen requirement (3 (17%) vs. 17 (53%), $p = .01$) and had a slower respiratory rate (37 (SD 12) vs. 47 (SD 13), $p=.009$), but had no significant difference in loculated multi-septated effusions, prior antibiotic use, fever duration, WBC count, or positive blood culture. Those treated conservatively had a shorter mean LOS (8.2 vs. 14.1 days, $p<.001$) and fewer complications (0% vs. 22%, $p=.04$). There were no significant differences in co-interventions, readmissions or any 1 month outcomes. LOS of conservative therapy was 6.5 days shorter (95% CI: 3-10) in the adjusted model.

CONCLUSIONS: Conservative therapy may be a safe alternative to an invasive procedure for children with complicated pneumonia presenting with relatively mild respiratory distress.

81
HOME OXYGEN THERAPY FOR ACUTE BRONCHIOLITIS IN INFANTS: IS IT EFFECTIVE IN REDUCING HOSPITAL STAY?

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BACKGROUND: Data on short term home oxygen therapy (HOT) for children with acute bronchiolitis is still very limited.

OBJECTIVE: To estimate the impact of HOT on hospital stay for acute bronchiolitis.

MEHODS: A retrospective cohort study was done including all children 0-12 months of age discharged from a tertiary-care pediatric hospital between 11/01/2007 and 03/31/2008 with a diagnosis of acute bronchiolitis. Oxygen was administered to maintain SpO_2 = or >92% according to

a standardized protocol implemented in 2005. We assumed children with the following criteria could have been sent home with O_2, instead of being kept in hospital: age = or >2 months, distance between home and hospital <50 km, in-hospital observation = or >48 hr, need for iv fluids <50 mL/kg/day, no gavage feeding, O2 requirement = or > 0.5 L/min and stable clinical condition over the last 24 hrs. Children with significant underlying disease were excluded.

RESULTS: One hundred seventy-seven infants were included in the study. Median age was 2.0 months (range 0-11); 54.8% were male. Eighty eight per cent (156/177) were admitted for a first episode of bronchiolitis, and 75.3% of those tested were RSV positive (116/154). Median length of stay was 3.0 days (range 0-18). Admission to PICU and mechanical ventilation were required for 14.7% and 13.6% of patients, respectively. Forty five percent of patients (79/177) received oxygen during their hospital stay. Of these 79 children, 49.4% were = or >2 months of age, 72.2% lived within 50 km of the hospital and 91.1% were hospitalized 48 hr or more. Criteria for early discharge with HOT were met in only 9 children (5.1% of all patients), a mean of 1.1 days (SD 0.8) prior to discharge. For the entire cohort, the number of patient-days of hospitalization which would have been saved with HOT was 10, representing 1.4% of total patient-days of hospitalization for bronchiolitis in otherwise well children over the study period (10/703).

CONCLUSIONS: In our setting, HOT would be minimally effective in reducing length of stay of infants hospitalized for bronchiolitis.

82

PROSPECTIVE OBSERVATIONAL STUDY OF CLINICAL ACTIVITIES, EDUCATION AND SLEEP DURING PAEDIATRIC RESIDENT ON-CALL SHIFTS

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BACKGROUND: Long duty hours and fatigue are hallmarks of physician training. Acute and chronic sleep deprivation is associated with reduced performance and increased likelihood of error. Furthermore, the ability to learn is reduced during periods of sleep deprivation.

OBJECTIVES: To evaluate workload, staff support, education, sleep and physical stress in paediatric residents working within duty-hour regulations.

METHODS: A prospective observational study was performed in 3 periods: a cohort from 2005 (30 hour shifts), pre-July 2009 (30 hour shifts) and after July 2009 (24 hour) on call shifts. On-call trainees on their paediatric medicine rotations completed surveys describing on call workload, communication with the supervising paediatrician, teaching, learning and the nature of clinical work. Distance walked was measured with pedometers.

RESULTS: 179 on-call shifts were studied: 61 in 2005, 55 in May-June 2009, and 63 in July-August 2009. We found differences in patient volumes, workload, distance walked and supervision between the 3 periods (medians reported): of assigned patients (23.5, 27, 22, p=0.002), overnight admissions (4, 3, 2, p<0.0001), pages (27.5, 24, 15.5, p<0.0001), minutes entering orders (70, 105, 65, p=0.003), minutes examining patients (75, 120, 90, p=0.0004), minutes communicating with patients and families (100, 140, 120, p=0.004) and minutes communicating with the staff physician (not measured, 87.5, 30, p<0.0001). Patient emergencies were reported in 9 (15%), 46 (83%) and 15 (24%) shifts (p<0.0001).

Trainees reported learning at any stage during 54 (89%), 39 (71%) and 48 (76%) shifts, and specifically overnight during 46 (75%), 14 (25%), 20 (32%) shifts (p<0.0001).

CONCLUSIONS: We performed a before and after evaluation of the effect of duty hour reductions in a paediatric teaching hospital using prospective self-report. We found significant differences in workload and supervision between periods. The overall proportions of shifts where trainees reported learning was similar, although perceived learning during the night portion of the shift reduced significantly from 2005 to 2009. The inclusion of a remote control group provides additional context in which to frame the shorter term comparisons before and after implementation of the July 2009 duty hour regulations.

83

SHOULD THIS HOSPITALIZED CHILD RECEIVE EMPIRIC TREATMENT WITH ACYCLOVIR?

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BACKGROUND: When considering the diagnosis of Herpes Simplex Encephalitis (HSE), hospitalists would benefit from identifying children who should receive empiric acyclovir treatment while awaiting definitive diagnostic testing.

OBJECTIVES: To identify the initial clinical, laboratory and imaging factors associated with children receiving complete and incomplete courses of acyclovir for suspected HSE.

METHODS: From the hospital pharmacy database, all hospitalized children who received acyclovir from January 2000 to March 2008 comprised the sampling frame. Inclusion: admitted to the Pediatric Medicine Inpatient Unit (PMIU) from the ED or a community hospital with suspected encephalitis. Exclusion: age <28 days, immunocompromised, transferred from the PICU or NICU, diagnosis of varicella, stomatitis or ezcema herpeticum. Children were categorized as receiving a complete course of acyclovir (>14 days) or an incomplete course of acyclovir (<14 days) as a proxy for the physicians' discharge diagnosis of probable HSE. Clinical, laboratory and imaging variables, obtained within the first day of evaluation, were abstracted from hospital records. Odds ratios (OR) and 95% confidence intervals (CI) were calculated.

RESULTS: During the study period, 3224 hospitalized children received intravenous acyclovir, 312 met eligibility criteria, 33 (10%) received a complete course (>14 days) and 279 (89%) received an incomplete course (<14 days). Four patients were CSF-PCR HSV positive. 81% also received a third generation cephalosporin and 38% received an anticonvulsant. Children receiving a complete course compared with those receiving an incomplete course of acyclovir were more likely to have: focal neurologic deficit (OR 5.2, 95% CI: 2.4-11.5); GCS <13 (OR 2.3, 95% CI: 1.1-4.8); abnormal CT head (OR 3.0, 95% CI: 1.1-8.2). The following were not significant: history of headache, seizures, fever, hallucinations, behaviour change, recent varicella or herpes infection in the child or family; examination findings of fever or seizure; laboratory investigations including WBC, CSF, liver function.

DISCUSSION: A large number of children are treated empirically with acyclovir. However, a small proportion receives a complete course, which is most strongly associated with: focal neurologic deficit, GCS <13, abnormal head CT scan. Hospitalists may assess these variables when considering an empiric course of acyclovir.

84

COULD HSP BE AN ADVERSE EVENT FOLLOWING IMMUNIZATION? A REPORT FROM THE CANADIAN PEDIATRIC SOCIETY IMMUNIZATION MONITORING PROGRAM, ACTIVE (IMPACT)

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Henoch Scholein purpura (HSP) is the most common vasculitis in childhood however, the definitive etiology remains to be elucidated. Some authors propose that it may be an adverse event following immunization (AEFI) as there are a some case reports and a single published case series. The success of vaccination programs relies heavily on accurate and informed vaccine safety data for counseling by health care providers. This study aims to describe the cases of HSP reported to IMPACT over the last 18 years in the context of the other literature on HSP as a possible AEFI.

IMPACT has been doing active surveillance for conditions that are seen as possible AEFIs since 1991. The 12 current participating centres are located from coast to coast and account for over 90% the nation's tertiary care pediatric beds. Nurse monitors employed at each center search for admissions due to suspected or possible AEFIs within 30 days of immunization. The case definition was based on a discharge diagnosis of HSP within 30 days after an immunization. Data was collected on a standardized report form. During that period, 205 possible but unproven unusual AEFIs were reported.

A total of seven cases of HSP following immunization were recorded in previously healthy children with an average age of 6.5 years (range 2-15 years); a clinical description was available for 6/7. All of the cases reported joint pain or swelling, and 5/6 reported rash. Abdominal pain or other gastrointestinal manifestations and renal manifestations were each reported in 3 cases. 3/7 cases were reported after meningococcal vaccination, and 4 after the second dose of MMR (of whom 3 also had DPT-IPV). There was a median of 2.5 days (range 1 – 18) between immunization and the onset of symptoms. In all cases, patients were hospitalized with a median stay of 2 days and at the time of discharge were all expected to make a full recovery although full follow up details were not available. In 3/7 cases there was an antecedent viral illnesses that may have triggered the HSP.

In this small case series of HSP within one month after vaccination the age distribution and clinical presentation are consistent with the known epidemiology of HSP. The received vaccines are consistent with what children 2-15 years of age usually receive. A temporal relationship does not necessarily imply causation; at least 3/7 had viral illnesses which may have been the trigger for HSP. HSP has not been reported to follow measles, mumps or rubella disease. Further study would be required to definitely determine if these or any immunizations are associated with HSP development in susceptible hosts. Given the relatively rarity of this disease, a large prospective case control series examining the link between HSP and immunizations would be helpful.

85
TRAVEL-RELATED ILLNESSES IN CANADIAN CHILDREN (TRIP STUDY)

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BACKGROUND: Increasing numbers of Canadians travel internationally each year and a significant number of them will develop travel-related health problems. An estimated 4% of travelers are children who account for a disproportionate number of travel-related hospitalizations. However, the burden of travel-related illnesses (TRIs) among Canadian children is unknown.

METHODS: The Canadian Paediatric Surveillance Program (CPSP) is an active national surveillance program that collects data from approximately 2,500 pediatricians and pediatric sub-specialists. A survey regarding TRIs among pediatric patients was mailed out by the CPSP in August 2008 to 2,499 participants.

RESULTS: There were 631 respondents (25%), of whom 185 (29%) had seen patients with TRIs during the previous 12 months. Children who traveled to visit friends and relatives (VFRs) were seen by 71% of the respondents while tourist travelers and immigrant travelers were each seen by 46% of the respondents. The regions of travel most commonly associated with TRIs were Africa (51%) and India (43%). Travel to Mexico, the Caribbean, and South and Central America was also commonly associated with TRIs. The most commonly seen TRIs were diarrheal diseases (57%), enteric fever (35%), and malaria (35%).

CONCLUSION: Almost one third of Canadian pediatricians and pediatric sub-specialists see children with TRIs in their practices, the majority of whom are pediatric VFRs. These data highlight the need for pediatric training in TRIs and for advocacy concerning pre-travel advice for families traveling abroad with children.

86
CARESS: THE CANADIAN REGISTRY OF SYNAGIS (2006-2009)

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BACKGROUND: Palivizumab is used for respiratory syncytial virus (RSV) prophylaxis in high risk children. Data on seasonality, risk factors, and outcomes are necessary to evaluate the impact of palivizumab on the incidence of RSV infections, minimize healthcare resources and identify which infant sub-sets are receiving prophylaxis.

OBJECTIVE: To evaluate the current management (utilization, compliance) of children at high-risk of RSV infection with palivizumab prophylaxis in tertiary care centers and community settings through the development of a Canadian Registry Database.

DESIGN/METHODS: A prospective, observational, registry of infants who received at least 1 dose of palivizumab during the 2006-2009 RSV seasons from 26 Canadian sites. Neonatal and demographic data were collected from the parent/caregiver upon enrollment. Data on palivizumab utilization and compliance, including outcomes related to respiratory infection events were collected monthly.

RESULTS: 4926 infants aged 2 days to 47 months (mean=5.4 months) were enrolled. Participants were typically male (57.1%), Caucasian (71.5%) with an average gestational age (GA) of 32.2 ± 5.4 completed weeks. 3480 (70.6%) infants received palivizumab because they were premature only (i.e. =< 35 completed weeks GA), 397 (8.1%) required oxygen, 468 (9.5%) had congenital heart disease and 572 (11.6%) were prophylaxed for other risk factors such as CNS disorders, airway anomalies and cystic fibrosis. Patients received an average of 3.7 ± 1.5 injections, with 17,909 doses given overall. Only 6.2% of patients withdrew from the study. No directly, drug related serious adverse events were identified. 296 infants required a total of 351 hospitalizations for a spectrum of respiratory tract infections, resulting in a hospitalization rate of 6.0%. There were significant differences between indications for palivizumab (chi-square=32.7, p<0.005). The overall incidence of RSV positive hospitalization was 1.1%. Hospitalization rates were highest in non-Caucasian infants of aboriginal descent (17.9%, p<0.005). Hospitalized infants had a lower percentage of compliant injections (61.1% vs 67.7%, p=0.026).

CONCLUSIONS: The RSV hospitalization rate observed in the 2006-2009 RSV seasons was lower than that found in several published reports (range 1.3%-5.3%). The rates of RSV hospitalization may be decreasing for various reasons such as high compliance with palivizumab prophylaxis, variability in RSV epidemiology, hospital admission criteria and preventive education.

87
RESPIRATORY SYNCYTIAL VIRUS PROPHYLAXIS IN SPECIAL POPULATIONS

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BACKGROUND: Infants with underlying medical disorders are at high risk for morbidity and mortality from respiratory syncytial virus (RSV) infection. Recent position statements from the Canadian Paediatric Society (CPS) and the American Academy of Pediatrics (AAP) recommend palivizumab prophylaxis only for specific infants with cystic fibrosis, Down syndrome or those who are immunocompromised and are deemed at risk.

OBJECTIVE: To examine palivizumab utilization and compliance in infants with pre-existing disease within the Canadian Registry Database (CARESS).

DESIGN/METHODS: A prospective, observational, registry of infants who received at least 1 dose of palivizumab during the 2006-2009 RSV seasons from 26 sites. Neonatal and demographic data were collected from the parent/caregiver at enrollment. Data on palivizumab utilization, compliance, and outcomes related to respiratory infection (RI) events were collected monthly. Premature infants 35 completed weeks gestational age (GA) who met approval criteria by the CPS for the prevention of RSV infection (Group 1) were compared to those who received prophylaxis for a spectrum of medical disorders (Group 2).

RESULTS: Comparative, demographic, compliance and outcome data are shown in Table 1.

Table 1

	Group 1 (n=3376)	Group 2 (n=487)	P
% Male	56.9%	55.2%	0.492
Enrollment Age, mean ±SD	3.6 ±3.4	9.8 ±8.7	0.000*
GA. mean ±SD	31.1 ±4.6	37.0 ±4.4	0.000*
# Injections. mean ±SD	3.7 ±1.5	3.8 ±1.5	0.198
RI Hosp. Rate	4.0%	9.9%	0.000*
RSV Hosp. Rate	1.0%	2.3%	0.019*
Compliant Injections (%)	69.5%	69.5%	0.999

* P<.05 significant

Group 2 infants comprised Down syndrome (n=117, 24.0%), airway anomalies (n=111, 22.8%), cystic fibrosis (n=62, 12.7%), neuromuscular impairment (n=51, 10.5%), pulmonary (n=38, 7.8%), multiple system disorders (n=31, 6.4%), cardiac (n=15, 3.1%), immunocompromise (n=8, 1.6%), and miscellaneous (n=54, 11.1%). From 2006-2009, the proportion of Group 2 infants receiving prophylaxis increased 2-fold from 6.0% (73/1224) to 12.1% (244/2016) overall. Group 2 infants were older at enrollment with more advanced GA and had significantly higher RI and RSV hospitalization rates. There were no serious adverse events directly related to palivizumab.

CONCLUSIONS: Despite limited recommendations from advisory bodies, clinicians strongly advocate for RSV prophylaxis in special populations based on perceived morbidity and mortality risk and evolving evidence from small cohort and case-controlled studies. Large, prospective trials are necessary to demonstrate effectiveness in infants with pre-existing medical diseases.

88

EFFECTS OF HEPTAVALENT PNEUMOCOCCAL CONJUGATE VACCINE (PCV7) ON INVASIVE PNEUMOCOCCAL DISEASE (IPD) IN CENTRAL AND NORTHERN SASKATCHEWAN, 2000-2008

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Streptococcus pneumoniae is one of the leading vaccine preventable bacterial infections in young Canadian children.

Universal PCV7 for children was introduced in Saskatchewan in April 2005. The objective is to compare the number of cases and antibiotic susceptibilities of IPD in the pre-vaccine (2000-2004) and post-vaccine (2006-2008) eras, excluding the vaccine introduction year of 2005.

IPD cases collected as part of the Immunization Monitoring Program, Active (IMPACT) center were reviewed. This center provides tertiary level pediatric care to central and northern communities in our province (catchment area of approximately 600,000 people). Subjects consisted of children <17 years of age with positive sterile site cultures for S. pneumoniae. Serotypes were divided into vaccine-related categories as shown in Table 1. Over the 9-year study period, there were 105 children (excluding 17 in 2005) with IPD.

Table 1: Number of Cases of IPD Divided Into Vaccination Categories Before and After Universal PCV7 in 2005

# Cases	Pre 2000-2004	Post 2006-2008
Serotypes in PCV7†	58	8††
Additional 3 serotypes in PCV10*	7	7
Additional 3 serotypes in PCV13*	5	2
Additional 10 serotypes in PPV23*	7	2
Others not in PPV23*	5	4
Total	82	23

* Additional serotypes not included in the vaccine immediately above
† p=0.008
†† 6 of 8 cases did not receive PCV7

The number of cases of IPD in children <2 years of age decreased significantly (pre 55 vs. post 10, p=0.013). No cases of meningitis occurred in the PCV7 group after 2005 compared to 7 cases in the pre-PCV7 vaccine era. Overall, penicillin and cephalosporin non-susceptibilities decreased from 22.5% to 8.7% (p=0.161) and 4.9% to 0% (p=0.299), respectively.

Since the introduction of PCV7, the number of cases of IPD, meningitis, and antibiotic non-susceptibility has decreased significantly in central and northern Saskatchewan.

89

EXTENDED INTERVAL DOSING OF GENTAMICIN IN NEONATES LESS THAN 28 WEEKS GESTATION

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BACKGROUND: Gentamicin, an aminoglycoside antibiotic, is extensively used in Neonatal Intensive Care Units. Higher peak levels (5-12 mg/L) of gentamicin are associated with better clinical efficacy (better bactericidal activity) and high trough (>2 mg/L) levels are associated with toxicity. Conventional interval dosing (CID) regimens of gentamicin employ a lower dose with shorter dosing intervals while the more recent extended interval dosing (EID) regimens employ a higher dose with longer dosing intervals. EID has been shown to result in better therapeutic levels of gentamicin in term and late pre-term infants. However, there is very limited data on the safety and efficacy of EID in extremely low birthweight infants.

OBJECTIVE: The aim of our study was to evaluate the pharmacokinetic efficacy of EID of gentamicin, as assessed by peak and trough serum levels, in neonates <28 weeks gestation.

METHODS: Gentamicin was administered in a dose of 5 mg/kg intravenously to neonates <28 weeks every 36 to 48 h (EID). The dosing interval was based on a random level at 22 h after the first dose. Trough and peak levels were measured before and after the second dose. These levels were compared with control subjects who had received gentamicin in a dose of 2.5 mg every 24 h (CID). In both groups, gentamicin was started on the first day of life. Exclusion criteria included major congenital, renal or ear anomalies, neuromuscular disorders, neonates receiving less than 72 h of therapy, perinatal asphyxia, and the non-availability of both peak and trough levels. Statistical analysis was performed using a two way non-paired Student t test and Chi^2 or Fisher s exact test as appropriate.

RESULTS:

Characteristics of the Study Groups

Variable	CID n= 23	EID n=19	P Value
Maternal age (yrs)	29.2 ± 4.08	30.7 ± 7.3	NS
Gravidity	2.7 ± 1.3	2.9 ± 1.9	NS
Parity	0.63 ± 0.83	0.82 ± 1.13	NS
Apgar 1 minute	4.2 ± 2.1	4.2 ± 1.2	NS
Apgar 5 minutes	6.5 ± 1.5	6.7 ± 1.6	NS
Cord pH (arterial)	7.26 ± .13	7.23 ± .08	NS
C-section	12	5	< 0.001
Males	13	12	NS
Gestation (weeks)	25.5 ± 1.3	26.2 ± 1.4	NS
Birthweight (gm)	823 ± 154	930 ± 209	NS
Max. creatinine (μmol/L)	86 ± 18	74 ± 13	NS
Trough gentamicin (mg/L)	1.35 ± .39	1.38 ± .39	NS
Peak gentamicin (mg/L)	**4.7 ± 1.1**	**9.6 ± 1.6**	**< 0.001**

Data are presented as mean ± SD, NS= non-significant

Eleven infants (47%) in the CID group had peak levels less than 5 mg/L while all infants in the EID group had peak levels >5 mg/L. All infants in both groups had trough levels <2 mg/L.

CONCLUSIONS: Extended interval dosing of gentamicin in neonates less than 28 weeks gestation achieves a more optimal peak level as compared to a conventional interval dosing regimen. Our data suggests that EID is safe in neonates less than 28 weeks gestation and will require less dose adjustment than a CID regimen.

90

WHEN "PUSH" COMES TO "SHOVE" IN MANAGING NEONATAL BEDS IN A PUBLICLY FUNDED HEALTH CARE SYSTEM: THE NEED FOR PUBLIC CONSENT

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BACKGROUND: Optimal functioning of a regionalised perinatal care system is dependent on availability of tertiary neonatal beds (NICU), and beds in step-down units (level 2) to provide an appropriate level of care closer to home. Operating a regional neonatal intensive care system at very high bed occupancy can help to control costs by reducing the overall number of staffed beds. Our province has 3.6 combined level 2 and 3 beds per 1000 births. Babies no longer reliant on intensive care are transferred promptly to a lower level of care closer to home to free up acute beds.

OBJECTIVE: To examine the unintended consequences of operating a tertiary neonatal intensive care system at extreme high capacity.

METHODS: Use of beds, data on admissions, duration of stay and neonatal transfers for each baby admitted to the provincial quaternary NICU were analysed and information was collected for out of province/out of country (OOP/OOC) transfers of infants/mothers for our province between 2005 and 2008.

RESULTS: Very high tertiary staffed bed occupancy (96%) was associated with decrease in NICU stay for ELBW infants (<750g: 88 to 54 days, 38%; 750-999g: 65 to 53 days,18%). There was no reduction in NICU stay for larger infants. Earlier NICU discharge was associated with larger numbers of infants who experienced multiple transfers (MT; 3 or more transfers between neonatal units before discharge home), (2005: 32/632,4%; 2006: 26/658,4%; 2007: 41/673,6%; 2008: 67/679,9%). Two infants were transferred 7 or more times before discharge home. MT was not confined to extremely low birthweight infants; (23% were <1000g; 22% were >2.5kg). During the same period, difficulties with bed availability lead to babies and mother/baby pairs being transferred OOP/OOC (2005: 84, 2006: 42, 2007: 123, 2008: 29) functioning as a safety valve for the system. The 166 MT babies and the 278 mother or mother/baby pairs transferred OOP/OOC during this four-year period illustrate effects of functioning overcapacity for patients and families, and threatens continuity of care.
CONCLUSIONS: Operating a regionalized neonatal intensive care system beyond capacity requires a trade off between optimal utilization of beds, disruption of continuity of care, and inconvenience and additional stress to caregiver and families. The public, who are the owners of the health care system, need to be more transparently involved in public policy decisions around use of scarce resources.

91
AN ACCURATE NICU BEDSIDE TOOL TO CALCULATE OSMOLALITIES OF FORTIFIED HUMAN MILK WHEN COMBINED WITH COMMONLY USED ORAL MEDICATIONS

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BACKGROUND: Hyperosmolar feeds have been associated with necrotizing enterocolitis. For preterm infants, a feed osmolality of less than 425mOsm/kg H2O has been recommended. In the preterm population, medications, with high osmolalities, are routinely mixed with human milk prior to feeding. The effects of these mixtures on total osmolality are cumulative. Routinely measuring osmolalities of feed-medication mixtures prior to administration is impractical in a clinical setting.
OBJECTIVE: To determine the correlation between a previously reported Osmolality Equation and the measured osmolalities of fortified human milk mixed with oral medications.
DESIGN/METHODS: To mimic a clinical situation, a 1000g infant feeding 160cc/kg/d (13mL q 2h) was used as a reference. The osmolality of 13 mL of fortified human milk and medication combinations was measured by freezing point depression using the Advanced Micro-Osmometer Model 3300®. Osmolalities for these same mixtures were calculated using the following equation:

[(Osmolality of drug × volume of drug) + (osmolality of feed × volume of feed)] / (Volume of drug + volume of feed)

25 different feed-medication combinations were tested.
RESULTS: A representative sample of 8 feed-medication combinations is presented in Table1. Measured and calculated osmolalities were strongly correlated. $r^2 = 0.98$, $p<0.0001$.
CONCLUSIONS: This equation can be used to accurately determinine the osmolalities of feed-medication combinations used in NICUs. This tool can be used at the bedside to prevent administration of hyperosmolar feed-medication combinations.

Measured vs. Calculated Osmolalities

Feed-Medication Combinations	Mean Measured Osmolality (mOsm/kg)	Calculated Osmolality (mOsm/kg)
Fortified EBM* + 1mL D-Vi-Sol® (400 IU Vitamin D)	891	841
Fortified EBM + 1mL Polyvisol®	1033	1037
Fortified EBM + 0.13 mL Iron (15 mg elemental iron/mL)	442	403
Fortified EBM + 1mL caffeine(10mg/mL)	345	342
Fortified EBM + 1mL Phenobarbital(5mg/mL)	1176	1199
Fortified EBM + 0.27mL NaCl(2.5mmol Na/mL)	451	448
Fortified EBM + 0.1mL furosemide(10mg/mL)	399	386
Fortified EBM + 1mL Poly-Vi-Sol + 0.4mL NaCl + 2mg Fe	1219	1249

*expressed breast milk with Enfamil human milk fortifier 1 package:25ml

92
ONTOGENY OF PULMONARY SURFACTANT PROTEINS A AND B DURING THE PERINATAL PERIOD

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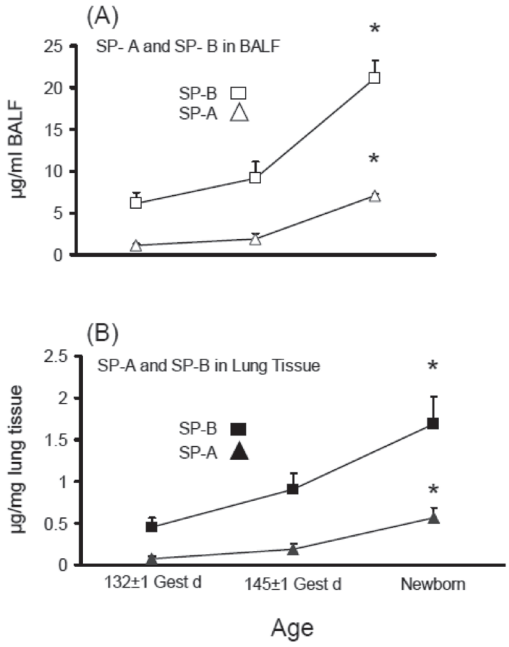
INTRODUCTION AND RATIONALE: Pulmonary surfactant, a developmentally regulated complex lipoprotein mixture, plays a critical role in establishing postnatal pulmonary gas exchange. The ovine model has been used extensively to investigate the physiological and cellular properties of lung surfactant. However, temporal quantitative analysis of surfactant protein A and B (SP-A and SP-B, respectively) during the perinatal period has not been performed.
OBJECTIVE: To elucidate the quantitative changes in pulmonary SP-A and SP-B during pre- and early post-natal periods.
METHODS: All studies were performed on time-dated fetal and newborn lambs (term = 147 d). Total protein (mg/mL) in bronchoalveolar lavage fluid (BALF), and SP-A and SP-B were measured in BALF (mcg/mL) and lung tissue (mcg /mg) at 132 (n=9) and 145 (n=6) gestational day (GD) and in the immediate newborn period (n=5). The animals were neither chronically instrumented nor had undergone acute or chronic experiments. Total proteins were measured using Lowry's method and ELISA was used to determine the quantitative concentrations of SP-A and SP-B.
RESULTS: Total protein levels in BALF were similar at the time points tested. No significant differences in SP-A and SP-B concentrations, in either BALF or lung tissue, were observed between 132 and 145 GD. However, SP-A and SP-B levels showed marked increase between 132 and 145 GD vs. the immediate newborn period in both BALF and lung tissue. * P<0.05 newborn period vs. 132 and 145 GD (Fig. 1).



CONCLUSIONS: Our data demonstrates a marked surge in SP-A and SP-B levels in both ovine BALF and lung tissue in the immediate newborn period. Our study provides the first quantitative data on the ontogeny of SP-A and SP-B in both BALF and lung tissues during the perinatal period.

93
DOES A MULTIDISCIPLINARY NUTRITION TEAM IMPROVE THE OUTCOMES OF INFANTS WITH SIMPLE OR COMPLEX GASTROSCHISIS?

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BACKGROUND: Gastroschisis (GS) impairs intestinal function causing feeding delays, parenteral nutrition (PN) dependence and increased

hospital stay (LOS). Due to these difficulties, and literature supporting a multidisciplinary nutrition team (MNT) approach, we instituted a MNT in the NICU for patients with GS, whom we categorized as simple (S-GS) or complex (C-GS) at birth.
OBJECTIVE: To determine whether a multidisciplinary nutrition team (MNT) improves outcome for simple and complex GS patients.
DESIGN/METHODS: Outcomes were collected for pre-MNT (2005-2006) and MNT (2007-2009) periods. C-GS was defined as intestinal complications (atresia, perforation, necrosis, volvulus) or delayed closure (>24h); S-GS defined as no complications and primary closure (<24h). Data was analyzed using Mann-Whitney U tests for continuous variables and tests for proportions where appropriate.
RESULTS: C-GS infants showed higher medical complexity than S-GS, in the pre-MNT period, with significantly increased LOS, PN days, and time to full feeds ($p<0.05$). C-GS infants also showed higher complexity than S-GS during the MNT period, with increased LOS ($p<0.05$). S-GS infants had significantly increased LOS, days to FF, and PN days during MNT period vs pre-MNT ($p<0.05$). C-GS infants showed a trend to reduced LOS and time to FF during MNT period. There were similar PN days in the two periods and 2 MNT patients went home on PN. The combined effect of PN and time to FF (MNT period) was reflected in a reduced LOS (11%). Both C-GS cohorts had 1 death; the pre-MNT death was at day 172 and the MNT death was 24h after first surgery and not influenced by MNT.
CONCLUSIONS: Implementation of a MNT appears to improve outcomes in C-GS, but the same conservative approach was not beneficial for S-GS. Categorization at birth helps predict outcomes (favorable/unfavorable) and appears to be a useful tool in determining the appropriate management for S-GC and C-GS.

Table 1: Demographics and Outcomes of Infants with Gastroschisis

	Simple		Complex	
	Pre-MNT (n=10)	MNT (n=14)	Pre-MNT (n=14)	MNT (n=18)
Gestational Age (wks)[1]	36 ±2	36±2	37±1	36±3
Birth Weight (g)[1]	2552 ±446	2603±537	2760±458	2369±458
LOS (d)[2]	32 (20-55)	47 (21-164)	84 (27-415)	75 (4-323)
PN (d)[2]	22 (15-47)	39 (17-145)	61 (15-293)	63 (4-309)
Time to FF(d)[2,3]	11 (6-24)	25 (10-128)	41 (6-332)	31 (16-293)
Cholestasis (%)[4]	30	50	64	67
Confirmed Sepsis (%)	30	29	64	78

[1]Mean ± SD; [2]Median (range); [3]3 infants not on FF at discharge (not included);
[4]Cholestasis=conjugated bilirubin >34umol/L (2mg/dL)

94
THE EVIDENCE-BASED PRACTICE FOR IMPROVING QUALITY (EPIQ) TRIAL: IMPACT ON EARLY NEONATAL MORTALITY

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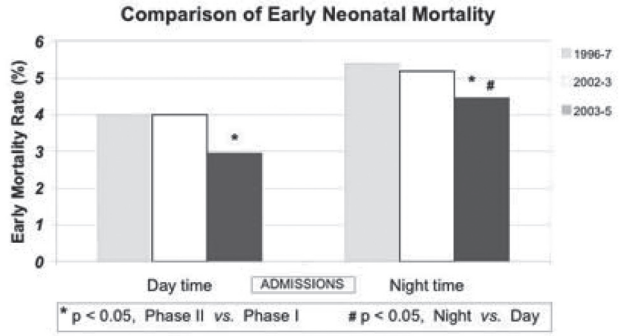
BACKGROUND: Previous data from the CNN showed a higher early neonatal mortality (death within 7 days of NICU admission) among inborn infants <32 weeks' gestation admitted at night (from 5 pm to 8 am) compared to daytime admissions. A cluster-randomized EPIQ trial was conducted in 12 of the CNN NICUs between Oct. 2002 and Sept. 2005 to target improvements in nosocomial infection and bronchopulmonary dysplasia (BPD). The results showed a significant decrease in BPD with EPIQ.
OBJECTIVES: We examined whether the EPIQ trial has affected early neonatal mortality.
DESIGN/METHOD: The first 12 months of the EPIQ trial constituted the baseline assessment and training period (phase I, 2002-3). In years 2 and 3 (phase II, 2003-5), rapid change cycles were used to introduce evidence-based interventions. Death was recorded a priori. Enrolled infants with incomplete admission data were excluded (n=104). Early neonatal mortality rate of 1618 infants from phase I was compared to that of 3813 infants admitted in phase II. Univariate analyses identified infant characteristics associated significantly with early neonatal death in phases I and II. A final multivariate logistic regression model was derived from the stepwise regression method and Akaike Information Criterion (AIC) to compare phase I vs phase II.
RESULTS: 945 (58%) and 2259 (59%) infants were admitted to NICU at night in phase I and phase II, respectively. The multivariate model showed that lower gestational age, higher SNAPII score, Apgar score <7 at 5 min and small for gestational age were independent predictors for early neonatal death ($p<0.05$). Antenatal corticosteroids and the inborn status were negative predictors for early death. Compared to infants admitted during day time, infants admitted at night had higher risk of early neonatal death for both phase I, odds ratio, 1.31 (95% CI, 0.81,2.11) and phase II, odds ratio, 1.53 (95% CI, 1.08, 2.19), despite a 14% decrease in early neonatal death rate in inborn infants in phase II.



CONCLUSION: The EPIQ trial significantly reduced early neonatal mortality in inborn infants. However, a discrepancy between daytime and night time admissions persists, with night time admissions showing a higher early neonatal mortality. This may be due to factors not addressed by the EPIQ trial.

95
PATENT DUCTUS ARTERIOSUS TREATMENTS AND NEURODEVELOPMENT OUTCOME AT 18 MONTHS

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INTRODUCTION: Patent ductus arteriosus (PDA) is a common complication of prematurity associated with short and long term morbidities. The optimal treatment for PDA remains controversial, and recent data suggests that PDA ligation is associated with both increased neurosensory impairments and bronchopulmonary dysplasia.
OBJECTIVE: To determine whether PDA ligation is associated with increased neurosensory impairment in ELBW infants.
METHODS: Retrospective cohort study of all infants admitted to our Neonatal Intensive Care Unit (NICU) (British Columbia's Women's Hospital) between 1999 and 2004, born with weight less than 801 g. Infants that developed PDA were divided in 4 groups based on the treatment they received: supportive treatment, indomethacin only, indomethacin treatment followed by surgical ligation and primary surgical ligation. The data was extracted from the hospital database and chart reviews. Exposure to PDA ligation was the variable of interest. We excluded all infant with congenital anomalies and those who died in the first 48 hours. Sequential multidisciplinary assessments were performed at 18 months corrected age in the Neonatal Follow up Program. For the data analysis we used descriptive statistics to determine incidence of neurosensory impairment and univariate analyses.
RESULTS: We studied a total of 143 infants with less than 801 g. Median birth weight and gestational age was 670 +/- 94 g and 25 +/-1.8 weeks. Incidence of PDA was 64.1% (91/142). 12 infants had no treatment, 31 received indomethacin, 42 received indomethacin followed by ligation and 8 infants had primary surgical ligation. A total of 109 infants survived the neonatal period and 88 were assessed at 18 months in the follow up clinic. Twenty infants developed CP (22.7%), 21 infants had an MDI less than 70 (27.6%) and 16 had a PDI less than 70 (26%). Eight infants had sensoryneural deafness requiring aids (9.3%) and 7 infants became blind (8.1%). Infants that were exposed to ligation (n=50) showed a trend towards a higher incidence of CP (19% vs 5%) and an MDI less <70 (16% vs 8%) than infants that were not exposed to surgical ligation (n= 43) ($p=0.07$).

CONCLUSION: We observed a high rate of PDA ligation in this population. There was a trend towards increased neurosensory impairment in infants exposed to ligation than those not. Further work is required to elucidate the role of PDA management.

96
INVASIVE GROUP B STREPTOCOCCAL INFECTIONS IN NEONATES AND FOETUSES

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BACKGROUND: Group B Streptococcus (GBS) remains a leading cause of neonatal infection.
OBJECTIVE: To evaluate the clinical impact of CDC-2002 prevention guidelines, to describe characteristics and outcomes of patients with neonatal GBS disease and to study foetal deaths secondary to GBS infection.
METHODS: Retrospective study of GBS perinatal infections recorded during two periods: 2000-2004 / 2005-2008. Infants younger than 6 months of age and foetuses with GBS positive cultures of blood, urine, cerebrospinal fluid or tissues were included. A total of 186 patients were eligible, 107 were excluded.
RESULTS: Overall, there were 79 infants. Median and range of ages were 1 day (1-6), 31 days (10-88) and 137 days (100-180), for early (EOD) -late (LOD) -and very late diseases, respectively.
Between the first and second studied periods, we observed a significant decrease of EOD (15 vs. 3 cases) p<0.005; OR 0.15 (CI: 0.04-0.57), however, LOD increased (23 vs. 33 cases), p<0.004; OR 5.17 (CI: 1.68-15.91). We also observed a decrease in bacteraemia p<0.02; OR 0.33 (CI: 0.12-0.86) while the rate of meningitis, urinary tract infection, pneumonia and osteomyelitis remained stable. Mortality rate was 6.3%; of survivors, 12.7% presented serious long term sequelae. Meningitis was more frequently diagnosed in premature than in term infants p<0.003; OR 4.46 (CI: 1.64-12.10), and leucopenia was significantly found in these cases p<0.001; OR 20.36 (CI: 4.98-83.29). Urinary infection was seen in term newborns p<0.017; OR 0.08 (CI: 0.01-0.63). EOD was associated with multiparity p<0.001; OR 16.79 (CI: 4.24-66.44), whereas LOD with primiparity p<0.001; OR 0.13 (CI: 0.05-0.39).
Median age of the 27 mothers who delivered infected foetuses was 30.5 years (17-42) and median gestational age was 22 weeks (17-38). Overall, 66.7% presented in the second study period. Median foetal weight of these foetuses was 401.9 gr (114-3645) and 59.3% were males. GBS was isolated from 76.2% of placentas and from body fluids or tissues biopsies for the remainder.
CONCLUSIONS: The observed changes in clinical presentation of GBS perinatal infections between the two studied periods suggest an improvement of adherence to intrapartum prophylaxis guidelines. We have no explanation for the increase of LOD. We noted an increase in foetal death; this is a group for which intrapartum antibiotics would not be effective, but potentially preventable by vaccination. Appropriate prophylactic interventions should remain a high priority to reduce the rate of perinatal GBS diseases.

97
GROWTH AND BODY COMPOSITION AMONG INFANTS WHO SURVIVE NECROTIZING ENTEROCOLITIS: FOLLOW-UP TO 2 YEARS OF AGE

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BACKGROUND: Infants who survive necrotizing enterocolitis (NEC) may be at risk of delayed bone development as well as osteoporosis during later life.
OBJECTIVE: To determine if growth and body composition, including lean and fat mass as well as bone mineral content (BMC), differ among infants who survive NEC compared to healthy controls at 24 months (mo) corrected age (CA).
DESIGN/METHODS: Using a case-control design, survivors of NEC (n=8) and healthy infants (CON) (n=10) matched for birthweight and gestational age (CON=1188±490g, 28±3wk; NEC=1140±491g, 29±4wk) were recruited by 4 mo CA. Weight, length and head circumference (HC) were measured at 4, 8, 12 and 24 mo CA and *z*-scores calculated. Nutrient intakes were determined at these times by 3 day food records. Body composition was measured at 12 and 24 mo CA by dual energy xray absorptiometry. Data were analyzed by Student's *t*-test and expressed as mean ± SD.
RESULTS: Body weight did not differ among groups at any time point. NEC infants were shorter (p<0.05) than CON infants at 12 months CA. HC was consistently smaller (p<0.05) at 4, 8 and 12 months of age in NEC group but was similar to CON group at 24 mo CA. NEC group had lower (p<0.05) *z*-score for HC for age only at 4 mo CA. Body composition at 24 mo CA did not differ between groups. Selected outcomes at 24 months are shown in Table.

Outcomes	CON	NEC	P value
BMC (g)	300 ± 37	282 ± 25	NS
BMC/Weight (g/kg)	25 ± 2.2	25 ± 2.9	NS
BMC/Length (g/cm)	3.44 ± 0.33	3.33 ± 0.35	NS
BMD (mg/cm²)	660 ± 40	600 ± 10	NS
% Lean Mass	87 ± 4	86 ± 1	NS
% Fat Mass	13 ± 4	13 ± 2	NS

CONCLUSIONS: Infants who survive NEC have compromised head and length growth in the first year of life. However, with close follow-up including nutritional support, by 2 years CA these growth differences do not persist, and body composition is similar between groups. Whether neuro-developmental outcomes differ at 24 months will also be determined.

98
MRSA IN THE NICU: AN UP-AND-COMING PATHOGEN

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BACKGROUND: Hospitalized neonates are at risk of the adverse consequences of MRSA colonization and infection. Risk factors for MRSA infection in the NICU include extreme prematurity, LBW, surgery and procedures such as central lines, ventilation and drains. The incidence of MRSA colonization and infection, and characteristics of MRSA infected neonates, has not yet been published to our knowledge with respect to a Canadian NICU.
OBJECTIVE: To determine the incidence of MRSA colonization and invasive infection in neonates admitted to the NICU at BC Children's Hospital from 1999 through 2008.
DESIGN/METHODS: The NICU database was searched for infants with at least 1 positive MRSA screening swab and/or other clinically obtained cultures positive for MRSA (including wound, eye/ear fluid, blood, urine, CSF, tracheal aspirates) from 1999-2008. A retrospective chart review of colonized and/or infected babies was performed, and cases of invasive infection were described.
RESULTS: MRSA colonization was highest in 1999 and lowest in 2001 [table 1] but has been increasing since 2005. The incidence of invasive infection varied yearly (0-50%), but remained between 31-42% over the past 3 years. Invasive infections varied from MRSA pustules/abscesses, infected surgical wounds, pneumonia, osteomyelitis, bacteremia to overwhelming sepsis. Infants with invasive infection were 28+5 wks GA, BW was 1222g, and LOS was 102 days (means). Nine of 35 babies with MRSA infection underwent a recent surgical procedure prior to onset of infection. MRSA was implicated in the cause of death in 5 babies; 4 were born at <26 wks GA, and one was born at 33wks with a congenital neurologic disorder.

The incidence of MRSA colonization and invasive infection in colonized babies per year in the NICU

Year	Total admissions	No. colonized	Incidence colonization (%)	No. with infection	Incidence of infection (%)	No. deaths
1999	620	40	6.5	14	35	3
2000	609	4	0.7	1	25	0
2001	569	1	0.2	0	0	0
2002	585	8	1.4	1	12.5	0
2003	627	7	1.1	1	14	0
2004	635	12	1.9	6	50	1
2005	625	4	0.6	0	0	0
2006	663	6	0.9	2	33	1
2007	655	12	1.8	5	42	0
2008	653	16	2.5	5	31	0

CONCLUSIONS: MRSA infections appear to have caused a great degree of morbidity for neonates in the NICU, and were directly linked to mortality for 5 babies in this study. MRSA colonization has been rising, and infection will likely become an increasingly important cause of morbidity in Canadian NICUs.

99
TRANSFUSION RELATED LUNG INJURY IN THE NEONATAL POPULATION

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INTRODUCTION: Transfusion related lung injury, or TRALI, is a distinct transfusion related complication. Recently it has been recognized, that transfusion of blood products to critically ill patients increases the chance of acute lung injury. Whether similar injury occurs in the ill neonate is not known but potentially has not been recognized because of the existence of concurrent disease. We hypothesized that TRALI occurs in neonatal populations.

METHODS: A retrospective review of changes in the level of pulmonary support following transfusion in neonates requiring intensive or intermediate care. Data were collected from the periods 6 hours before transfusion, during, 0 to 6 hrs, and 6 to 18 hours after transfusion. Each transfusion was considered separately. Possible TRALI was considered to be present if (compared to the pre transfusion period) there was an increase in the highest mean airway pressure (MAP) of >= 2 cmH_2O or FiO_2 >0.15 in the 6 hours after transfusion which persisted 6-18 hours post transfusion.

RESULTS: We analyzed 408 transfusions given to 117 infants (74 VLBW). 359 (88%) transfusions were packed red blood cells, 37 (9%) platelets, 6 (2%) fresh frozen plasma and 6 (2%) exchange transfusion. Possible TRALI occurred following 32 (7.8%) transfusions in 24 patients. During the first 6 hours after transfusion, FiO_2 or MAP was increased in 51 transfusions (12.5%) and the changes persisted in 32 transfusions (7.8%). Infants who developed TRALI were less mature (27.1±0.7 vs. 30.8±0.5 wks; p=0.005) and of lower birth weight (1004±106 vs.1654±96 g; p=0.001), Gender, postnatal age (20.4±2.4 vs. 16.7±0.9 days; p=0.109), presence of a PDA and diuretic use during transfusion were not different between those with or without possible TRALI. Type of blood product was not associated with risk of possible TRALI. Infants who developed possible TRALI using this definition were more likely to develop NEC (6/24 vs. 4/93; p=0.001) and die within 24 hours of transfusion (5/24 vs. 3/93; p=0.002).

CONCLUSIONS: In neonates requiring intensive or intermediate care, blood transfusion was associated with need for increased respiratory support (Possible TRALI) in a significant number of cases. Whether these cases represent true TRALI cannot be determined from this study.

100
THE MODALITY OF TPN ADMINISTRATION MODULATES THE OXIDANT STRESS INDUCED BY TRANSFUSIONS RECEIVED EARLY IN LIFE BY PRETERM INFANTS

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BACKGROUND: In preterm infants, the risk of receiving red blood cell transfusions (Tx) is the highest in the first 2 weeks of life. Oxygen, TPN and Tx represent sources of oxidant stress associated with increased risk of later developing BPD. Photo-protection of TPN or co-administration of parenteral multivitamins (MVP) with the lipid emulsion (LIP) both decrease the generation of oxidants such as peroxides.

HYPOTHESIS: The mode of TPN delivery modulates the effect of transfusions on the redox state of premature infants during the first 2 weeks of life.

OBJECTIVE: To evaluate the role of transfusions on the oxidant status of premature infants receiving TPN.

METHODS: Preterm infants were randomized to receive from birth one of 3 TPN solutions differing by the mode of delivery, but providing the same nutrient intakes. AA: MVP+ amino acid/dextrose exposed to ambient light, with LIP provided separately (n=16); LE: MVP+LIP exposed to light, with amino acid/dextrose provided separately (n=16); LP: MVP+LIP protected from light (n=19). Upon reaching full TPN, blood was sampled on days 7 (S1) and 10 (S2) to measure the redox potential of glutathione (E, mV). Data (mean±sem) for E were compared by ANOVA in infants requiring low (<0.25) vs high (>=0.25) FiO_2, sampled before or after transfusions [oxygen × transfusion × (AA vs LE vs LP)]. S1 and S2 were treated as separate data sets since transfusion and oxygen variables differed between these time points.

RESULTS: Patients in all 3 groups had similar clinical characteristics: birthweight: 775±22 g; gest.age: 25.6±0.1 wk; TPN days: 13±4 d; illness severity score: 18±2; samples collected post Tx: AA= 18/30 (60%), LE= 17/31 (55%), LP= 21/38 (55%). In LP, transfusions induced a more oxidized state (no Tx: −198±0 vs Tx: −194±−2 mV, p<0.01). In AA, FiO_2 >=0.25 induced a more oxidized state (low: −199±0 vs high FiO_2: −190±−2 mV, p<0.01). In LE, neither oxygen nor transfusion affected significantly the redox state (average: −193±−1 mV).

CONCLUSION: The absence of effect of oxidants in LE suggests a protective effect or conversely an original status that is initially already oxidized. Transfusions can induce an oxidant state early in life in premature infants. The mode of TPN administration modulates this source of oxidant stress.

101
THE BAYLEY SCALES OF INFANT AND TODDLER DEVELOPMENT IN EXTREMELY LOW BIRTH WEIGHT SURVIVORS AT 18 MONTHS CORRECTED AGE

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BACKGROUND: The Bayley Scales of Infant and Toddler Development 3rd edition (Bayley-III) introduced new composite scores (Cognitive, Language and Motor scales) with subtest scores for Receptive (RC) and Expressive Communication (EC) and Fine (FM) and Gross motor (GM). The Bayley 1st (1969) and 2nd Ed. (1993) results are expressed as a Mental (MDI) and a Psychomotor Development Index (PDI).

OBJECTIVE: Describe Bayley-III, Bayley-II and Bayley-I results on a cohort of extremely low birth weight (ELBW) (<800 gram birth weight) children seen at 18 months corrected age.

DESIGN/METHODS: Non-impaired toddlers free of severe cerebral palsy (CP), visual impairment (VI) and able to complete test items and score 50 (low score) seen in a Neonatal Follow-Up Program between 1984-2009 were included. Bayley-I was used 1984-1993, Bayley-II 1994-2006, Bayley-III Mar 2006-Sept 2009. Paired T-tests were used to compare Bayley-III profiles.

RESULTS:

Results of Bayley Assessments

Bayley Version Median MDI (Range) Median PDI (Range) Median Cognitive (Range) Median Language (Range) Median RC /EC Median Motor (Range) Median FM/ GM

Bayley-I 96 (50-150) 91 (50-141)

Bayley-II 91(50-119) 87 (50-110)

Bayley-III 100 (70-125) 89 (62-127) 8/8 94 (61-115) 10/8

During period 1 (1984-1993) there were 201 subjects: 22 were excluded (14 CP, 12 VI, 10 low score). Included subjects (n=179) had a median birth weight (bwt) of 720 g (range 480-800 g) and median gestational age (GA) of 25.7 weeks (range 23-33). Period 2 (1994-2006) had 203 subjects: 40 excluded (8 CP, 11 VI, 24 low score) leaving 163 with a median bwt of

700 g (425-800 g) and GA 25.7 wks (range 22-32). Period 3 (2006-2009) had 98 subjects: 6 excluded (5 CP, 3 VI, 1 low score) leaving 92 with a median bwt of 658 g (range 385-800 g) and GA 25 wks (range 23-29). Bayley-III Cognitive scores were higher than Language and FM > GM (both p < 0.0001). RC=EC.

CONCLUSIONS: In ELBW subjects, Bayley-I MDI and PDI scores are higher than Bayley-II scores consistent with the literature. The Bayley-III profile of Canadian non-impaired ELBW infants show better cognitive vs language and better fine vs gross motor skills. Several studies have shown worse cognitive outcomes in ELBW than term control subjects so the median cognitive score of 100 highlights that results should be verified against Canadian term controls.

102

RATES OF NEC PRE AND POST INFECTION PREVENTION AND CONTROL MEASURES FOR AN S AUREUS OUTBREAK IN AN NICU

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BACKGROUND: Necrotizing enterocolitis (NEC) is a complex multifactorial illness of unclear etiology affecting the gut of premature infants. Most cases are sporadic, but outbreaks do occur, suggesting an infectious cause. No specific infectious organism has been linked to epidemic NEC. We recently experienced an outbreak of methicillin-sensitive S. Aureus in our inborn combined level 2 and 3 Neonatal Intensive Care Unit (NICU). Infection prevention and control measures were progressively implemented to control the outbreak. Subsequently, we observed that our incidence of NEC seemed to have decreased.

OBJECTIVE: To compare the incidence of NEC before and after the S. Aureus outbreak and the implementation of enhanced infection prevention and control measures in our NICU.

DESIGN/METHODS: A retrospective chart review of all cases of NEC (Bell stage ≥ 2 or treated for ≥ 7 days) in infants < 30 weeks or < 1500 g at birth during 3 time periods: period 1 (before the outbreak; January to September 2007); period 2 (during the outbreak, with enhanced infection prevention and control measures; October 2007 to February 2008) and period 3 (after the outbreak; March to December 2008). An unadjusted analysis of the primary outcome (incidence of NEC) was carried out using Fisher's exact test.

RESULTS: 182 infants were admitted during the study period: 110 in period 1, 54 in period 2, and 118 in period 3. Mean gestational age +/- standard deviation (SD) was 27.9 +/- 2.5 weeks in period 1, 28.0 +/- 2.9 weeks in period 2, and 28.1 +/- 2.9 weeks in period 3. Mean birthweight +/- SD was 1031 +/- 289 g in period 1, 1036 +/- 277 g in period 2, and 1027 +/- 298 g in period 3. The incidence of NEC was 25/110 (22.7%) in period 1, 4/54 (7.4%) in period 2 and 7/118 (5.9%) in period 3. The incidence was significantly lower in period 3 than in period 1 (p<0.001).

CONCLUSION: Enhancing infection control and prevention measures, including good hand hygiene practices, avoidance of overcrowding, enhanced housecleaning measures and reduced cluttering in our NICU during a S. Aureus outbreak was associated with a significant decrease in the incidence of NEC in a population at risk.

103

TEMPERAMENT AS A PREDICTOR OF NUTRITION RISK IN PRE-SCHOOL CHILDREN

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BACKGROUND: Early identification of young children at high risk for nutrition disorders (such as underweight, overweight, micronutrient deficiencies) may lead to opportunities for preventive interventions.

OBJECTIVE: To assess the relationship between child temperament and nutrition risk in preschool aged children.

METHOD: A cross-sectional, prospective observational design was used. Healthy children 1-5 years attending well-child visits were recruited between Sept 2008 and Sept 2009 through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. Child's nutrition risk was assessed using the Nutrition Screening Tool for Every Pre-schooler Questionnaire (NutriSTEP) with categories: low, moderate and high nutrition risk. Child's temperament was assessed using the Child Behaviour Questionnaire (CBQ) with subscales: Surgency, Negative Affect, and Effortful Control. Logistic regression was used to assess the relationship between each temperament subscale and the three nutritional risk subgroups.

RESULT: 1517 children were recruited, mean age was 32 months and 757 (50%) were male. Nutrition risk categories were: low n=1331 (88%); moderate n=121 (8%); high n=65 (4%). There was no association between nutrition risk and temperament subscales Surgency and Effortful Control. However, the Negative Affect subscale was highly associated with nutrition risk (p<0.001). The mean (SD) Negative Affect score was: children at low nutrition risk 3.57 (+ 0.87) vs high nutrition risk 4.32 (+ 0.93). The age adjusted odds of high nutrition risk increased by 2.2 (95% CI: 1.6-2.9) for each point increase on the 7 point Negative Affect scale. Furthermore, age adjusted odds of high nutrition risk was 4.5 times greater for children in the 4th quartile of the Negative Affect scale relative to children in the 1st quartile.

CONCLUSION: The Negative Affect subscale includes items relating to anger, frustration, discomfort, fearfulness, sadness and difficulty with soothability. Clinicians may identify children at highest risk for nutritional disorders when obtaining a history of a temperament compatible with Negative Affect. This may guide clinical decision making, for example laboratory testing, counseling interventions, close monitoring.

104

ELEMENTAL FORMULA DIET IN AUTISTIC CHILDREN

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BACKGROUND: Autism is a complexed neurodevelopmental-neurobiological disorder of behaviour, which is characterized from loss in three domains: social behaviour, status of contact-speech, interests. Also, autistic children have a strong hyperactivity status and many nutritional problems.

OBJECTIVES: The investigation of the correlation of the autistic children's hyperactivity status with major nutritional changes using elemental formula diet and testing these children for food allergies using Rast/Cap IgE tests.

DESIGN/METHOD: A total number of 45 children aged 2.5 to 8 years were checked. All of them were diagnosed with pervasive developmental disorder (international criteria 1994). Also, all these children were checked for food allergies. From the 45 children, 17 were found having positive Cap IgE tests for cow milk allergy (class 1-3) and 3 of the 17 children had multinutritional allergy. Further, the 17 children group was randomly divided in two subgroups, 9 of the children started elemental formula (containing free aminoacids-Neocate®) diet with exclusion of all milk products or milk containing food (group A) and the rest 8 children continued their previous diet (group B). The other 28 children group was also randomly divided in two subgroups, 13 children started elemental formula (containing free aminoacids-Neocate®) diet with exclusion of all milk products or milk containing food (group C) and the rest 15 children continued their previous diet (group D). Statistical analysis was performed using SPSS 14.0 statistical software. The study was accepted by the hospital ethics committee.

RESULTS: After 4 months of observation, statistical significant differences (p<0.001) were found in hyperactivity status (measured using properly arranged questionnaire model and special scoring system for the therapist and the parents) between groups A and B, also between groups C and D, even comparing A+C to B+D groups. Also children in groups A and C showed significant clinical improvement compared to groups B and D.

CONCLUSION: Children suffering from pervasive developmental disorder have increased hyperactivity status but it seems that oligoantigenic diet have much to offer in order to lower hyperactivity levels, not only in autistic children with proven food allergy, but in all of them.

105
PROLONGED BOTTLE USE AND NUTRITION RISK: A TARGET KIDS! STUDY

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BACKGROUND: Prolonged bottle use has been associated with iron deficiency. It is not clear whether prolonged bottle use is associated with nutrition risk. The Nutrition Screening Tool for Every Preschooler (NutriSTEP) was developed to identify preschoolers at high nutrition risk, and was validated against a registered dietitian's assessment.

OBJECTIVE: To determine if bottle use beyond 2 years is associated with nutrition risk as identified by NutriSTEP.

DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children 2-5 years attending well-child visits were recruited between Sept 2008 and Sept 2009 through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. The NutriSTEP questionnaire along with a questionnaire on parent and child lifestyle factors was administered. Prolonged bottle use was defined as bottle use (daytime or nighttime) beyond 2 years of age. The primary outcome was nutritional risk as defined by NutriSTEP score > 25.

RESULTS: 1006 children between 2 and 5 years were recruited. Mean age was 44 months, 501 (50%) were male and 234 (15%) were using a bottle. Compared to children not using the bottle, those using the bottle were younger (40 vs. 45 months, $p < 0.0001$), were of similar sex (54% male vs. 49%, $p = 0.26$), and had similar level of maternal education (88% with postsecondary degree vs. 90%, p=0.31). Children with vs. without prolonged bottle use had a mean NutriSTEP score of 16 vs. 14, $p < 0.0001$. Age adjusted odds of nutrition risk among children with vs. without prolonged bottle use was 1.8 (95%CI 1.05-3.2). For children using the bottle at nighttime beyond 2 years vs. children without prolonged bottle use, the age adjusted odds of nutrition risk was 4.2 (95% CI: 2.3-7.7). For children with prolonged bottle use vs. children who had never used a bottle (breast to cup) the age adjusted odds of nutrition risk was 6 (95%CI 1.4-26).

CONCLUSIONS: Bottle use beyond 2 years is associated with nutrition risk. Nutritional counseling in addition to bottle cessation should be considered for children with bottle use beyond 2 years.

106
THE USE OF A VALIDATED DIETARY DIVERSITY QUESTIONNAIRE TO ASSESS DIETARY INTAKE AND HABITS OF ORPHANED YOUTH IN KAMPALA, UGANDA

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BACKGROUND: For more than 4 years, since 2007, The Brighter Smiles Africa Program has partnered with the African Hearts Community Organization (AfriHCO) in Kampala, Uganda. AfriHCO provides accommodation, food, schooling and a stable environment for more than 60 male street youth/AIDS orphans between 6 and 19 years of age. Nutrition education for the youth was requested as part of our 2009 project in Uganda. Our purpose was to evaluate the youth's current food intake and dietary habits, to collect baseline information and to provide nutrition education.

METHODS: A 24 hour validated dietary recall instrument was used. The questionnaire collects information on nutritional adequacy by asking about dietary diversity. We consulted with AfriHCO's director to include local Ugandan foods in our survey instrument. Boys interested in participation were interviewed individually after providing written informed consent.

RESULTS: 41 boys participated in this study. Of 16 boys living at AfriHCO's Kampala home (KH), 11 residents were interviewed. The remaining 30 participants receive assistance from AfriHCO but live in the surrounding area. The reported intake reflected a usual day in terms of the type and quantity of food consumed by 78.0% of participants. Each individual's dietary diversity score was calculated based on suggested food groupings, with a maximum score of 14. The average dietary diversity score was 5.6, with KH residents having a slightly higher score than non-residents (6.2 vs. 5.4). Common foods consumed included rice, bread, matoke (green plantain), beans, added oils, fats and sweets. Food group analysis showed that 65.9% of the boys consumed either plant or animal-based food groups high in vitamin A. Only 48.8% of boys reported consumption of iron-rich food groups. Education on how to improve nutrition was provided while in Uganda and a summary document was prepared upon return to Canada. Recommendations included an increase in the variety of foods consumed and the consideration of creating household garden projects.

CONCLUSIONS: Energy intake among the boys interviewed did not seem to pose a serious concern in terms of weight status. However, a lack of dietary diversity could place them at risk of nutrient deficiencies. The dietary diversity questionnaire acted as a quick, easy and objective way of identifying potential nutritional concerns. Our findings helped guide nutrition education and have the potential to evaluate changes over time.

107
NUTRITIONAL STATUS OF PATIENTS IN A TERTIARY CHILDREN'S HOSPITAL

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BACKGROUND: Nutrition is a fundamental aspect of pediatric care and prevention and treatment of malnutrition should be a priority. Unfortunately the prevalence of malnutrition remains high in hospitalized patients.

OBJECTIVES: To assess the nutritional status of patients hospitalized in various units of a tertiary children's hospital on admission, and its evolution during the hospital stay.

METHODS: The charts of all the patients hospitalized in a tertiary children's hospital on a weekday were reviewed. Admission diagnosis, underlying diagnosis, nutritional risk factors, surgeries, weight and height on admission and during the hospital stay were recorded; hemoglobin, serum albumin level and nutritional intervention were reviewed.

RESULTS: One hundred fifty four patients were in the hospital (neonatal and pediatric intensive care units were excluded) on that day, 40 on the surgery ward, 46 on pediatric ward, 18 on the hematology ward, 20 on the adolescent ward, 10 on the psychiatry ward and 20 on the specialty ward. Mean age was 7.9 years (18 d-19.3 y). Length of hospital stay was 20.3 days (1-207 d). Weight on admission was available in all patients and height was available in 88 (57%). Mean weight Z-score on admission was –0.43. Mean height Z-score was –0.43. Among the 136 patients who had been in the hospital for > 24 hours, 97 (71.3%) had been reweighed. Weight Z-score had gone down to –0.56. One or more nutritional risk factors were present in 98 patients (63%), of whom 41 (42%) did not receive any nutritional intervention. Albumin was available in 64 patients and was low in 69% of them. Hemoglobin was available in 137 patients and was low in 45% of them.

CONCLUSION: While patients are weighed on arrival, they are often not measured and often not reweighed during the hospital stay. The documented weight loss during hospital admission is indicative of deteriorating nutritional status in some patients. Presence of nutritional risk factors was common but nutritional intervention was often not offered. We think that nutritional care could be improved, possibly by instituting a universal nutritional risk-screening tool on admission and systematic reassessment in patients at risk.

108
CAREGIVERS' PERCEPTION OF CHILDHOOD OBESITY AND FOOD SECURITY: DOES IT MATTER WHERE YOU LIVE?

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BACKGROUND: Studies have consistently shown an incongruity between the overweight child and their parent perceiving them as such. To

our knowledge, this has not been studied in urban compared to rural communities in Canada where variable access to a recommended diet may play an important role.

OBJECTIVES: To explore caregivers' perceptions of their preschool child's weight status and of their level of food security, in both rural and urban communities in Northwestern Ontario.

DESIGN: A 19-question survey was given to caregivers of preschool children who were attending a well-child visit with their physician, or for a dental procedure. Caregivers were asked to classify their child as underweight, the right weight, or overweight. The child's BMI was calculated and compared to the WHO and the CDC's growth standards with overweight defined as >= 85th% and obese as >= 95th%. Food security was studied using the Household Food Insecurity Access Scale, from the Food and Nutritional Technical Assistance Project, which is a set of 9 questions that distinguishes food insecure from food secure households across different cultural contexts.

RESULTS: The mean age of the 102 participating children was 53.2 ± 10.88 months. This included 50 females and 52 males, of whom 52 were rural and 50 urban-dwelling. The rural and urban differed in weight (p=0.04), BMI (17.9 ± 3.20 vs 16.7 ± 2.04) (p=0.02), CDC BMI Z-score (1.10 ± 1.24 vs 0.65 ± 1.07) (p=0.048), ethnicity and education. Although 46.1% of all the children were overweight or obese, caregivers perceived that 7.8% were overweight and 81.4% were normal weight. Amongst the overweight or obese children, 85.1% were perceived to be normal weight. In addition to actual weight status, accuracy of the caregiver's perception of weight status was influenced by the dwelling location and caregiver education. In all, 69.6% had food security, whereas 9.8% had mild, 16.7% moderate and 3.9% severe food insecurity. These were correlated to education (p<0.001), weakly to location (mean rural: 2.17 ± 3.91 vs urban: 0.98 ± 2.33) (p=0.06), and not to the CDC BMI Z-score (p=0.17). The severely food insecure all lived in a rural community.

CONCLUSIONS: Childhood obesity and food insecurity are more prevalent in rural communities. Overweight status is exceedingly misperceived by caregivers in both rural and urban communities. To be successful, obesity prevention programs should focus on obesity awareness among caregivers and on improving food security, especially in rural communities.

109
VISUAL OUTCOMES OF PRETERM INFANTS WITH RETINOPATHY OF PREMATURITY

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BACKGROUND: Retinopathy of Prematurity (ROP) may have negative effects on the eye structure and refractive error which could be prevented if optimal laser treatment was provided.

OBJECTIVE: To examine the prevalence of visual morbidities and their determinants in children who had ROP.

METHODS: Retrospective cohort study with prospective visual follow up to 36 months corrected age including all infants admitted to NICU weighing 1250 g and/or born 28 weeks at Calgary Health Region, AB, Canada, between 1996 and 2004. Infants with congenital anomalies or who died before final assessment were excluded. The screening, staging and laser therapy of ROP was carried out as per the Canadian Screening Guidelines, International Classification and Early Treatment of ROP, respectively. The primary outcome is visual morbidity defined as any of the following: impaired visual acuity, abnormalities of refraction, ocular motility or ocular structure.

RESULTS: Of the 1065 infants included, 311 were either missing or didn't have their final assessment. Of the remaining 745, 50% had no ROP, 32% had mild ROP (<stage III) and 18% had severe ROP (stage III, plus or zone I disease). Maternal variables were not different except in percentage of Caucasian and antenatal steroid were significantly lower in the severe ROP group. Infant's morbidities were significantly increased in the severe ROP groups. Laser therapy was done in 2% of infants with mild ROP, 78% with severe ROP. Overall visual morbidity was significantly increased in children with severe ROP (41% vs. 11% and 7% in the no and mild ROP groups, respectively) even after stratification to each component of visual morbidity. This group also received more ocular surgical treatment and had more blindness. Adjustment for gestation and laser treatment did not affect the outcome results.

Visual Morbidities at 36 Months Corrected Age

Visual outcomes	No ROP	Mild ROP	Severe ROP
Normal %	93.8	88.8	84.4
Impairment %	5.7	10.2	8.3
Blindness %	0.5	1	7.3
Total Visual morbidity % *	**7**	**11**	**41**
Impaired visual acuity %**	2.2	3.1	15.6
Impaired refraction %	4.9	6.6	33
Impaired ocular motility %	1	6.1	12.8
Ocular structural abnormality %†	0.5	1	5.5
Treatment other than laser %	4	4.6	29.4

* Over all visual morbidity not including visual impairment or blindness ** Not to the level of impaired vision or blindness †Not retinal

CONCLUSIONS: Severe ROP is associated with significant visual morbidities at 36 corrected age even if laser therapy was done.

110
REGIONAL MIGRATION PATTERNS OF YOUNG FAMILIES WITH COMPLEX CHRONIC CONDITIONS

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BACKGROUND: Caregiving for children with complex chronic conditions (CCCs) can lead to financial strain and compromised family well-being, particularly for those who live far from care. Little is known about whether these stresses lead to changes in migration patterns as they relate to income adequacy and proximity to care.

OBJECTIVES: To compare the migration patterns and associated changes in family income of children with CCC and other chronic diseases compared with healthy children.

DESIGN/METHODS: Cohort study of newborns in a universally insured population (Ontario, Canada) from 1998-2003 and followed for 5 years. CCCs were identified using diagnostic codes, and divided into those affecting one or multiple organ systems. Comparison cohorts included: 1) very low birth weight (VLBW) infants with no CCC; 2) asthma/recurrent wheeze (A/RW) without VLBW/CCC; and 3) healthy children. Migration was defined as a change in neighbourhood (postal code) by age five. Decreased socio-economic status (SES) was defined as a drop in neighbourhood income quintile. Movement closer to care was defined as migration to < 80 km from a children's hospital among those living > 80 km. Multivariate logistic regression adjusted for gender, rurality, birth neighbourhood income quintile, and hospital distance.

RESULTS: Of 324,380 children studied, 3178 (0.9%) had multiple organ CCCs, 7326 (2.2%) single organ CCCs, 1539 (0.4%) VLBW, and 49,383 (15.2%) A/RW. Changes in postal code in the first five years of life occurred in 62.8% of multiple CCCs, 61.8% of single CCCs, 61.4% of VLBWs, 60.2% of A/RW, and 59.4% of healthy controls. All children with chronic diseases were more likely to migrate compared with controls [multiple CCCs (AOR 1.19, 95% CI: 1.1-1.3), single CCC (AOR 1.15, 95% CI: 1.1-1.2), VLBW (AOR 1.11, 95% CI: 1-1.2), asthma (AOR 1.06, 95% CI: 1-1.1)], but the strongest association with migration was low birth income quintile (AOR 2.7, 95% CI: 2.6-2.8). Chronic disease cohorts were also more likely to have a drop in SES than controls with the strongest association for multiple CCCs (AOR 1.19, 95% CI: 1.1-1.3). No significant differences in migration to close hospital proximity were found in any groups.

CONCLUSIONS: Migration is more common in early life in chronic disease populations and in those with low SES. Those children with medical and social vulnerabilities who are at greatest need of coordinated care in a Medical Home are likely at highest risk of discontinuity of care.

111
'SOCIAL PEDIATRICS': A PILOT STUDY ON HEALTH SERVICES DELIVERY FOR VULNERABLE INNER CITY CHILDREN & FAMILIES

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BACKGROUND: Despite technological advances and new treatments for neonatal and paediatric health conditions, children and youth who are vulnerable because of their material and social circumstances remain the most likely to manifest delayed development and poorer health. Lack of access to appropriate health care further compounds these vulnerabilities and has been identified as an ongoing challenge in both urban and rural settings.

OBJECTIVES: (1) to develop an integrated health model for a historically disenfranchised inner city pediatric population that can coordinate with and complement existing community health services: (2) to gain knowledge on ways to foster intersectoral engagement in design/delivery of this model and inform clinical practice education; (3) to identify indicators of accessibility, responsiveness and effectiveness; and (4) to identify key elements for use in other community settings where there are similar inequities an access to paediatric services.

METHODS: This study received ethical approval from both our university and provincial/regional health authority review boards. A participatory case study design informed by critical theoretical perspectives was employed to capture different cultural and community perspectives and forms of knowledge. The structure and design included both a sampling strategy with a community based facilitator and formation of community advisory committee to foster unbiased and inclusive participation.

RESULTS: Our research identified both structural and social barriers to access. By enacting an engaged outreach approach that linked 'in' and 'across' health services, the importance of child development and social determinants of health were identified. A series of key "universal" indicators were explicated, including the density of chronic health impairments, disparate developmental trajectories, social determinants for both child and family, exposures to adverse childhood experiences (ACEs), and inefficiencies of services for vulnerable families. As a result, we have initiated a shared care, integrated health network model of service delivery using an interdisciplinary electronic patient record. This will help capture outcomes (vs. outputs) and profile the density and complexity of need and responsiveness to children's health and development.

DISCUSSION: This pilot study has enabled us to develop an expanded research grant for a CIHR: Partnerships for Health Services Innovation Grant which will allow us to: 1) further refine the model, as partnerships develop and diversify; 2) measure parents' perspectives of access and responsiveness; and 3) appraise the impact of the model on 'at risk' children's health, development and health care access by tracking community and child focused indicators identified in this pilot study.

ABSTRACT PRESENTATION A (NEONATAL) PRÉSENTATION D'AFFICHES A (NÉONATALE)

112
MOTHERS EXPECT MORE THAN INFORMATION FROM THE PRENATAL CONSULTATION FOR PRETERM LABOUR

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INTRODUCTION: Recommendations about prenatal counseling, drawn from expert medical opinions, emphasize informing parents about prematurity. However, literature regarding parents' perspectives lacks.

OBJECTIVE: To evaluate mothers' expectations from the prenatal consultation by a neonatologist.

METHODS: In a previous study, exploratory interviews were conducted with mothers at risk of premature delivery; this data was used to construct a survey. Construct validity was verified by sending the survey back to the women interviewed. Content validity was assessed by presenting the tool to a group of experts and then testing it on 7 women hospitalised for preterm labour. Some changes were brought to the tool. The final survey (consisting of 66 items) was then distributed to mothers hospitalized for preterm labour, within 72h of their meeting the neonatologist, between February 2008 and November 2008.

RESULTS: During the study period, 70 surveys were distributed and 51 were completed. After meeting the neonatologist, women reported feeling concerned and anxious, but also reassured by the consultation. The complications of prematurity (46.4%) and the mother's roles as both decision maker (19.8%) and caretaker (11.9%) were the most important themes to address. Although complications of prematurity were discussed in 81.3% of consultations, mothers' roles as decision makers were addressed only 23% of the time. Most women wanted to visit the NICU (70.6%), but only 12.8% of couples were offered this. Although many women wanted their spouse to be present during the consultation (77.6%), this happened only half the time (51%). Almost all women surveyed (90%) wanted written information about the complications of prematurity and how the NICU functions. They often suggested they should be offered such documentation before the consultation, to help them prepare for the meeting and ask questions relevant to them.

CONCLUSION: Women anticipate discussing a variety of themes during the prenatal consultation for preterm labour, such as complications of prematurity, and they are reassured by being informed about their situation. They also expect to be more empowered by asking questions which are important to them and discussing what roles they will play as parent or decision maker. They would benefit from being prepared for the consultation by receiving documentation beforehand and by planning to meet the neonatologist with their spouse.

113
IMPLEMENTING PRACTICE CHANGE: WHAT EDUCATIONAL METHODS ARE EFFECTIVE?

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BACKGROUND: Effective knowledge translation (transfer of new information into practice) requires educational methods that engage and motivate busy clinicians, including trainees. It is unclear what methods are most useful and effective.

OBJECTIVE: To determine the educational tools that were most useful when new clinical recommendations were implemented.

DESIGN/METHODS: In 2009, recommendations for investigation and management of infants at risk of sepsis, published by the Canadian Paediatric Society (Paediatr Child Health 2007;12:893), were implemented at our hospital. A multifaceted approach was used to educate neonatologists, paediatricians, family physicians, neonatal fellows, paediatric residents, nurse practitioners, respiratory therapists, nurses and midwives. Educational tools included 10 interactive seminars, a user-friendly web-based tutorial, written material (position statement and summary of recommendations), pocket cards and a web-based reference module providing real-time guidance for infant management. At each seminar, participants completed a feedback form that included 3 questions assessing knowledge of the recommendations. Three months after implementation, a web-based survey that included the same 3 questions was sent to 41 front-line staff physicians and trainees. Compliance with the recommendations was assessed by chart audit for a 3-month post-implementation period.

RESULTS: Ninety-two seminar participants completed feedback forms. Content was helpful to 97% and 88% were comfortable using the new recommendations. Response rate for the 3-month survey was 71%. The most frequently used educational tools were pocket cards (77%), seminars (74%) written summaries (52%), and CPS statement (45%). Only 1 respondent used the web tutorial and 4 used the reference module. The most useful tools were pocket cards and seminars; 77% continued to use the card. There was no significant difference in the percent of correct responses after the seminar and at 3 months ($p>0.05$), as shown in the table. Post-implementation compliance with the recommendations was 83%.

CONCLUSIONS: Pocket cards plus seminars were useful and effective educational methods for implementing new clinical recommendations, with little loss of knowledge at 3 months. Self-directed web-based tools

were rarely used. Simple, readily available tools are likely preferred by busy clinicians. Further work is needed to determine knowledge retention past 3 months.

Question #	1		2		3	
	seminar	3 mos	seminar	3 mos	seminar	3 mos
% correct response	91%	96%	80%	67%	73%	71%

114

MANAGEMENT OF INFANTS AT RISK OF SEPSIS: DOES IMPLEMENTATION OF RECOMMENDATIONS HAVE CLINCAL IMPACT?

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BACKGROUND: In 2007, Canadian Paediatric Society (CPS) published recommendations that provided evidence-based algorithms for investigation and management of infants at risk for sepsis. These recommendations are more conservative than those published by CDC in 2002. We hypothesized that use of CPS recommendations will lead to fewer number of infants evaluated and treated for sepsis without compromising clinical outcomes.

OBJECTIVE: To assess the effectiveness of implementation of CPS recommendataions on compliance with management decisions for infants > 35 wks gestation at risk for early-onset neonatal sepsis (EONS) and health care resource utilization as determined by the number of CBCs and blood cultures performed, antibiotic usage and length of hospital stay.

DESIGN/METHODS: Observational study was conducted during 2 time periods: April-June 2009 (Pre-implementation phase) and August-October 2009 (Post-implementation phase). In July 2009, the CPS guidelines were introduced in our unit and all stake holders were educated using seminars, web-based modules and pocket cards. All consults performed on infants > 35 wks gestation at risk for sepsis in the 2 time periods were reviewed. Using a pre-specified data form, information on compliance with CPS recommendations and health care resource utilization data were collected. Data were analyzed and compared between the 2 time periods using Student t-test and Wilcoxon Rank Sums test as appropriate.

RESULTS: Data from 126 and 128 consults during pre- and post-implementation phases were included. The demographic and outcome data are presented below [Figure]. Compliance with CPS guidelines was 83%. No case of EONS was noted.

Demographics and outcome data

Variables	Pre-implementation phase (N=126)	Post-implementation phase (N=128)	p-value
Maternal age (yrs)	33 (5)	33 (5)	0.74
GA (wks)	39 (1.6)	39 (1.5)	0.56
BW (kg)	3.3 (0.49)	3.3 (0.48)	0.8
CBC [N (%)]	97 (77%)	114 (89%)	0.01
Blood cultures [N (%)]	91 (72%)	6 (4.7%)	<0.0001
Infant antibiotic use [N (%)]	50 (40%)	5 (4%)	<0.0001
Length of stay (hrs)	73 (29)	67 (35)	0.04

Results are presented as mean (SD) or N (%)

CONCLUSIONS: Compliance with recommendations for management of infants was high. On-going education may be warranted to sustain compliance. Health care resource utilization was significantly reduced without compromising clinical care.

115

THE EVOLUTION OF SERUM PGE2 DURING ORAL AND INTRAVENOUS IBUPROFEN TREATMENT IN PRETERM INFANTS WITH PATENT DUCTUS ARTERIOSUS (PDA)

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BACKGROUND: Many small studies in the literature suggest that ibuprofen PO may be a safe, effective and cost effective alternative in the treatment of PDA.

OBJECTIVE: To investigate changes in serum PGE2 in premature infants with symptomatic PDA during the course of PO or IV ibuprofen treatment.

METHOD: Randomized, double-blind study involving n = 20 patients clinically diagnosed with a symptomatic PDA, confirmed by echocardiography. Inclusion criteria were gestational age < 34 wks and hemodynamically significant PDA requiring treatment. Oral and IV ibuprofen treatment doses consisted of 10 mg/kg dose followed by two more 5 mg/kg doses at 24 hrs intervals. Serum PGE2 levels were measured prior to treatment and then at 3, 24 and 48 hours following treatment (prior to the 2nd and 3rd doses).

RESULTS: Randomization yielded similar groups with regards to gestational age, birth weight and age at first treatment of PDA (27.4±2.6 vs 27.7±3.3 weeks, 988±328 g vs 1171.5 ±545g, 5 vs 5.5 days in the IV vs PO groups respectively). Ductal closure was achieved in 2/10 patients after one course of ibuprofen PO and in 4/10 patients after IV administration. We observed a statistically significant decrease in serum PGE2 as measured during the course of the treatment in the group that achieved ductal closure. However, we did not observe a significant decrease between the groups that either received IV or PO ibuprofen.

CONCLUSION: Patients achieving ductal closure significantly decreased their baseline PGE2 levels whether they received IV or PO ibuprofen. The low ductal closure rates in either the IV and PO groups are reflected in their insufficient drop in PGE2 concentration after initiation of treatment probably secondary to insufficient ibuprofen doses. Further studies focusing on IV and PO ibuprofen regimens for PDA should consider evaluating the titration of subsequent treatment doses according to the relative drop PGE2 from baseline.

Figure 1: PGE2 changes during the course of treatment

Time after initiation of treatment	PEG2 serum concentration (pg/ml)	
	Ibuprofen IV (n=10)	Ibuprofen PO (n=10)
Pre-treatment	7323 ± 3058	6850 ± 3090
3 h	6503 ± 2550	6730 ± 3000
24 h	6287 ± 3051	5600 ± 1880
48 h	7115 ± 3486	5895 ± 2675

Figure 2: Serum PGE2 according to ductal status post treatment

Time after initiation of treatment	PEG2 serum concentration (pg/ml)	
	Ductal closure (n=6)	No ductal closure (n=14)
Pre-treatment	8890 ± 3175	6315 ± 2675
3 h	7545 ± 2165	6395 ± 2915
24 h	6510 ± 2845	5705 ± 2395
48 h	5620 ± 1635*	6865 ± 3490

* $p < 0.02$ paired t-test

116

STEROIDS AS FIRST LINE DRUG TREATMENT FOR HYPOTENSION IN PRETERM INFANTS

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BACKGROUND: Hypotension in Very Low Birth Weight (VLBW) infants is very common and may be associated with adverse neurodevelopmental outcome and death. The standard treatment of hypotension with volume expansion and vasopressors is not always effective and can be associated with adverse effects. Relative adrenal insufficiency is considered to have an important role in the pathogenesis of hypotension in this population.

OBJECTIVE: To test whether use of Hydrocortisone (HC) in hypotensive VLBW infants leads to a reduction in the total dose of vasopressors and is not associated with adverse effects.

DESIGN/METHODS: Prospective, double blind, randomized, controlled pilot trial. VLBW GA<28 weeks or BW<1250 g found to be hypotensive (MBP less than GA) in the first 48 hours of life, after receiving 10 ml/kg bolus of normal saline, were randomized to receive dopamine (D) and HC or D and placebo (P) for 48 hs.

RESULTS: Eighteen VLBW infants were enrolled: 9 in the HC group and 9 in the P group. The mean gestational age in the HC and P group was 26.1 and 25.6 weeks, respectively. Mean birth weights were 870 and 757 g, and

cortisol levels at study entrance were 189 nmol/L (range 77-425) and 163 nmol/L (84-289), respectively. The average dopamine cumulative doses were 16391 mcg and 32576 mcg (p=0.2) in the HC and the P groups, respectively. The clinical course is presented in the table.

CONCLUSIONS: In this pilot study involving sick VLBW infants, HC had a vasopressors sparing effect. There was a trend towards reduction in BPD, mortality and need for PDA ligation, supporting the absence of increase in adverse effects. The number needed to treat in order to improve the composite outcome of survival without BPD was 1 in 3. In order to strengthen this observation, a larger study will be needed.

Clinical outcome: Hydrocortisone vs. Placebo

	HC (n=9)	Placebo (n=9)	P value *
BPD (%)	44	67	0.64
PDA n (%)	8(89)	9(100)	1
PDA ligation n (%)	2(22)	6(67)	0.15
IVH n, grade (%)	5 ,II (56)	6 ,II (67)	1
PVL n (%)	2(22)	1(11)	1
NEC n (%)	0	3(33)	0.2
Surgery for NEC n(%)	0	2(22)	0.47
NEC - perforationn n(%)	0	1(11)	1
Positive blood culture n (%)	3(27)	6(67)	0.35
Died n(%)	0	3(33)	0.2
Survival without BPD n(%)	5(55)	2(22)	0.34

* calculated by Ficher exact test and Student's t-test

117

PREGNANCY OUTCOMES OF ABORIGINAL/NATIVE/INDIGENOUS MOTHERS: A SYSTEMATIC REVIEW AND META-ANALYSES

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BACKGROUND: Inadequate prenatal care, higher rates of risky health behaviors and gestational diabetes put aboriginal women at increased risk of adverse pregnancy outcomes.

OBJECTIVE: To systematically review pregnancy outcomes among aboriginal/native/indigenous mothers.

DESIGN/METHODS: We searched Medline, Embase, CINAHL and bibliographies of identified articles for English language studies that reported pregnancy outcomes among aboriginal mothers. Study quality was assessed for biases in selection, exposure assessment, confounder adjustment, analyses, outcomes assessment, and attrition. Unadjusted and adjusted data from included studies were extracted by two reviewers. Summary unadjusted and adjusted odds ratios (UAOR and AOR) were calculated using the random effects model.

RESULTS: Thirty studies of low-moderate risk of biases were included. UAORs of LBW, SGA, neonatal mortality, perinatal mortality and stillbirth were increased among aboriginal mothers; however, AOR were only increased for PTB and macrosomia.

Subgroup analyses revealed higher UAORs of LBW, PTB, stillbirth, neonatal and perinatal mortality among Australian aboriginals; macrosomia, stillbirth and neonatal mortality among Canadian aboriginals and PTB and neonatal mortality among American Indians/Alaskan natives.

CONCLUSIONS: Maternal aboriginal status was associated with increased risk of adverse pregnancy outcomes. Further confirmatory studies with proper adjustment of confounders are needed for clarifying subgroup differences.

Pregnancy Outcomes

Outcome	# of Studies	Participants	Aboriginals (%)	Non-aboriginals (%)	UAOR (95%CI)	AOR (95%CI)
LBW	18	9060874	21622/340273 (6.4)	475819/8720601 (5.5)	1.66 (1.34, 2.06)	5 studies; 1.12 (0.88, 1.14)
PTB	15	3723425	11622/111290 (10.4)	256608/3612135 (7.1)	1.71 (1.46, 2.01)	4 studies; 1.38 (1.31, 1.45)
SGA	5	2255890	6834/86616 (7.9)	120961/2169278 (5.6)	1.63 (1.43, 1.86)	1 study 1.20 (0.82, 1.76)
Macrosomia	8	1665401	4823/78870 (6.1)	72558/1586531 (4.6)	1.48 (0.85, 2.60)	2 studies; 1.63 (1.43, 1.86)
Stillbirth	6	1484003	288/266899 (1.1)	7191/1457104 (0.5)	1.69 (1.45, 1.97)	N/A
Neonatal death	10	7786873	11966/267377 (4.5)	249667/7519507 (3.3%)	1.81 (1.40, 2.34)	2 studies; 1.06 (0.82, 1.38)
Perinatal deaths	4	344632	294/11907 (2.5)	4156/332725 (1.3)	1.93 (1.35, 2.76)	N/A

REACH FOR THE TOP: BEST RESIDENT ABSTRACT PRESENTATIONS
VISEZ LE SOMMET : LES MEILLEURS RÉSUMÉS DES RÉSIDENTS

118

ADMINISTRATION OF THE ADJUVANTED PH1N1 VACCINE IN EGG ALLERGIC CHILDREN AT HIGH RISK FOR H1N1 DISEASE

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BACKGROUND: The Public Health Agency of Canada recommends the pH1N1 vaccine for children, particularly those less than 5 years of age or with chronic underlying disease. The pH1N1 vaccine contains residual allergenic egg white proteins and immunization may pose a risk to children who are egg allergic.

OBJECTIVE: To describe the outcome of pH1N1 influenza vaccine administration to egg allergic children at high risk for H1N1 disease.

DESIGN/METHOD: In this prospective observational cohort study children identified by allergists as being high risk for egg allergy and H1N1 disease were referred to a controlled hospital setting for vaccination. The pH1N1 influenza vaccine, which contains less than 0.165mcg/ml of egg protein, was administered in a two dose split protocol to egg allergic children. Children were given an initial test dose of 10% of the total vaccine dose and observed for 30 minutes. If no reaction was noted the remainder of the dose was administered and the children were observed for allergic reactions for 1 hour.

RESULTS: Sixty-two egg allergic children with a mean age of 4.5 years (range from 10 months to 16 years of age) received the adjuvanted pH1N1 vaccine. Egg allergy was diagnosed by combined skin testing and serum IgE in 40.3%, by skin testing alone in 58.1% and by serum IgE alone in 1.6%. All of the 62 immunized children were considered high risk for H1N1 disease; where 58.1% had asthma, 37.1% were less than 5 years of age, 3.2% had heart disease and 1.6% had an immunocompromised household contact. Within 1 hour of immunization, 2 children developed hives, 1 child had a vasovagal response and 1 child had a hypo-responsive episode. There were no anaphylactic reactions.

CONCLUSION: Administration of the adjuvanted pH1N1 vaccine in egg allergic children at high risk for H1N1 disease was safe when performed in a two dose split protocol in a controlled hospital setting.

119

A POPULATION-BASED STUDY ON THE ASSOCIATION OF STANDARDIZED PROTOCOLS IN THE EMERGENCY DEPARTMENT ON CHILDHOOD ASTHMA ADMISSIONS AND RE-VISITS IN ONTARIO, CANADA

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BACKGROUND: Childhood asthma is a leading cause of hospital admissions and emergency department (ED) visits. There is evidence of variations in admission and ED re-visit rates, which may reflect the quality of care provided, including the use of evidence-based management. To improve and standardize care, many EDs have implemented clinical practice guidelines (CPGs).

OBJECTIVE: In children aged 2 to 17 years old with known asthma treated in Ontario EDs between April 14, 2006 and March 24, 2008, we determined the association between CPGs in the ED and the risk of 1) Hospital admission, 2) ED re-visits within 7 days, 3) Non-urgent physician visits within 7 days.

DESIGN/METHODS: Retrospective cohort study using population-based health administrative data and survey data from the Ontario Ministry of Health and Long-term Care. Using multilevel logistic regression adjusted for patient (age, sex, severity on presentation) and hospital (frontline staff training, volume, location) factors, we tested the association of CPGs with the outcomes and calculated adjusted odds ratios (AOR).

RESULTS: In our cohort of 31,131 children, 12,542 (40.3%) were seen in one of the 39/148 EDs with CPGs for asthma. Of children managed in EDs with CPGs, 1182 (9.4%) were admitted compared to 1443 (7.8%) in EDs without CPGs (p=0.02). There were 636 (5.1%) and 1136 (6.1%) re-visits in EDs with and without CPGs respectively (p=0.0001). After adjusting for patient and hospital factors, having a CPG was not a significant predictor of admissions (AOR 1.02; 95% CI 0.92, 1.12) or ED re-visits (AOR 1.11; 95% CI 0.99, 1.24). Physician follow-up visits were significantly lower in the CPG vs. the non-CPG group (AOR 0.89; 95% CI 0.84, 0.95). Further subgroup analyses on outcomes of patients in EDs with CPGs will be presented. We will explore the effect of format (comparing pathways vs. order sets), content (recommending the use of systemic steroids and appropriate discharge planning), or implementation (organizational characteristics including local championship) of CPGs.

CONCLUSIONS: CPGs are not associated with decreased admissions or ED re-visits but with decreased outpatient follow-up. Although simply having a CPG in the ED may not yield significant results, their format, content, and implementation may be linked to outcomes.

120

HEALTH STATUS OF A PAEDIATRIC URBAN REFUGEE AND IMMIGRANT POPULATION IN CANADA

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BACKGROUND: An increasing proportion of the paediatric Canadian population is foreign born. The often unique health issues and barriers to health care for this population are of rising importance for pediatricians, requiring continued emphasis on the evolving literature.

OBJECTIVE: To document the changing demographics and summarize the overall health status of children seen in a resident-led paediatric refugee and new immigrant clinic, affiliated with an urban settlement organization.

DESIGN: Retrospective chart review from September 2004 to September 2009, of all new immigrants, 0-20 years of age, who were seen for initial comprehensive screening assessment.

RESULTS: A total of 342 charts were reviewed: 94% were refugees with a mean age of 8.4 years and nearly equal gender distribution (males 55%, females 44%). More than half previously resided within a refugee camp prior to arrival in Canada and only 37 of these children arrived directly from their country of origin (transit times ranging from 5 days to 17 years). The most common countries of origin were Somalia (33%), Burma (16%) and Afghanistan (12%). Only 6% of patients spoke English or French as their first language.

Major health issues identified were dental disease (51%) and inadequate immunizations (47%). 70% of patients had a nutritional deficiency (including iron and Vitamin D), with 19% and 20% of children measuring less than the 5th percentile for height and weight for age respectively. Ongoing psychosocial issues and moderate to severe developmental delays were also identified in 14% and 10% of patients respectively. Infectious diseases occurred in 91% of those with results: 48% of infections were do to intestinal infestations, where 35% of these had at least 1 pathogenic parasite. Skin infections were also present in 9% of children. Tuberculosis (3), malaria (2), syphilis (1), HIV (3), and hepatitis B (1) infections were also present but to a much lesser extent.

CONCLUSIONS: There are many health issues affecting children newly arrived to Canada. While infectious diseases and immunizations are important from a public health perspective, we must not minimize the consequences of undiagnosed nutritional deficiencies, developmental delays, and psychosocial problems, as these have the potential to hinder successful integration into new schools and communities. Therefore, an understanding of these issues as well as initial targeted screening plan are valuable in ensuring that these children receive appropriate and timely care.

121

MORTALITY RATES AND NICU OUTCOMES OF NEONATES BORN AT THE LIMITS OF VIABILITY IN INBORN VS OUTBORN CENTRES

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BACKGROUND: At the limits of viability, outcomes are less than optimal and decisions regarding resuscitation are difficult. There has been a recent trend for increasing resuscitation of infants born at the limits of viability. It has been shown that preterm infants born in perinatal (inborn) centres have significantly better outcomes compared with those born in non-perinatal (outborn) centres. However, previous data comparing inborns and outborns have grouped infants at the limits of viability with higher gestational ages (GA) and outcome data for infants at the limits of viability have represented mostly inborn infants. For deliveries at the limits of viability that continue to occur in significant proportions in non-perinatal centres, outcome data for outborn infants is required to guide counseling and decision making.

OBJECTIVE: To determine the mortality and NICU outcomes of inborn vs outborn infants born at 23 to 25 weeks GA.

METHODS: The records of all neonates born at 23-25 weeks GA who were referred to the 3 NICUs in our region during January 2005 to December 2007 were reviewed for mortality and NICU outcomes. These 3 NICUs provide tertiary NICU care for 50% of Ontario births.

RESULTS: Among 318 neonates born at 23-25 wk GA, 211 (66%) were inborn and 107 (34%) were outborn. Intubation at delivery was used as a proxy for significant resuscitation. Among intubated infants, mortality rates for GA 23-25 weeks was 33% for inborns compared with 50% for outborns (p=0.006). See Table for further results. The proportion of infants with grade III/IV IVH or PVL was 42%, grade IV ROP or ROP requiring surgery was 19% and need for respiratory support at 36 weeks corrected GA was 66%. There were no significant differences in these NICU outcomes among the 3 GA groups or between inborn vs outborn infants.

CONCLUSION: A significant proportion of 23 week GA infants born in inborn centres were not resuscitated. Consistent with previous studies, the mortality rate for infants born at 23-25 weeks GA was higher for outborns vs inborns. At the limits of viability where outcomes are already tenuous, this difference in mortality between inborns vs outborns places 24 week GA outborn infants at major risk of mortality (60%). These data support an aggressive approach to the transfer of women with threatened preterm labor to a perinatal centre. If maternal transfer does not occur, these differences in outcomes between inborn vs outborn infants should be considered during counseling and decision making.

Table: Mortality rates of inborn vs outborn infants born at 23-25 weeks GA

Intubated at delivery			
	23 wk N=47 Inborn 25 : Outborn 22	24 wk N=127 Inborn 91 : Outborn 36	25 wk N=144 Inborn 95 : Outborn 49
Inborn	16 (64%)	85 (93%)	93 (98%)
Outborn	19 (86%)	35 (97%)	49 (100%)
p-value*	0.103	0.672	0.548
Mortality among intubated patients only			
	23 wk N=35 Inborn 16 : Outborn 19	24 wk N=120 Inborn 85 : Outborn 35	25 wk N=142 Inborn 93 : Outborn 49
Death prior to NICU admission (in delivery suite for inborns)			
Inborn	7 (44%)	3 (4%)	3 (3%)
Outborn	4 (21%)	5 (14%)	6 (12%)
p-value*	0.273	0.046	0.064
Death in NICU			
Inborn	6 (67%)	28 (34%)	17 (19%)
Outborn	7 (47%)	16 (53%)	11 (26%)
p-value*	0.423	0.082	0.374
Death prior to 18 mo follow up (delivery, transport, NICU, post NICU discharge)			
Inborn	13 (81%)	31 (37%)	20 (22%)
Outborn	12 (63%)	21 (60%)	18 (37%)
p-value*	0.285	0.025	0.072
Age of death for NICU deaths (days)			
Inborn	N= 51; median 9.5; range: 0-180; IQR: 3.75-23		
Outborn	N=34; median 5.5; range: 0-74; IQR: 2-14		
p-value†	0.133		

*Chi-square or Fisher's exact test
†Mann-Whitney test

POSTER SESSION
SÉANCE DE RÉSUMÉS PAR AFFICHES

122
WEIGHING IN ON GROWTH CURVE PROVISION FOR EATING DISORDER ASSESSMENT AND MANAGEMENT; NOT ENOUGH OF A GOOD THING

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Growth curves are sensitive indicators of health in growing children and adolescents. Trajectories of growth are more valuable when represented as multiple points over time as they can provide key information and also raise red flags for the possibility of serious or chronic illnesses, such as eating disorders (ED). Re-establishment of a healthy body weight (HBW) is a key priority in treating eating disorders. An accurate prediction of HBW can help address patient anxiety towards weight goals and also allow for a prediction of estimated weight required for return of menses (ROM) – an objective determinant of health in ED patients.

Our objectives were to review provision and availability of adolescent growth curve data of patients referred for an eating disorder assessment, and to examine the relationship between the growth curve data provided and the prediction of HBW goals based upon weight required for ROM.

A retrospective chart review was completed on all outpatients assessed for an eating disorder between January 2004 and December 2006. Ethics approval was obtained prior to study onset. Demographic information, growth curve data, healthy body weight predictions, menstrual history and medical parameters of health were retrieved and analyzed. In order to determine whether predicted healthy body indices provided an accurate estimation of health, a comparison of predicted healthy body mass index (BMI) at assessment versus the BMI at ROM was performed where possible.

102 charts met the inclusion criteria. 92% of the sample was female, and mean age of all study subjects was 15.50 years (SD=1.47). 81 patients (79.4%) presented with at least one growth curve data plot; although most frequently this data point was recorded after the illness had already resulted in weight and/or height impairment. HBW prediction using growth curves was possible in only 24 patients (23.8%) due to lack of sufficient prior growth plots. When HBW prediction was possible, no significant difference between the predicted healthy BMI determined at assessment and the BMI at return of menses was found (p=.438), suggesting that the healthy predicted BMI could allow for an accurate estimation of ROM.

The majority of patients referred for assessment of an eating disorder do not present with completed or sufficient prior growth curve data. When complete, growth curves can provide very valuable information and aid health care providers in their attempt at predicting an accurate HBW for patients with eating disorders.

123
ACUTE ALCOHOL INTOXICATION ADMITTED TO A PEDIATRIC INTENSIVE CARE UNIT

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BACKGROUND: Alcohol use and acute alcohol intoxication is very common in our society, even in children and adolescents, and is frequently associated with medical problems and psychosocial comorbidity.

OBJECTIVE: To describe the characteristics and follow-up care of children and adolescents with acute alcohol intoxication admitted to a pediatric intensive care unit (PICU).

METHODS: A retrospective study of children admitted in a PICU from January 1998 to September 2008 with a diagnosis of acute alcohol intoxication was conducted. Medical records were reviewed to describe presentations, clinical and biological characteristics, management and follow-up care (based on 2005 American Academy of Child and Adolescent Psychiatry Practice parameter).

RESULTS: A total of 53 admissions for 50 children were analysed. Fifty three percent were boys and mean age was 14.7 (+/- 1.31(SD)) years old. Coma was the most frequent presentation with a mean Glasgow Coma Score at arrival of 6.8 (+/- 4.2(SD)) and 45% required endotracheal intubation (mean duration of mechanical ventilation, 8.7 hours (+/- 3.6 (SD)). Trauma was present in 18% of cases, suicidal ideation in 13%, hypothermia in 17%. Polyintoxication was present in 41%, THC was the most frequent co-intoxicant (68%). Mean ethanolemia was high (2.11 g/l) (normal 0-0.92 g/l) (potential lethal dose > 3 g/l). Substance abuse counselling was documented in 73%: brief counselling being most frequently used (64%). Communication with family was documented in 70%, social context in 51%, history of substance use in 63%, criterias for substance abuse and dependency were documented in 13% and 8% respectively. Of concern, familial history of substance abuse, personal and familial history of mental health problems were rarely documented. Psychiatric symptoms evaluation was made more frequently: suicidal risk evaluation was in 49%, symptoms of depression in 47%, anxiety disorder in 9%, conduct disorder in 30%, Attention Deficit Hyperactivity Disorder in 9%, eating disorder in 8%, past or active physical/sexual abuse in 11%. Documentation of follow-up plan was present in 53%. All patients survived.

CONCLUSIONS: Acute alcohol intoxication in PICU is associated with coma and short duration of mechanical ventilation. Psychiatric and behavioral problems are frequent despite sub-optimal assessment of comorbidities and risk factors for psychosocial dysfunction. Guidelines for assessment and referral must be established in PICUs.

124
CANADIAN MEDICAL STUDENT ATTITUDES TOWARDS THE ETHICS OF PAEDIATRIC CLINICAL TRIALS

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Due to ethical concerns and constraints inherent to research in children, the conduct of clinical trials in children has often been difficult. The views of medical professionals and trainees towards conducting clinical trials in children have been largely unexplored and are potentially important towards working to increase the number of appropriate trials conducted in children. The objective of this study was to explore the views of Canadian medical school trainees towards paediatric clinical trials and to compare these views with that of an earlier pilot study conducted amongst Canadian and British health care professionals. Medical students at the end of their clinical clerkship year were given a questionnaire which consisted of direct questions as well as scenarios with ethical dilemmas. Responders were

asked to state whether they would enter children in the trial documented in the scenario and to justify their reasons. Eighty-nine questionnaires were collected (74% response rate). It was found that 42% had formal teaching regarding paediatric ethical dilemmas but only 2% had formal teaching on pharmaceutical testing in children. The students were divided on whether children should only participate in trials where they receive direct benefit. Most students (85%) were comfortable with non-inferiority trials even with post-hoc consent. Only a third (33%) agreed with the use of placebo in an analgesia trial. We concluded that teaching on the ethics of paediatric clinical trials still appears to be lacking amongst medical trainees. However, there does seem to be increased willingness on the part of trainees compared to practicing medical professionals in enrolling children in clinical trials.

125
ASSESSMENT OF RED CELL DISTRIBUTION WIDTH (RDW) FOR DIAGNOSING IRON DEFICIENCY ANEMIA (IDA) IN CHILDREN

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IDA is a common condition that causes adverse health consequences in children. There is currently no gold standard diagnostic test. When anemia is noted with a complete blood count (CBC), a second phlebotomy is done for iron indices. This two-step method introduces added health care costs, distress to the child and is unnecessary in most instances to confirm the diagnosis of IDA if the RDW is utilized. The RDW is included in the CBC, is the first test to become abnormal in IDA, and is unlikely to be affected by factors that influence iron indices and cause them to be inaccurate. Thus, RDW is a practical and cost-effective diagnostic tool for IDA in children.

The purpose of this study is to evaluate the accuracy of the RDW as a diagnostic tool for IDA in children.

A systematic review of the literature was completed using rigorous predefined methods and studies were identified by searching databases from 1975 to June 2008. Two reviewers screened 1344 abstracts to identify 293 potentially relevant studies. Data from 20 studies that met inclusion criteria was pooled and analyzed in a meta-analysis weighted by sample size.

8 studies compared children with IDA (454) and normal controls (1159). The mean RDW in IDA was 4.58% higher than in controls ($p<0.00001$). 5 of these studies reported sensitivity 0.42-1.00; specificity 0.67-1.00; positive likelihood ratio (PLR) and negative likelihood ratio (NLR) were calculated as 7.39 ($p<0.00001$) and 0.10 ($p=0.003$). 7 studies compared children with IDA and other causes of anemia with sensitivity 0.71-1.0; specificity 0.33-0.91; PLR and NLR were calculated as 1.87 ($p=0.002$) and 0.21 ($p<0.0001$). The mean RDW was reported in 2 of these studies (28 IDA, 28 other anemia) and was 3.91% higher in IDA ($p<0.00001$). 3 studies compared children with IDA and beta thalassemia trait (BTT) with sensitivity 0.86-1.0; specificity 0.32-0.94; PLR and NLR were calculated as 3.41 ($p=0.20$) and 0.07 ($p=0.04$). 2 of these studies reported mean RDW values (48 IDA, 48 BTT) and was 4.87% higher in IDA ($p<0.00001$).

Our results found that the mean RDW is significantly higher in children with IDA. The highest PLR was found when differentiating between IDA and normal controls. We conclude that the RDW is a good diagnostic test and most accurate when used to determine the diagnosis of anemia compared with normal controls.

126
TARGET KIDS! - RATIONALE, GOALS AND FIRST STEPS

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BACKGROUND: Providing preventative care during child health supervision is a defining component of pediatric primary care practice. Although significant advances in primary care have been made, preventative care suffers from a lack of data to guide practice. The 3 major preventable nutritional problems in preschoolers are obesity, iron deficiency and low vitamin D. Developing a better understanding of the causes of these problems holds promise to develop early interventions for prevention.

OBJECTIVE: To describe the development of a large pediatric primary care practice based research network called TARGet Kids! and to evaluate its progress towards meeting its aims.

DESIGN/METHODS: TARGet Kids! is a collaboration between child health researchers and primary care physicians which aims to develop evidence for primary proventitive healthcare. Healthy children (1-5 years of age) seen during routine primary healthcare were approached to participate by a trained research assistant in each practice. Consenting parents completed a questionnaire to identify biological, nutritional and environmental exposures, the Nutrition Screening Tool for Every Preschooler (NutriSTEP) and a validated child behavior questionnaire (Rothbart 1996). Anthropometric measurements and blood samples were obtained to identify micronutrient status and cardiometabolic risk. Initial goals were: producing prevalence estimates for obesity, iron deficiency and low vitamin D, identifying predictors of these nutritional disorders, developing interventions for perevention and forming the basis for a large long-term cohort to identify ASSOCIATED HEALTH OUTCOMES.

RESULTS: In its first year, 2493 children between 1 and 5 years of age from 5 large pediatric or family medicine group practices were recruited with detailed survey and anthropometric measurements. Serum sampling was obtained from 551 children. Of families who were approached, 86% consented to participate with survey and anthropometric measurements and 43% consented to having blood drawn. The assessment took roughly 40 minutes per child. The cost for each participating child was $29.86 without laboratory measurements and $199.37 with subjective feedback from parents and primary care providers was positive.

CONCLUSIONS: TARGet kids! aims to develop an evidence base for primary preventative healthcare for preschoolers. Preliminary results suggest that the TARGet Kids! methodology is powerful, efficient, cost effective and is well accepted by primary care providers and families.

127
SURVEY OF MANAGEMENT OF NEONATAL JAUNDICE BY MEDICAL PRACTITIONER TYPE IN ONTARIO: ARE WE FOLLOWING GUIDELINES?

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BACKGROUND: Hyperbilirubinemia continues to be the most common cause of neonatal readmission to hospitals in North America and kernicterus has been reported in healthy near-term and term infants with no apparent risk factors. In response to concerns about neonatal hyperbilirubinemia, the Canadian Paediatric Society (CPS) published a statement in June 2007 to promote good practice in the screening and management of hyperbilirubinemia. The guidelines indicate that all neonates need measurement of their serum total bilirubin during the first three days of life. Clearer guidelines for phototherapy and follow up were also outlined. It is important to assess knowledge translation and assess the extent to which the CPS guidelines are known and practiced.

OBJECTIVE: To determine current practices among medical practitioners in Ontario in the screening for and management of neonatal hyperbilirubinemia.

DESIGN/METHODS: A cross-sectional survey of medical practitioners in Ontario involved in the care of healthy newborns in the immediate neonatal period was completed. Within Ontario there are 4844 general practitioners, 5716 family medicine physicians and 1042 pediatricians. Five hundred participants were randomly selected from each group of family medicine physicians and pediatricians. In Ontario there are 390 midwives, thus all midwives were included. An anonymized questionnaire, developed by our group, was sent out via postal service and electronic mail using Survey Monkey to the selected sample of practitioners.

RESULTS: See Table

Table: Questionnaire responses

	Practitioner Type			
	Pediatricians	Family Medicine	Midwives	
Number of surveys returned	117	65	67	
				P-value *
Volume of neonates seen: >5 per month	91.3%	10.8%	61.8%	<0.001
Newborn follow-up post discharge within 24 hours	7.1%	1.6%	94.1%	<0.001
Newborn follow-up post discharge within 72 hours	88.5%	64.1%	100%	<0.001
Routinely measure bilirubin in all newborns prior to discharge	57.7%	37.7%	23.9%	<0.001
Do you use CPS guidelines as a resource	71.6%	46.2%	73.5%	0.001
Do you use AAP guidelines as a resource	26.7%	6.2%	2.9%	<0.001
Answer jaundice infant scenario correctly (as per CPS guidelines)	99.1%	84.4%+	79.1%+	<0.001

*Chi-square analysis
+Included consult with a pediatrician as correct answer

CONCLUSIONS: In our sample there was considerable variation in practice among the various practitioner types. Pediatricians were more aware of the guidelines and were more likely to follow them. Increased efforts are required to promote knowledge translation of CPS guidelines across all practitioner types but particularly among the family medicine group.

128
THE RELIABILITY AND VALIDITY OF THE AGITATED BEHAVIOUR SCALE IN CHILDREN WITH TRAUMATIC BRAIN INJURY

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BACKGROUND: Agitation is commonly observed in children following traumatic brain injury (TBI). Agitated behaviour can be distressing for the patient's family and medical team and can negatively impact on rehabilitation in the acute phase of recovery. Currently there is no validated tool to measure acute TBI agitation in pediatrics. We examined the validity/reliability of the Agitated Behaviour Scale (ABS) in children with TBI.
METHODS: The ABS is a 14-item scale, completed by an observer. It takes 5 minutes to complete and ranges from 14 (no agitation) to 56 (severe agitation). There are three phases of the ABS reliability/validity study: 1. face validity ratings by nurses; 2. inter-rater reliability at training sessions; and 3. ABS reliability and validity evaluation in children with TBI. Children were enrolled prospectively at 2 children's hospitals if they had TBI, age 5-17 years and were admitted to critical care. The ABS was completed 3 times daily for 4 days by the patient's nurse following extubation. In addition each day a video recording was taken and viewed by a blinded assessor and a questionnaire rating agitation on a visual analogue scale (VAS) was completed by a physician.
RESULTS: Of the 22 participants enrolled in the ATBI study to date, 10 have completed the ABS component. The subjects' mean age was 13 and nine of the participants were male. Eight of ten injuries were from motor vehicle collisions. All participants were alive at discharge. Eighty-nine ABS scores have been collected with a mean of 19.9 (range 14-36). The mean ABS for days 1 through 4 was 19.6, 19.8, 17.9 and 18.3. There was a high degree of agreement between the blinded assessor ABS score and the physician VAS rating ($r=0.89$ $p <= 0.05$). Mean ABS scores for each subject were also created for the blinded assessor and all the nurses' scores. There was not a significant correlation between the blinded assessor and nurses ABS scores. The mean blinded assessor ABS correlated positively with the number of days of hospitalization ($r=0.913$ $p <= 0.05$), as did the physician VAS rating (0.95 $p <= 0.05$). The mean ABS blinded assessor also had a negative correlation with the pediatric trauma score (-0.851, $p <= 0.05$), which was in the expected direction. Results from the face validity and inter-rater reliability phases of the study are pending and will be presented at the Canadian Paediatric Society Meeting.
CONCLUSIONS: Despite a small sample size to date, one can appreciate significant correlation between ABS score and physician rating of agitation. Further patient enrollment in this ongoing study will clarify these relationships and establish the validity and reliability of the ABS in children following TBI.

129
THE NATURE OF SLEEP IN CANADIAN CHILDREN WITH FETAL ALCOHOL SPECTRUM DISORDER

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BACKGROUND: Fetal Alcohol Spectrum Disorder (FASD) is the leading cause of developmental disabilities among Canadian children. Although sleep disturbances have been well studied in children with other developmental disabilities, there is a paucity of research examining sleep in children with FASD.
OBJECTIVES: To determine sleep duration, sleep onset delay, and the frequency of other sleep disturbances in Canadian children with FASD. To identify factors that impact on the sleep of these children.
DESIGN/METHODS: Cross-sectional study design was used. Caregivers of children aged 5 to 8 years with FASD living in urban and rural communities throughout Canada participated in the study. Validated 35-item sleep questionnaire examining sleep duration, and sleep onset delay; sleep history; and a 7-day sleep diary were used to collect data from the caregivers. Mean (SD) scores of sleep duration and sleep onset delay were calculated for this group of children with FASD. Sleep disturbances, reported in the histories and sleep diaries, were labelled, and frequency of each was reported. A stepwise multiple regression analysis was used to determine factors that influenced sleep.
RESULTS: Three-hundred and twenty-five (325) caregivers of Canadian children with FASD aged 5 to 8 years (mean = 6.2 years) participated. Mean sleep duration was 7.2 hours (SD 1.4). Mean sleep onset delay was 63 minutes (SD, 16). In the 7-day diary, 256 of the 325 caregivers reported other sleep disturbances experienced by their children including night terrors (74), sleep walking (n = 10), waking more than twice during the night (169), and day-time fatigue (23). Lack of bedtime rituals, severity of the child's condition, and a history of abuse negatively impacted on the sleep of children with FASD ($p < 0.01$).
CONCLUSIONS: The young children with FASD who participated in this study demonstrated sleep disturbances. These children slept on average 7.2 hours each night and took 63 minutes to fall to sleep. Study findings support the need for clinicians to monitor the sleep of children with FASD, and the need to develop interventions to assist these children. The results also support conducting a control study using objective measures as well as caregiver reports to identify sleep problems in children with FASD.

130
VISIBILITY OF THE URETHRAL OPENING DOES NOT CORRELATE WITH RISK OF URINARY TRACT INFECTION IN UNCIRCUMCISED BOYS

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Urinary tract infections (UTI) are the most commonly diagnosed serious bacterial infections amongst young children. Uncircumcised boys are at higher relative risk for UTI compared to circumcised boys. The main objective of this study was to compare the rate of positive urine cultures (defined as growth of a single pathogenic organism $>=10^7$ cfu/L) amongst 3 groups of uncircumcised boys: those with a completely visible (CV), partially visible (PV), and non-visible (NV) urethral openings; with the rate in circumcised boys as the main comparator.
This was a prospective cohort study in a tertiary care pediatric emergency department. All boys presenting to the emergency department (ED) for whom a catheter urine specimen was requested by the treating physician were eligible. Exclusion criteria included recent bladder catheterization (<7 days), antibiotics <72 hours, or any genitourinary anomaly that precluded catheterization. Bladder catheterization was performed by the ED nurses who then completed a brief questionnaire. We then used Chi square analysis to compare between groups and multivariable logistic regression analysis to allow adjustment for potential covariates.

We enrolled a total of 405 boys, of whom 395 (97.5%) were analyzed for the primary outcome. The median age was 4 months [1 day-42 months] with 44% <3 months, 34% 3-12 months and 22% >12 months. The distribution of visibility amongst the groups was as follows: 84 (21%) were circumcised, 164 (33%) were NV, 107 (21%) were PV and 40 (8%) were CV. Overall, 58% of children in our study had a temperature >38.0°C (mean 39.1°C). The rate of positive urine cultures in circumcised boys was 4.8% vs. 26.7% in uncircumcised boys, with an odds ratio (OR) of 5.29 (95% CI: 2.07-13.53). Amongst uncircumcised boys, the rate of positive urine cultures (OR, 95% CI) was 26.8% (5.8, 2.2-15.3) in NV, 20.6% (OR 4.1, 1.5-11.3) in PV and 30% (OR 6.77, 2.2-20.9) in CV, with circumcised boys as the reference group. Adjusting for age and fever did not affect these findings.

The results of our study failed to demonstrate a hierarchy of risk for positive urine cultures amongst uncircumcised boys. We conclude that amongst boys for whom UTI is being considered during their ED evaluation, those who are uncircumcised are at higher risk compared to circumcised boys irrespective of the degree of visibility of the urethral opening.

131
IMPACT OF PHYSICIANS' CHARACTERISTICS ON THE RISK OF ADMISSION AMONG CHILDREN VISITING A PEDIATRIC EMERGENCY DEPARTMENT

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INTRODUCTION: Children seeking care in pediatric emergency departments (ED) can be treated by physicians trained in various specialties; their characteristics may impact patient management.

OBJECTIVE: To assess the effects of physicians' training, work experience and gender on hospitalization rates among children visiting a pediatric ED.

METHODS: This retrospective cohort study used the computerized database of a tertiary care pediatric ED staffed by pediatric emergency physicians, pediatricians and general emergency physicians. Participants were all children aged less than 19 years old who were seen by a physician in the ED between April 1st 2008 and March 31st 2009. The physician's gender, years of work experience and specialty training were assessed as predictors of admission. The primary outcome was hospitalization. The secondary outcome was the proportion of unscheduled return visits to the ED within 48 hours of discharge. Multivariate logistic regression was used to evaluate associations between physicians' characteristics and the risk of admission, adjusting for triage level and referral status. Sample size calculation was based on the fact that 10 physicians are needed for each risk factor. We estimated that studying all patients visiting the ED for one year would provide 50,000 patient visits and 5,000 admissions.

RESULTS: During the study, 49,500 patients were evaluated by 45 physicians; each physician treated at least 20 patients. Of the patients, 6,087 (12.3%) were admitted and 3,040 (5.6%) returned to the ED within 48 hours of discharge. Physicians' individual admission and return rates were 0%-29% and 0%-11%, respectively. On multiple logistic regression, the physician's years of work experience was associated with admission rates (OR for 5 years work: 1.20 (95% CI 1.10, 1.29); OR for 5-10 years work: 0.82 (95% CI 0.76, 0.90); reference >10 years work) and with unscheduled return visits (OR 1.16 95% CI 1.04, 1.30 for <5 years and 5-10 years worked, as compared to >10 years work). Physicians' specialty and gender were not determinants of hospitalization.

CONCLUSION: This study demonstrates that, in addition to patient characteristics, a physician's work experience has an impact on admission rates, independent of specialty training.

132
WHO ARE THE CHILDREN LEAVING THE EMERGENCY DEPARTMENT WITHOUT BEING SEEN BY A PHYSICIAN?

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INTRODUCTION: Waiting times to see a physician in emergency departments (ED) are growing and increasing numbers of patients are leaving the ED without being seen by a physician (LWBS). Information about these patients is lacking.

OBJECTIVE: To assess the characteristics of the children who left a pediatric ED without being seen by a physician.

METHODS: This retrospective case-control study was performed using the computerized database of a tertiary care pediatric ED. Participants were all children aged less than 19 years old consulting the ED between April 1st 2008 and March 31st 2009. Cases were all triaged children who LWBS. Controls were all triaged children seen by a physician. Independent variables about the patient, the illness and the period of consultation were assessed. A stepwise logistic regression model was constructed, using significant variables identified through univariate analysis, to select characteristics most predictive of early departure. The sample size needed to evaluate 10 risk factors is 100 patients who LWBS. We estimated that evaluating all patients visiting the ED for one year would minimize seasonal variation and generate more than 10,000 patients who LWBS.

RESULTS: During the study period, there were 60,525 patient consultations to the ED; all were included in this study. 10,323 (17.1%) patients were triaged but LWBS. On multiple logistic regression, physician referral (OR 0.01, 95% CI 0.08, 0.12), summer or fall consultation (OR 0.46 95% CI 0.43, 0.45 and OR 0.42 95% CI 0.39, 0.45, respectively, compared to winter) and higher acuity triage level were associated with a lower proportion of patients LWBS. Evening consultations (OR 2.1 95% CI 1.9, 2.2, compared to night), ages between 3 months and 11 years (OR varying from 1.3 to 1.8 compared to > 11 year) and living close to the hospital (OR 1.2, 95% CI 1.1, 1.3) were risk factors for LWBS. The most important predictor of LWBS was triage level with rates of 0%, 0%, 1.5%, 23% and 49% for levels 1 to 5 (Canadian Triage and Acuity Scale), respectively.

CONCLUSION: This study shows that children who LWBS have a lower triage acuity, are less often referred by a physician and are 3 months to 11 years old. Environmental factors, such as the timing of the consultation and the proximity of patients' homes, are associated with LWBS.

133
TRIAGE NURSES' COUNSELING INFLUENCE RETURN VISITS OF CHILDREN LEAVING THE EMERGENCY DEPARTMENT BEFORE BEING SEEN BY A PHYSICIAN

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INTRODUCTION: Waiting times to see emergency department (ED) physicians are growing and more patients are leaving without being seen by a physician (LWBS). Nurses are trained to counsel the parents of these patients about common childhood illnesses, but the impact of this strategy is not known.

OBJECTIVE: To assess the impact of triage nurse counselling on ED return visits and outcomes for children who leave before being seen by a physician.

METHODS: This retrospective cohort study used the computerized database of a tertiary care pediatric ED. Participants were all triaged children who LWBS between April 1st 2008 and March 31st 2009. When parents notified nurses of their intention to leave prematurely, they received information regarding common childhood illnesses and counselling about when to return to the ED. The occurrence of such counselling was this study's exposure of interest. The control group was composed of patients who LWBS, did not notify the health care team and therefore were not counselled. The primary outcome was a return visit to the ED within 48 hours of the initial consultation. Triage level and referral status were used as indicators of severity. To demonstrate a 2% difference in return visits (alpha value of 0.05, power of 80%), 3,213 participants were needed per group. By assessing all patients visiting the ED for one year, we estimated there would be more than 4,000 participants per group.

RESULTS: During the study period, 60,525 patients consulted the ED and 10,323 (17%) LWBS. Of those who LWBS, 4,639 (45%) received counselling from an ED nurse and 5,684 (65%) did not. There was a 2.0% (95% CI 1.0, 3.0) difference in ED return visit proportions between both groups: 6.1% for the group who received counselling and 8.1% for the control group. On multiple logistic regression, adjusting for triage level, referral status and timing of the consultation, the group who received counselling was still less likely to return to the ED in the following 48 hours (OR 0.81; 95% CI 0.67, 0.99).

CONCLUSION: This study suggests that, of the patients who LWBS,

those who receive counselling by a trained nurse have less return visits in the following 48 hours. Training health care professionals to inform parents about the approach to common illnesses and when to seek urgent medical help seems a good way to decrease unnecessary return ED visits and to safely guide parents in caring for their child.

134
ASSAULT RELATED INJURIES IN CHILDREN AND ADOLESCENTS PRESENTING TO THE EMERGENCY ROOM

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BACKGROUND: Children and adolescents are particularly vulnerable to violence and its long lasting effects. Physical violence frequently brings its victims to seek care in emergency departments and first line physicians play an important role in the detection and the prevention of this type of aggression.

OBJECTIVE: To describe injuries related to physical aggression in youth 5 to 19 years old presenting to an urban emergency department, their tendencies over a ten year period, and identify risk factors to guide their prevention.

METHODS: We used retrospective data from the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) available from one urban paediatric tertiary center. Intentional injuries inflicted by other youth were examined over a study period from 1998 to 2007. For each case, the age and sex were recorded. The age groups were divided into three: 5-9 years, 10-14 years and 15-19 years. Injuries were characterized according to type, body part involved, place where they occurred, mechanism and disposition of the patient. As a second step, we will study postal code link to socioeconomic status and evolutions of injury characteristic trends over ten years.

RESULTS: During the studied period, a total of 504 visits for non accidental physical injuries were identified. There were 395 (78%) males and 109 (22%) females. Thirty nine (8%), 251 (50%) and 214 (42%) patients belonged to the 5-9 years, 10-14 years and 15-19 years groups respectively. Injuries were superficial (23%), open wounds (21%), concussions (19%) and fractures (17%). The body parts involved most frequently were the head (34%), the face (29%) and the upper extremity (14%). For the cases where information was available, 50% of injuries occurred at school (153 of 306), and 63% involved bodily force (190 of 300). Twenty-five (5%) were admitted to the hospital. Among those, the injuries resulted in more severe open wounds (36%), fractures (32%) or concussions (20%).

CONCLUSION: In this study, most injuries related to physical aggression in youth occurred in 10 to 19 year old boys, were not severe, involved the head and face, occurred at school and resulted from bodily force. Only a small minority of patients were admitted. Youth that have already been assaulted can be targeted for intervention and follow-up in order to manage the physical and psychological sequelae, as well as prevent their repeated victimisation, their possible evolution into perpetrators and enhance their empowerment.

135
ADOLESCENT SATISFACTION IN AN URBAN PEDIATRIC EMERGENCY DEPARTMENT

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BACKGROUND: Adolescents are frequently cared for in an urban pediatric emergency department (ED). In studies of adult patients, increased levels of satisfaction have been correlated with improved outcomes and utilization of health care resources. No study has focused directly on adolescents to ascertain their level of satisfaction and gather suggestions for improvement from this age group.

OBJECTIVES: To determine how satisfied adolescents are with the care they receive in an urban pediatric ED and to identify areas adolescents report their experience can be improved.

METHODS: A survey was designed for this study focusing on areas of care important to patient satisfaction that were identified in previous studies. The 33-question survey included ratings covering overall satisfaction, waiting room experience, treatment by medical and nursing staff, diagnosis and discharge instructions. The survey employed likert-scale ratings and questions where respondents could enter their own responses.

RESULTS: 282 adolescents were enrolled over a twelve month period in the ED at BC Children's Hospital in Vancouver, British Columbia, Canada. 92.4% of respondents rated their satisfaction as good to excellent with no differences observed by age, diagnosis and level of urgency. Almost half of the surveyed adolescents (45.8%) identified a desire to have more adolescent appropriate material (magazines, video games and movies) in the waiting room and, ideally, their own age appropriate waiting space. Physicians and nurses were highly regarded and trusted by their patients. However, 184 (67.3%) teenagers did not get an opportunity to meet with their physician alone. Of these, 16 (8.7%) expressed a desire to do so. Discharge diagnosis and treatments plans were understood by 232 (87.2%) of patients. Of the 161 adolescents who had attended a general hospital in the past for any reason only 11 (6.8%) preferred a general hospital ED compared to a pediatric ED.

When given the opportunity to write their own responses 77 adolescents expressed a desire to have more teenage appropriate entertainment such as magazines and computers, 60 felt the wait was too long and 16 wanted a larger more comfortable waiting space.

CONCLUSIONS: Adolescents were overwhelmingly satisfied with care in the pediatric ED. As adolescents become autonomous from their caregivers and may withhold critical information in the presence of them it is imperative that medical staff make a greater effort to meet with adolescents in the absence of their caregivers. Finally, institutions should strive to create a more age-appropriate ED environment for adolescents.

136
ASSESSMENT OF EMERGENCY DEPARTMENT CASTING ERRORS AND CAST-RELATED COMPLICATIONS IN CHILDREN

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BACKGROUND: Fractures account for 10-15% of injuries sustained in childhood. Many children undergo fracture immobilization in the emergency department (ED). Literature suggests that cast quality impacts fracture healing, however, quality of casting in the pediatric ED has not been well studied. Further, there is little literature on the association between cast quality and subsequent soft tissue complications in children.

OBJECTIVES: The primary aim of this study was to describe common casting errors and complications following casting of pediatric fractures in the ED. The secondary aim of this study was to determine whether there was an association between casting errors and soft tissue and fracture site complications.

METHODS: This was a prospective case-control study of children aged 0-17 years, who sustained a traumatic fracture of an extremity requiring casting in the ED and orthopedic follow up. Patients were excluded if they had a pathologic fracture or if their cast had been changed or split prior to orthopedic follow up. A clinical cast assessment tool was utilized to assess casting errors and complications. The cast assessments were made at both the initial orthopedics visit and at the time of cast removal. Assessments for complications occurred at each orthopedic clinic visit. Patients were classified as cases if they sustained any soft tissue complication or worsening displacement/angulationre at the fracture site.

RESULTS: 85 patients were enrolled in the study. The majority were between 6-12 years (53%) and had fractures involving the radius and ulna (62%). 53% of children had at least 1 casting error identified. Common errors included: poor molding (25%), excess padding (16%), cast too tight/loose (15%), improper limb position (15%), cast too short (15%), cast covering fingers/toes (14%). The presence of a soft tissue or fracture site complication was seen in 28% of patients. Common complications included: pressure sores (7%), worsening displacement/angulation (14%). A significant association was found between patients with a complication and the presence of at least 1 casting error (OR 7.2, CI 2.2-23.6).

CONCLUSIONS: Casting errors are common in the pediatric population. There is an association between poor cast application and both soft

tissue and fracture site complications. Knowledge of common casting errors may assist emergency physicians in providing optimal care to pediatric fracture patients.

137
THE INFLUENCE OF THE FAMILY MEAL ON NUTRITIONAL RISK AND OBESITY IN HEALTHY PRESCHOOL CHILDREN: A TARGET KIDS! STUDY

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BACKGROUND: The family meal is associated with dietary and psychosocial benefits in adolescents. Increased understanding of the family meal, nutritional risk, and obesity in healthy preschool children is needed.
OBJECTIVE: To determine if the frequency of eating the dinner meal as a family is associated with nutritional risk and body mass index (BMI) in healthy preschool children.
DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children ages 2-5 attending well-child visits were recruited through TARGet Kids!, a Primary Care Research Network including 10 community pediatrician practices and 2 family medicine group practices, in Toronto, Canada. Questionnaires on demographics, lifestyle factors, and validated tools for nutritional risk using the NutriSTEPTM were administered. Height, weight, and waist circumference of children and their accompanying parent were measured. Children were categorized as low (NutriSTEP score <20), moderate (21-25), or high nutrition risk (>26). Number of family dinner meals in the last week was reported by parents. Regression models were performed to assess the influence of family dinner meal on NutriSTEP and BMI.
RESULTS: 1007 children 2-5 years of age were included in this study. Their mean age was 44 months, and 50% were female. 16% of children had moderate or high nutritional risk. 13% of children were overweight (BMI 85-95%ile), and 6% were obese (BMI >95%ile). The mean (SD) number of reported family dinner meals in the last week was 6 (2). Children with moderate/high nutritional risk group reported eating 5 family dinner meals, compared to the low risk group who reported eating 6 meals (p=0.002). There was no significant association between BMI and reported family dinner meals (p=0.9). In multivariable analysis, adjusting for parent BMI, age, and sex, increase in each family dinner meal was associated with a decrease in NutriSTEPTM score by 0.4 points (95% CI: 0.2,0.5).
CONCLUSIONS: There is a small association between the frequency of the family meal and nutritional risk, but not BMI, in preschool children. The family dinner meal may gain more influence on nutritional risk and health outcomes in older ages. Longitudinal data is needed.

138
TEMPERAMENT AS A PREDICTOR OF SCREEN TIME IN PRE-SCHOOL CHILDREN: A TARGET KIDS! STUDY

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BACKGROUND: Increased screen time is associated with adverse educational, developmental and nutritional outcomes in children. Understanding associations between child temperment and screen time may lead to interventions to effectively reduce screen use.
OBJECTIVE: To assess the relationship between child temperament and screen time in preschool aged children.
DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children 1-5 years attending well-child visits were recruited through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. Screen time was assessed by parent report. Child's temperament was assessed using the Child Behaviour Questionnaire (CBQ) subscales. Children with high Negative Affect have high anger, frustration, and difficulty with soothability. Children with high Effortful Control have pleasure with low stimulus intensity and maintain attentional focus. Children with high Surgency are impulsive and show high gross motor activity. Linear regression was used to assess the relationship between each temperament subscale and total weekly screen time.
RESULTS: 1520 children completed the CBQ. Their mean age was 34 months and 50% were female. The mean (SD) Negative Affect, Effortful Control, and Surgency scores were 3.6, 5.4, and 4.6, respectively. In univariate analysis Negative Affect and Surgency were positively, and Effortful Control negatively associated with increased total screen time (p<0.001). In multivariable model controlling for maternal education, age, and sex, each unit increase in Negative Affect subscale score was associated with increase in 47 minutes per week (95% CI: 25,69) of screen time. Each unit increase in Effortful Control subscale score was associated with reduction of 45 minutes per week (95% CI: 19,71) of screen time.
CONCLUSIONS: Screen time may be used as a parenting strategy for children with temperaments consistent with high Negative Affect and low Effortful Control. The assessment of temperament may be included in strategies to reduce screen use in young children.

139
NUTRITIONAL RISK IS ASSOCIATED WITH CHOLESTEROL LEVELS IN PRESCHOOL CHILDREN IN PRIMARY CARE PRACTICE: A TARGET KIDS! STUDY

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BACKGROUND: The Nutrition Screening Tool for Every Preschooler (NutriSTEP) was developed to identify preschoolers at high nutrition risk, and was validated against a registered dietitian's assessment. It is unknown if nutritional risk in preschool aged children is associated with cardiometabolic risk factors.
OBJECTIVE: To determine if cardiometabolic risk factors-LDL, HDL, total cholesterol (TC), triglycerides (TG) are associated with nutrition risk as identified by NutriSTEP in children 1-5 years of age.
DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children 1-5 years attending well-child visits were recruited through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. Parents completed the NutriSTEP and children were categorized as low (NutriSTEP score <20), moderate (21-25), or high nutrition risk (>26). A non-fasting blood test was taken. Multiple linear regression was used to adjust for confounders.
RESULTS: 187 children had blood tests. Mean age was 39 months, mean (SD) NutriSTEP score was 13.9 (6.4). 88%, 9%, and 3% of children were in low, moderate, and high nutritional risk groups, respectively. The mean (SD) TC, LDL, HDL, and TG were 4.2 (0.7), 2.4 (0.6), 1.2 (0.3), and 1.4 (0.7). 64 (34%) children had elevated TC; 8 (4%) had elevated LDL. The mean (SD) TC level in the low, moderate, and high nutritional risk group was 4.3 (0.7), 4.2 (0.8), and 4.5 (0.7), respectively. The mean (SD) LDL in the low, moderate, and high nutrition risk group was 2.3 (0.6), 2.4 (0.8), and 2.7 (0.7), respectively. In univariable analysis, increased NutriSTEP score was associated with increased TC (p=0.004), LDL (p=0.03), HDL (p=0.004) but not TG (p>0.05). In multivariable analysis, adjusting for maternal education, parent BMI, child age and sex, each increased unit in NutriSTEP score was associated with an increase in total cholesterol of 0.003 mmol/L, and LDL of 0.002 mmol/L.
CONCLUSIONS: Children 1-5 years with increased NutriSTEP score, have increased levels of TC and LDL. Understanding associations between nutrition risk and cardiometabolic risk factors in young children is important to guide investigations and interventions in the primary care setting.

140
RISK FACTORS FOR OBESITY AMONG OFF-RESERVE ABORIGINAL CHILDREN IN CANADA

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BACKGROUND: Rising rates of obesity and overweight among Canadian children have attracted research attention. First Nations, Inuit, and Métis children have even higher rates of these conditions, yet there has been little investigation of the risk factors for obesity and overweight in these populations. Aboriginal children may be more likely to have behavioural, economic and social characteristics, such as low family income, that also increase risk of overweight and obesity in the general population. However, there may also be risk factors are specific to Aboriginal populations, as recent research on social determinants of Aboriginal health suggests. Moreover, research on most aspects of Aboriginal health has focused on First Nations and Inuit communities, although roughly half of Aboriginal children live in urban areas.

METHODS: We examine determinants of obesity among off-reserve Aboriginal children and ask how demographic and family characteristics, behaviour and activity patterns, and geography predict BMI and obesity among children 6 to 14. We use 2006 Aboriginal Children's Survey data (ACS), binary logistic regression and generalized additive models to investigate the effects of covariates on the BMI scores of Aboriginal children aged 6 to 14. Additive models are appropriate given the distributional properties of BMI and the suggestion that the CDC child obesity definitions might not be completely appropriate for Aboriginal children. We use CDC child obesity definitions and logistic regression models to confirm results.

RESULTS: Estimated obesity and overweight rates are considerably higher than those published for Canadian children. Aboriginal boys are at particular risk. We find different regional patterns in the Aboriginal population than have been found in the general population, with rates highest in the Prairies. Among Aboriginal groups, Registered Indian children had higher BMI scores than non-status First Nations, Métis, or Inuit children. Family characteristics, including lone parent and low-income status, had strong independent effects. Behaviours such as sports participation and TV viewing had effects similar in direction to those in the general population, but were less important than family income and region. Traditional activities and spending time with Elders also led to lower BMI.

CONCLUSIONS: Child overweight and obesity are particularly important given the young age of Aboriginal populations and the life-long effects of these childhood conditions. We find that overweight and obesity among off-reserve Aboriginal children are predicted by many of the same factors that are important in the general population, but that there may be other factors that are also important for Aboriginal children.

141
THE ASSOCIATION BETWEEN PROLONGED BOTTLE USE AND SCREEN TIME: A TARGET KIDS! STUDY

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BACKGROUND: There has been increasing concern about negative health outcomes associated with high levels of screen time. Bottle use and screen time are both strategies used to pacify children. It is unclear whether prolonged bottle use is an identifier of children at risk of increased screen time.

OBJECTIVE: To determine if prolonged bottle use, an easily identifiable marker in the office setting, is associated with increased screen time in healthy young children.

DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children 2-5 years attending well-child visits were recruited between Sept 2008 and Sept 2009 through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. Questionnaires on demographics and child and parent health and lifestyle factors were administered. Prolonged bottle use was defined as bottle use (daytime or nighttime) beyond 2 years of age. The primary outcome was daily screen time which was defined as the sum of weekend and weekday screen time divided by 7.

RESULTS: 1006 children between 2 and 5 years were recruited. Mean age was 44 months, 501 (50%) were male and 234 (23%) were using a bottle. Compared to children not using the bottle, those using the bottle were younger (40 vs. 45 months, $p < 0.0001$), were of similar sex (54% male vs. 49%, $p = 0.26$), and had similar level of maternal education (88% with postsecondary degree vs. 90%, $p = 0.31$). Children with prolonged bottle use had a mean daily screen time of 77 minutes vs, 58 minutes in children not using the bottle, $p = 0.01$. Age adjusted difference in daily screen time was 19 minutes (95% CI: 9 29 minutes). Children with prolonged bottle use were roughly twice as likely to watch TV during dinner on weekdays (24% vs. 13%, OR 2.1, 95% CI:1.4-3.1)) and on weekends (23% vs. 14%, OR 1.8, 95% CI: 1.2-2.7).

CONCLUSIONS: Prolonged bottle use is an easily identifiable marker of excessive screen time. Screen time counseling in addition to bottle cessation should be considered for children who are using the bottle beyond 2 years of age.

142
EFFECTS OF BREASTFEEDING AND MATERNAL SMOKING DURING PREGNANCY ON BODY MASS INDEX (BMI) TRAJECTORIES AMONG CHILDREN IN CANADA

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BACKGROUND: Research has suggested that breastfeeding and maternal smoking, among other factors, can impact child overweight and obesity. Breastfeeding has been identified as having a protective effect. Smoking during pregnancy has been associated with higher odds of childhood overweight.

OBJECTIVES: To examine how smoking during pregnancy and breastfeeding, two key modifiable factors associated with maternal behaviour, affect body mass index (BMI) trajectories among young children between the ages of two and 11.

METHODS: We conducted secondary data analysis of the National Longitudinal Survey of Children and Youth data collected from 1994 to 2002. Analysis was based on a sample of over 3,500 two-year old children who were followed until the age of 11. Multi-cohort latent growth modeling techniques for data with individually varying times of observations were employed. To assess an independent effect of smoking and breastfeeding on BMI trajectories, the following child- and family-level covariates were included: child's weight and health status at birth, pregnancy length, maternal diabetes, as well as mother's age and socio-economic status. We also examined gender and ethnic differences in the BMI trajectories by comparing Aboriginal and non-Aboriginal children, by gender.

RESULTS: Overall, between the ages of two and 11, the estimated BMI trajectory followed the expected U-shaped pattern. BMI trajectories varied significantly across children in terms of the baseline scores and the linear growth parameter. In the unadjusted models, smoking was associated with higher child BMI score at baseline, while children who were breastfed had, on average, lower BMI score at baseline. Neither of the two risk factors had a statistically significant effect on growth parameters associated with the BMI change between the ages of two and 11. Adjusting for the effects of background variables, the association between breastfeeding and BMI at age two was still statistically significant. The effect of smoking, however, became non-significant. Finally, there were some gender differences and differences between Aboriginal and non-Aboriginal children both in terms of the shape of BMI trajectories and effects of background variables on these trajectories.

CONCLUSION: Both maternal smoking during pregnancy and breastfeeding were significant predictors of childhood BMI scores. After controlling for a number of covariates, only breastfeeding had a significant effect on BMI growth trajectories for children between the ages of two and 11. These findings suggest that the promotion of breastfeeding could be an important obesity prevention strategy for all children, regardless of their background.

143
"MICRO-RESEARCH" FOR DEVELOPING COUNTRIES: BORROWING FROM THE MICROFINANCE EXPERIENCE

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BACKGROUND: Africa bears one quarter of the burden of disease worldwide, yet has barely 3% of all health workers. A recent WHO 'Call to Action' urged funding agencies to develop research capacity in Africa and recommended that community organisations be included in the research process. However, lack of access to funds has hampered the health research studies needed to improve local quality-of-care. A new model for research funding is desperately needed. The microfinance concept of Muhammad Yunus has generated economic opportunities in developing nations by giving impoverished citizens access to capital to start new small businesses. Borrowing from this principle, micro-research could offer researchers small grants to address relevant, local health research questions; community-based participatory research (CBPR).

OBJECTIVE: A pilot program has been launched, between Canadian and Ungandan research organizations and Universities to assess the potential of micro-research to enhance research capacity.

METHOD: The program provides research education (through a face to face workshop and ongoing internet curriculum), mentoring, seed funding ($2-4,000 per project) and ongoing peer-to-peer interaction. The goal of the micro-research approach to CBPR is to build research capacity and foster a culture of inquiry applicable to local health care needs and decision making. Local interdisciplinary groups set the priorities, develop a proposal and assess the outcome of each project.

RESULTS: A research capacity workshop with 22 participants was completed, a web based curriculum for ongoing support is 75% complete, 2 CBPR projects were started with grant support from peer review process.

CONCLUSION: Bureaucracy in micro-research will be kept to a minimum. The major focus will be on the local outcomes: research capacity enhancement, local applied health research questions addressed and health improvements achieved through application of research findings. As with microfinance, spinoffs from micro-research will likely start slowly but, with time, become significant, reaching areas of the world where the need is greatest for improved health.

144
CONTRIBUTIONS OF A CANADIAN ABORIGINAL COMMUNITY TO THE DEVELOPMENT OF A PEDIATRIC GLOBAL HEALTH PARTNERSHIP IN UGANDA

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BACKGROUND: The First Nations community of Hartley Bay in remote northern British Columbia was the first aboriginal community to partner with our pediatric residency program to deliver child health education under the umbrella of the Brighter Smiles Program. This partnership proved that a "Health-promoting School" could successfully employ a school-based oral health program to reduce the incidence of childhood caries. A health-promoting school recognizes that social, economic and environmental factors influence a child's health, and facilitates healthy development, knowledge, sound practices and positive vision and behavior. This model was expanded to address other health issues of community concern, and is now integral to the successful translation of the Brighter Smiles Program into a global health partnership in Uganda.

METHODS: The pediatric residents live in the community for several days each planned visit to contribute to educational content and health care delivery, and gain unique insights of life in the community. Elder, resident and faculty held dialogues in the community and worked together to address low immunization rates, poor nutritional practices and risk factors for obesity and diabetes. The impact and evaluation of the program in this community over a 5 year period led to an international request to implement health-promoting schools in communities in Uganda. The Brighter Smiles Africa Program was instigated in 2006 with teams from our university collaborating with a university in Kampala, Uganda for 4 weeks each summer. The Hartley Bay Canadian community became the training platform to prepare our faculty and resident team leaders and medical and dental students prior to embarking to Africa. This included orientation to health-promoting school activities, participation in health education, oral-health program delivery, cultural exchange, and team-building.

RESULTS: From 2006-2009 a total of 25 residents, medical and dental students have experienced 3 days training in the aboriginal community. The value of the training rated as 4.7 out of 5 by Likert scale, indicating its highlight for each team. This experience enabled the teams to understand key logistic and educational concepts and to plan effectively for program delivery to 5 Ugandan communities working together with university partners in Uganda. In 2009 elementary school children of Hartley Bay added another dimension by writing pen-pal letters describing their life and community for children in Uganda towards for mutual education and cultural exchange.

CONCLUSIONS: The commitment of a Canadian aboriginal community within a Canadian child health initiative has provided trainees with unique opportunities for insight, and practical lessons on the evolution of a global health educational partnership.

145
ANTHROPOMETRIC MEASUREMENT OF SCHOOL-AGED CHILDREN IN GUYANA, SOUTH AMERICA

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BACKGROUND: Little is known about the growth of school-aged children in Amerindian communities in rural Guyana and whether short stature and underweight affect this population.

OBJECTIVES: To determine the point prevalence of short stature, underweight and low body mass index (BMI) in school-aged children in the Rupununi region of Guyana, South America and to assess whether there are differences by gender or village type.

METHODS: A cross-sectional study of all children aged 3-18 years screened in April 2009 at mobile medical clinics in Amerindian communities in the Rupununi region of Guyana. Length and weight were measured on all children in one urban, one rural and three remote communities. The point prevalence of children who were short-statured (height-for-age < –2SD), underweight (weight-for-age < –2SD) and who had low BMI (BMI for age < –2SD) were calculated using the Centers for Disease Control and Prevention (CDC) reference tables.

RESULTS: 1021 children were measured; 32 were excluded due to missing data points. The point prevalence of short stature, underweight and low BMI were similar in males and females. 24.7% of children had short stature (23.9% males, 25.4% females), 10.5% were underweight (10.8% males, 10.2% females) and 2.2% had low BMI (2.0% males, 2.4% females). On analysis by community type, the point prevalence of short stature was 9.0% for urban, 20.0% for rural and 34.9% for remote villages. The point prevalence of underweight was 6.0% for urban, 5.2% for rural and 18.1% for remote and of low BMI was 4.5% for urban, 1.8% for rural and 1.2% for remote communities respectively.

CONCLUSIONS: Short stature was common in this population (24.7%), however, underweight and low BMI were less prevalent. Short stature, in the absence of associated underweight or decreased BMI, suggests a genetic basis and is unlikely to be related to nutritional deficiency. Urban villages had less short stature and underweight but a higher prevalence of low BMI, whereas remote communities had a lower prevalence of low BMI but a higher prevalence of short stature and underweight. This may reflect the increased racial diversity in the urban centre compared to the exclusively Amerindian population in remote communities.

146
WHAT GAPS EXIST IN THE ACQUISITION OF CLINICAL COMPETENCIES DURING PEDIATRIC RESIDENCY TRAINING?

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BACKGROUND: The fundamental objective of pediatric residency training education is to provide physicians with the knowledge and skills required for their future practice in Pediatrics. In order to meet this objective, training must encompass the necessary breadth and depth of content, as well as length of training.

OBJECTIVE: The purpose of this study was to identify the clinical competencies that are acquired during pediatric residency training to enable graduates to practice as consultant pediatricians in Canada, and to identify gaps in preparedness.

DESIGN/METHODS: Pediatricians certified by the Royal College of Physicians and Surgeons of Canada (RCPSC) between June 2004 and June 2008 were invited to complete a web-based questionnaire on 92 clinical competencies associated with pediatric practice. The questionnaire was based on the pediatric objectives of training of the RCPSC with a focus on clinical competencies (diagnosis, management and performing tasks/procedures). Pediatricians were asked to rate the importance of the competency and how well prepared they were at the start of their pediatric consultant practice on a Likert scale of 1 to 5. Comparisons were made between the importance and acquisition of the competencies.

RESULTS: The survey response rate was 43% (187/435). Overall mean scores for all competencies were: importance 3.61; preparedness 3.29; and gap score 6.40%, p <.001. Competencies rated as very important (mean > 4.0) and with gap scores (between importance and preparedness) of ≥ 5% included: crisis resource management (18.2%), ethics applicable to provision or withholding clinical care (12.2%), need for urgent consultation and/or transport (10.2%), failure to thrive, growth problems, gastro-esophageal reflux (5.8%) and diagnosing/managing shock (5.0%).

Disciplines with defined competencies and/or clinical competencies with gap scores > 10% included: allergy and immunology; behavior and development; cardiopulmonary resuscitation and airway management; cardiology and ECG interpretation; diagnostic imaging interpretation; hearing loss and hearing assessment; hypertension; obtaining intravenous access; mental health; obesity; ophthalmology; quality assurance and practice-based improvement activities; and thoracentesis and chest tube placement.

CONCLUSIONS: Our results indicate that certain competencies need more emphasis during residency training and pediatric programs need to make changes to adequately prepare residents for independent practice.

147
ENHANCING RESEARCH SKILLS FOR POST-GRADUATE PEDIATRIC TRAINEES: IMPLEMENTATION OF A PEDIATRIC RESEARCH CURRICULUM

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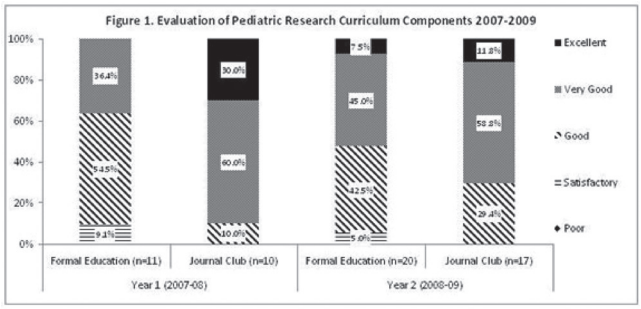
OBJECTIVES: Our purpose is to develop, implement and evaluate a research curriculum for pediatric trainees designed to improve research knowledge and skills.

BACKGROUND: Clinical Research is at the core of evidence-based practice. Health Services Research, Knowledge Transfer and Practice Audit are key features to establish and maintain good clinical practice. Pediatric residents and fellows must understand these features and become involved in research projects to acquire the knowledge, skills and competence to become better practitioners who are able to engage in their own research projects.

DESIGN/METHODS: The Research Curriculum has been in place for 2 years: 2007-09. It is mandatory for all new paediatrics residents and offered to sub-specialty residents and fellows. The curriculum includes the following components: 1) Formal Education (monthly) of clinical research/epidemiological fundamentals are presented by faculty members; each 3 hour session includes a lecture on health quality improvement/practice audit, followed by group discussion; 2) Journal Club (monthly) is structured to introduce and review key research methodologies and address important pediatric issues; 3) An Independent Research Project is a key component that should culminate in conference presentations and publications. At the midpoint of the research curriculum, trainees are solicited for feedback to assist with future planning and adjustments. Survey information collected from trainees identified their research background, attitudes towards research, baseline research knowledge, and areas of research interest.

RESULTS: All curriculum components were evaluated on an on-going basis. In Year 1 the new curriculum was well-accepted:1) Formal Education [91% Good or Very Good]; 2) Journal Club [30% Excellent; 60% Very Good; 10% Good]. In Year 2 overall evaluation was similar to the first year: 1) Formal Education [7.5% Excellent; 87.5% Good or Very Good]; 2) Journal Club [12% Excellent; 59% Very Good, 29% Good]. Results are summarized in Figure 1.



CONCLUSIONS: The Pediatric Research Curriculum is part of a broader effort at our institution to develop excellence in pediatric practice through clinical research and practice audit while also developing interest in research and academic careers amongst pediatric trainees. The evaluation of the research curriculum shows improvement since implementation and feedback from trainees continues to be positive. Implementation of the research curriculum for our pediatric trainees addresses the need for strengthening the scientific foundations of clinical practice.

148
CANADIAN PEDIATRIC SIMULATION PROGRAMS: A NATIONAL SURVEY AND NEEDS ASSESSMENT

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INTRODUCTION: The field of simulation has shown incredible growth around the world over the past decade. In Canada, pediatric hospitals all across the country are starting to use high-fidelity simulation as part of their various training programs. Our research aims to assess the current state of pediatric simulation in Canada, and to perform a needs assessment for these programs.

METHODS: A 12-item multiple choice survey was distributed via email to simulation program directors or simulation education leaders from 11 pediatric hospitals across Canada. The survey was designed to obtain information about the current state of pediatric simulation programs at these various centres, as well as to perform a needs assessment for planning future projects to help advance pediatric simulation on a national level.

RESULTS: The survey was completed by one representative (simulation program director or education leader) from each of the 11 Canadian pediatric hospitals surveyed. Ten out of the eleven (91%) hospitals surveyed reported having simulation equipment available to them. 55% (6/11) of the programs reported having 3 or more high fidelity pediatric simulators. Nearly all of the programs (82%, 9/11) are running in-situ simulation in actual patient care spaces. Over half of the programs have successfully integrated simulation-based education into Pediatric Advanced Life Support courses (55%, 6/11). The majority of programs surveyed are currently using simulation to run interprofessional team training sessions

(82%, 9/11). Finally, the top 3 barriers preventing Canadian simulation programs from moving forward over the next 5 years were identified as: lack of dedicated funding, lack of qualified instructors and associated training, and overall lack of support from hospital administration.
CONCLUSION: The results of this survey confirm the widespread use of simulation as an educational tool in most Canadian pediatric hospitals. Further growth of simulation in Canada will be dependent upon increased financial and administrative support at hospitals, as well as the development of a national instructor training course.

149
TEACHING CLINICAL SKILL ASSESSMENT OF NORMAL CHILD DEVELOPMENT TO MEDICAL STUDENTS: AN INTEGRATED, EVIDENCE-BASED APPROACH

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BACKGROUND: A review of medical education literature describes many gaps in self-reported knowledge and clinical skills related to childhood development for learners at all levels. Although observation of live patients, use of video clips and screening tools, and small-group case discussions all have some documented success, each has its own drawbacks. We have integrated several published strategies into a small group clinical skills learning experience for second year medical students. Use of a combined approach addresses practical and logistical problems of approaches used individually.
METHODS: Second year medical students are divided into groups of 8 - 10 for a 2-hour clinical skills block in normal child development. Groups rotate though four 30-minute stations, each set up in a clinical teaching unit room with a volunteer parent-child dyad, appropriate toys, and a preceptor. The four developmental stages represented are infant, toddler, pre-schooler and kindergarten. Parents interact normally with their child and provide developmental history as requested. The preceptor's role is to encourage interaction between the parent-child dyad, to help students make naturalistic observations about development and ask appropriate history, and to demonstrate the use of a screening tool, the "Ages and Stages Questionnaire" (ASQ). Rooms are also equipped with a computer and flat screen TV with immediate access to DVD video clips for back-up should there be not enough "live" parent-child dyads, if a child becomes ill at the last minute or if during the session a child becomes fatigued or non-cooperative. DVDs were prepared in advance by one of the preceptors using volunteer families; the content mirrors the ideal educational experience had the live family dyad been available.
RESULTS: Medical student evaluations using a Likert scale (1 = low, 5 = high) have rated the experience consistently 4/5 or greater. Student comments were strongly positive, especially about use of live parent-child dyads.
CONCLUSION: This integrated approach combines some of the best developmental teaching strategies from the literature in a format that is highly acceptable to medical students. Video clip usage to supplement live dyads preserves the interaction and immediacy of a clinical encounter while maintaining consistency in content. Clear written objectives and use of a standardized screening tool are identified as helpful to students. Further work needs to be done to evaluate whether a pre-clinical learning experience affects approach to real families in the core paediatric rotation and whether knowledge is carried forward into practice after graduation.

150
USE OF SIMULATION IN THE DEVELOPMENT OF A VALID AND RELIABLE PEDIATRIC RESUSCITATION TEAM LEADERSHIP EVALUATION TOOL

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INTRODUCTION: Competence as a leader of a pediatric resuscitation is challenging to assess during residency training due to the rarity of clinical opportunities as well as the complexity of the construct of resuscitation team leader competence. With the ability to provide standardized high fidelity clinical experiences using patient simulation, the greater challenge is now to provide educators with a valid and reliable evaluation tool. This study set out to develop such a comprehensive tool.
METHODS: Phase I: Using Delphi methodology, eight pediatric acute care experts participated in the development of a comprehensive evaluation tool. An extensive list of potential contributing items was developed from the literature and from an initial brainstorming meeting. Items were refined to produce a final evaluation tool containing only items of high importance and observability by consensus through the Delphi method. Phase II: Thirty pediatric residents were video recorded leading two standardized resuscitation scenarios on a high fidelity human patient simulator. The tool was piloted using randomly selected videos. Following piloting, three expert raters blinded to resident level of training independently rated resident leadership performance using the newly developed tool. A fourth expert rater used a global rating score. Evidence for the tool's face and content validity were built through use of the Delphi methodology in the tool's creation. Criterion validity, construct validity, reliability and generalizability were also measured.
RESULTS: An initial list of 58 potential items was reduced through two rounds of Delphi to 26 items divided into two sub-scales: leadership and communiction skills (Part 1), and knowledge and clinical skills (Part 2). Cronbach's alpha was found to be 0.818 for total scores, 0.827 for Part 1 and 0.673 for Part 2. Generalizability coefficient was 0.760, 0.844 and 0.482 for total, Part 1, and Part 2 scores respectively. A minimum of two raters and two scenarios were found to be necessary for stability of scores for the entire tool. Interrater reliability showed a medium to large strength of correlation for total scores, large strength of correlation for Part 1 scores and small to medium strength correlation for Part 2 scores. No significant difference was found for scores between scenarios. The correlation coefficient for global rating scores and evaluation tool scores was 0.702. Exploratory factor analysis supported the two subscales established in Phase I.
CONCLUSION: A 26-item evaluation tool with two subscales was created and tested. Evidence was built for the tool's reliability and validity, with Part 1 performing better than Part 2. These results support the ability validly evaluate pediatric resuscitation team leader competence using simulation.

151
PEDIATRIC SIMULATION IN CANADA - A VISION FOR THE FUTURE: A REPORT FROM THE CANADIAN PEDIATRIC SIMULATION NETWORK

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INTRODUCTION: The field of patient simulation has shown incredible growth across Canada over the past decade, especially at pediatric academic centres. Following the success of other academic networks, the Canadian Pediatric Simulation Network (CPSN) was developed to promote multi-centre collaboration on education and research projects. A recent meeting of the network was held September 2009 in Vancouver, British Columbia. This report attempts to define the upcoming vision for the network, and includes both the results of the focus groups as well as an evaluation of the meeting itself.
METHODS: A total of six focus groups were held during the 2009 CPSN meeting. The topics were: curriculum development, instructor training, leadership and team training, research, patient safety and innovation in simulation. Focus groups were asked to identify action plans for the next 3 to 5 years in an attempt to move pediatric simulation forward in Canada. At the conclusion of the meeting, participants were also asked to complete evaluations for several aspects of the meeting. Summative statements were rated on a 5-point Likert scale by participants.
RESULTS: Each focus group identified several possible suggestions to help advance the field of simulation in Canada. One theme identified by the focus groups was the need to standardize delivery of simulation-based education across Canada. This was reflected in several suggestions: development of a simulation-based acute care curriculum for pediatric residency programs, development of a national interprofessional team training course, and development of a national simulation instructor training course. The other underlying theme was the need for more collaboration between individual centres, including the need for multicenter research, in

education and patient safety. In terms of evaluation, participants felt strongly that the results of the focus groups were important, and that the network would be helpful in moving these initiatives forward on a national level (4.5/5). Participants also felt strongly that the meeting gave them ideas to help improve simulation at their own centres (4.85/5). Overall, participants felt the meeting would foster more collaboration at a national level (4.75/5), and recommended that it would be beneficial for the network to meet on an annual basis (4.7/5).

DISCUSSION: The results of focus groups held at the CPSN Network meeting confirm the importance and value of developing a network to address academic barriers in both education and research, discuss solutions to these barriers and their implementation, and promote on-going collaboration. Participants suggested this network meet on an annual basis.

152

IMPACT OF PARTICIPATION IN SIMULATED PATIENT RESUSCITATIONS ON PEDIATRIC RESIDENTS' CONFIDENCE

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INTRODUCTION: Given the infrequency of pediatric cardiorespiratory arrests, the knowledge, skills and confidence necessary for leading a successful resuscitation of acutely ill children must be taught through a curriculum designed to provide pediatric residents with the experiences they require, but are unlikely to obtain exclusively at the bedside. Currently, pediatric residents feel their knowledge and skills in pediatric resuscitation are insufficient, and lack confidence in their ability to manage pediatric cardiorespiratory arrests. New evidence suggests that a simulation-based curriculum might have a significant impact on confidence. The objective of this study was to formally assess the impact of participation in simulated pediatric cardiorespiratory arrests on pediatric resident confidence.

METHODS: Pediatric residents at the University of Calgary participated in four different structured simulated resuscitations during the study. Confidence assessment questionnaires were completed by all residents pre and post simulated patient encounters. Residents were asked to record their confidence on a visual analog scale for 32 different aspects of resuscitation, including leadership and communication skills, technical skills, clinical skills, and specific resuscitation knowledge.

RESULTS: Statistically significant increases in confidence were measured across all aspects of resuscitation care: clinical skills (61.3 vs 73.4, 20% increase; $p<0.001$), technical skills (40.7 vs 63.0, 68% increase; $p=0.001$), knowledge (43.8 vs 63.5, 45% increase; $p<0.001$) and leadership (38.1 vs 65.0, 72% increase; $p<0.001$). Specific items that showed the most significant improvement were: confidence in the ability to perform defibrillation (172%), synchronized cardioversion (139%) and needle decompression (70%); confidence in the ability to manage pulseless arrest (56%) and wide complex tachycardia (55%); and confidence in the ability to establish self as leader of the code team (105%), retain control of the code team (86%), make definitive decisions during a resuscitation (76%), communicate clearly (70%), establish crowd control (66%), elicit feedback from team members (62%) and use team members effectively (62%). As a group, leadership skills showed the most significant improvement overall, with all 8 of the leadership items in the top 10.

DISCUSSION: The most significant increases in confidence were found in items dealing with critical elements of resuscitation team leadership and elements needed to manage the most infrequent events in the pediatric population. Significant increases were also seen in the other domains of resuscitation: knowledge, technical skills and clinical skills. This supports using simulation in improving confidence in managing infrequent events and infrequently used skills.

153

EVALUATION OF AN INTERPROFESSIONAL SIMULATION TRAINING PILOT BETWEEN NURSING STUDENTS AND MEDICAL STUDENTS ROTATING THROUGH PEDIATRICS

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INTRODUCTION: Interprofessional team training has become a significant focus for simulation programs. There is good evidence that teams that train together may perform better in actual situations due to a greater understanding of the roles, abilities and limitations of other health care professionals, a better opportunity to practice communication and teamwork skills, and the greater ability of a team of professionals to troubleshoot and identify the issues and barriers to success. This pilot project incorporated team-based interprofessional training early in the formative training of health care professionals by combining final year medical students in their clinical clerkship rotation in pediatrics with third year nursing students rotating through pediatrics.

METHODS: Over one academic year, simulations sessions were held for both nursing and medical students from the University of Calgary during their clinical rotations in pediatrics. Working as a team, they performed two common pediatric acute care scenarios, followed by a common debriefing. The students were asked to evaluate the pilot using a standard evaluation tool, including scoring elements on a 5 point Leikert scale in regards to the organization and delivery of the simulation event as well as an opportunity to provide comments about their positive and negative experiences.

RESULTS: A total of 88 students completed the evaluation. On a scale of 1-5, with 1 being poor and 5 being excellent, the following ratings were given by the nursing and medical students respectively: overall quality of the simulation experience (4.52 and 4.53), organization of the simulation event (4.32 and 4.53), appropriateness of scenarios (4.34 and 4.71), usefulness of the scenarios for learning (4.61 and 4.82), helpfulness of the post-scenario debriefing (4.73 and 4.71), and the respect felt by the learners (4.39 and 4.94). In the freehand comments, almost 30% of students commented on the positive aspects of this interprofessional training experience on their learning, including: the focus on teamwork, communication and collaboration, the fact that involving other professionals made the experience feel more realistic and made for a better learning opportunity, and the opportunity to appreciate the way the other professionals work through problems, among others. Some reflected on previous simulation experiences without other professionals and commented on the usefulness of this session in comparison.

DISCUSSION: The consistent rating in the very good to excellent scale across the ranking statements and the extremely positive comments specifically related to the interprofessional involvement in the simulation experience supports the use of this type of education early in the formative training of health care professionals.

154

NEONATAL TRAINEES' ABSTRACTS TO FULL MANUSCRIPTS – ENABLERS AND DISABLERS: LESSONS FROM A LARGE NEONATAL TRAINING PROGRAM

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BACKGROUND: Annually, 5-10 new fellows join a two-year fellowship program in Neonatology at the University of Toronto from different countries. Around 70-80% of them engage in research activities and present abstracts. A few of them progress to full manuscripts.

OBJECTIVE: To study trainee and supervisor perspectives for success and failure of conversion of abstracts to full manuscripts.

DESIGN/METHODS: Abstracts presented by fellows were identified from abstract books of PAS, Hot Topics and Canadian Paediatric Society meetings between years 2000 and 2005. Primary author (fellow) and senior author (supervisor) for each abstract were asked to complete a web-based survey which explored enabling and disabling factors.

RESULTS: Of 187 abstracts identified to be presented, 62 (33%) had fellow as a primary author. Of these, 42 (68%) fellows and 50 supervisors

(81%) responded. 21 (50%) fellows and 19 (39.6%) supervisors responded success in converting abstract to a manuscript.
FELLOWS' RESPONSES: There were no differences between fellows who had their abstract published and who did not in terms of their age, primary language, or prior training, position or experience. Thirty (71%) were retrospective studies (12 published), 5 (12%) were basic science studies (4 published), 4 (10%) were prospective clinical studies (all published), one was systematic review (published) and two did not report study type. A good idea, supportive supervisors and practical design were the most important enabling factors. Limited time for research and limited data collection for abstracts only were main disabling factors. To enhance the productivity fellows' suggested to provide research training, designated time and making publication mandatory for obtaining completion certificate.
SUPERVISORS' RESPONSES: Adequate research time, fellows' interest and efforts were the main enablers for publication. Most (74%) of supervisors reported < 60% contribution to the manuscript. Limited data collected for abstracts only and lack of interest on fellow's part were the main disabling factors. To enhance productivity, supervisors recommended research training and designated research time for fellows.
CONCLUSIONS: A good research idea, proper research design, research methods training and designated research time are the most important enablers for successful publication in a neonatal training program with trainees from diverse backgrounds and limited training duration.

155
TRAINEES' PERSPECTIVES ON AN INTERNATIONAL TRAINING PROGRAM IN NEONATAL-PERINATAL MEDICINE IN SHANGHAI

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BACKGROUND: Although globalization of health care and medical education has led to increasing numbers of international training programs, there are few reports of the impact of these programs on trainees. The International Training Program in Neonatal-Perinatal Medicine in Shanghai is a joint venture of the Canadian Neonatal Network™ and the Children's Hospital of Fudan University (CHFU) in Shanghai. It is endorsed by the Canadian Paediatric Society. Launched in 2004, the program aims to establish a national neonatal training program to train a new generation of Chinese neonatologists, establish national standards for training neonatologists in China and upgrade standards of care and training at CHFU. To date, 49 trainees from hospitals across China have enrolled in this 2-year ongoing program; 19 trainees have completed their 1st year of training in Shanghai, a 2nd year of training in Canada and have returned to their hospitals in China.
OBJECTIVE: To obtain in-depth information on the training program to determine its impact on trainees, in particular whether it has led to changes in their clinical practices and in the NICUs where they work.
DESIGN/METHODS: In 2009, a focus group interview was conducted in Chinese at CHFU with 17 trainees who completed training in Shanghai and Canada. In addition to discussing their satisfaction with the program, trainees were asked about the program's impact on their medical skills, knowledge, behaviour, leadership role and ability to effect change. The 3-hour interview was videotaped, translated and transcribed. Using Krueger & Casey's (2000) framework of data analysis for focus group interviews, central themes and issues have emerged and been interpreted.
RESULTS: Among trainees, there was overall satisfaction with the program personally and professionally, although separation from family and adjustment to Canada were challenges. Excellent clinical training, exposure to inter-professional and family-centred NICU care and opportunities for teaching were some of the benefits. Changes made at CHFU were perceived as examples of the positive long-term impact of the program. Continuing programs like this are seen by trainees as the key to promoting change at local hospitals.
CONCLUSIONS: Although challenging for trainees, the program is viewed very positively with many benefits for participants' career development. Further, the program seems to have become part of the changing force in neonatology in China.

156
PAIN IN CHILDREN WITH CEREBRAL PALSY

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BACKGROUND: Many children with cerebral palsy (CP) are known to suffer from pain. Pain detection and grading, in children with CP, is often unclear both in the clinical and research setting. The medical complexity of CP contributes to this difficulty and frequently, the non-verbal nature of the child. Methodologic difficulties in studying pain in CP are evident with different scales and surveys used. Further examination of the determinants and experience of pain are needed in the CP population with a focus on pain scale validation.
OBJECTIVE: The objective of this study was to describe the pain experience in a cross-section of children with CP and compare the simultaneous use of four pain scales.
METHODS: Subjects participated in a cross-sectional study of osteopenia and orthopedic complications in CP. The inclusion criteria were: 2-15 years old and diagnosed with CP of any severity. Questions regarding pain frequency, use of analgesics, the origin of pain as perceived by the caregiver and relative significance of pain were completed by the caregiver. In addition, The Non-Communicating Children's Pain Checklist-Revised (NCCPC-R), the Health Utilities Index Mark 2 and 3 (HUI2 and HUI3) and the Caregiver Questionnaire (CQ) were used to survey the caregivers. The HUI2, HUI3 and the CQ have pain subscales that were calculated separately, with higher scores indicated more pain.
RESULTS: Forty five children completed the pain questionnaires. The mean age was 9.1 years (range 2.5-15), 51% were female, and had GMFCS level 1: 51%, level III: 20% and level V: 29%. On the NCCPC-R, 36 (80%) reported regular painful episodes. Causes of pain included transferring or positioning, joint problems or scoliosis, constipation, reflux and spasticity. The number of subjects using regular analgesia was 12 (27%). In children with regular painful episodes, the mean NCCPC-R score was 10.8 (range: 0-62, s.d. = 16.5); HUI2 pain rating was 1.84 (s.d.=0.86); HUI3 pain rating was 1.76 (s.d.=0.91); and CQ score was 0.98 (s.d.=1.7). The correlation between each of the NCCPC-R, CQ, HUI2 and HUI3 pain scores was significant ($p<0.001$ for all tests). Pain measured by the NCCPC-R significantly correlated with disease specific and general health related QOL as measured by the CQ, HUI2 and 3 ($p<0.05$). The proportion of those in pain and severity of pain were higher in those with more severe CP, however this was not statistically significant.
DISCUSSION/CONCLUSION: These results support previous studies that many children with CP suffer from frequent pain. This study demonstrates significant correlation between the NCCPC-R and pain subscales of the HUI2, HUI3 and CQ. Pain as measured by the NCCPC-R is associated with poorer health related quality of life ratings.

157
PEDIATRIC MULTIPLE SCLEROSIS AND EXECUTIVE FUNCTION

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BACKGROUND: Executive function (EF) is an umbrella term for a range of superordinate abilities that control performance across many tasks, allowing for cognitive efficiency and mental flexibility. Although EFs are commonly affected in multiple sclerosis (MS), little is known about the EF components that are most affected, particularly in pediatric-onset MS patients.
OBJECTIVE: To evaluate the components of EF that are impaired in pediatric MS patients relative to controls, and determine the clinical and neural correlates of impaired EF outcomes.
METHOD: Participants included 32 MS patients (26 females) and 20 controls (17 females) group-matched for sex and age, with a mean age at assessment of 16.2±2.1 years for patients and 15.5±1.9 years for controls. EF components measured were attentional control/working memory, inhibition, attention shifting/cognitive flexibility, information processing, and the behavioural manifestation of EF (as measured by parent-report on the

Behavior Rating Inventory of Executive Function). Multiple linear regression analyses were performed to assess the correlation of impaired EF components with clinical (age of disease onset, disease duration, and total number of relapses) and neuroimaging (T1- and T2-weighted total brain lesion volume (LV), and T2 frontal lobe LV) variables, adjusting for age, sex, and full scale IQ. Lesions were segmented using a fully automated, multi-spectral Bayesian technique, with manual correction where necessary.
RESULTS: Patients had a mean age of disease onset of 12.1±3.7 years, average disease duration of 4.1±3.2 years, and an average of 3.3±2.1 relapses. Relative to controls, MS patients had significantly lower IQ ($t=-3.63$, $p<.01$), and performed significantly poorer on measures of information processing and cognitive flexibility. In MS patients, T2-weighted total brain and frontal lobe LV were significantly associated with all measures of EF, with adjusted r2 values ranging from 0.43 to 0.46 ($p<.01$ for all).
CONCLUSION: EF abilities are significantly reduced in pediatric MS patients compared with healthy controls. Reductions in EFs correlate with total brain and frontal lobe LV, which highlights the impact of inflammatory activity on executive dysfunction in pediatric MS.

158
HELICOBACTER PYLORI INFECTION AND HEADACHE IN CHILDREN

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BACKGROUND: Headache and migraine is a common problem nowadays for an increasing number of children and adolescents. At the last few years, there are some references in the literature about the correlation in adults between headache and Helicobacter Pylori infection.
OBJECTIVES: The investigation of the correlation between headache and Helicobacter Pylori infection in children.
DESIGN/METHOD: A total number of 45 children and adolescents aged 7.5 to 17 years were enrolled. All of them suffered from headache or migraine (international criteria 2001) and they were tested firstly using urea breath test (UBT). From the children and adolescents tested with UBT, 11 of them were found positive for Helicobacter Pylori infection. These 11 children and adolescents were investigated with an upper GI endoscopy and received the proper therapy based on Helicobacter Pylori infected tissue culture and antibiogram. The study was accepted by the hospital ethics committee.
RESULTS: After 4 months of observation, starting 1 month after the end of the anti-helicobacter therapy, all 11 children and adolescents were free of headache and migraine symptoms.
CONCLUSION: Although these are preliminary findings, we can assume that Helicobacter Pylori infection maybe plays a role in the pathogenesis and phenotype expression of headache and migraine in children and adolescents.

159
WITHDRAWAL OF ARTIFICIAL HYDRATION AND NUTRITION IN NEONATES: A CASE SERIES

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BACKGROUND: For families and health care professionals, the decision to withdraw artificial hydration and nutrition in neonates when it is no longer thought to be an appropriate treatment can be a highly intense and challenging experience. A case series of 5 will be presented with preliminary data showing that the average length of survival after feeds and hydration are withdrawn is 13.2 days. A discussion of these charts will include diagnosis, palliative care consultation, comfort assessments, treatments given, ethics, and the psychological impact on the family and medical team.
OBJECTIVE: Currently there is very little research being done in this emerging area of Pediatric Palliative and Neonatal Care. The goals of this presentation are to report the data and information obtained from five cases at a pediatric hospice. Gathering this data is imperative as these decisions are highly complex and are often unspoken due to the nature of the decision itself.
DESIGN/METHODS: Five charts of neonates where the decision was made to withhold nutrition and hydration will be reviewed. Through a comprehensive review process, all progress notes, comfort logs, treatments, and interdisciplinary assessments will be analyzed.
RESULTS: The average length of survival after withdrawal of artificial hydration and nutrition is 13.2 days (the longest being 26 days and the shortest being 3). Four of the five neonates had Severe Hypoxic Ischemia and one Severe Bowel Atresia.
Each neonate had an initial Pediatric Palliative Care Consult done and all families were included in a Family team meeting prior to their admission to the hospice.
CONCLUSIONS: This case series illustrates the clinical and psychosocial impact of nutrition and hydration withdrawal in palliative neonates. Future research should be conducted in this area to determine how best to serve this population.

160
AN OUTPATIENT PEDIATRIC PALLIATIVE CARE CLINIC MODEL TO BUILD LOCAL CAPACITY: A 4-YEAR EXPERIENCE AND OUTREACH EXPANSION

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BACKGROUND: Pediatric palliative care encompasses a broad range of services to children and their families living with progressive, life threatening disease. In our setting, organizations partner to provide care to these patients through disease treatment and inpatient palliative care, including routine and emergency respite, acute symptom management, end of life care, and bereavement services. However, there are limitations to these care delivery models. In late 2005, a joint project established an outpatient clinic based at the hospital and staffed by the hospice team.
OBJECTIVES: To describe:

- A 4-year experience providing outpatient palliative care linked to a tertiary hospital and a hospice.
- How this model will influence an expanded program including regional outreach services.
- The impact of the addition of counseling to create a full interdisciplinary team in the outpatient setting.
- The impact and benefit of continuity of care provided by the addition of an outpatient program.

DESIGN: Program evaluation based on records and family satisfaction survey.
RESULTS: Semi-monthly to weekly clinics are held at the hospital, staffed by an inter-disciplinary team consisting of a Pediatric Palliative Care Clinical Nurse Specialist, Counsellor and a Physician. A range of diagnoses have been seen including cancer, metabolic and genetic conditions, and neurodegenerative diseases. Some clinics are conducted jointly with sub-specialty teams on a family-centered basis. A Family Satisfaction Survey was conducted and results include evidence of a high degree of satisfaction with this model. This program has been incorporated into the Hospice Intake and Referral process and has been helpful in assessing appropriateness for a pediatric palliative care program.
CONCLUSION: An outpatient clinic provides a vital link for family and caregivers to the continuum of palliative services being offered between a tertiary care children's hospital and a hospice. The outpatient setting provides an alternative way for children and families to access support from pediatric palliative care health professionals without inpatient admissions. This experience will directly influence the establishment of regional outreach programs and clinics.

161
HEALTHCARE PROFESSIONALS' REACTIONS AFTER A CHILD'S DEATH

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As the medical world aims towards multidisciplinary work, we wanted to extend previous research to describe the impact of the memorable death of a child on all healthcare professionals.

OBJECTIVES: To evaluate the intensity of the grief experienced by healthcare professionals after a child's death, to explore factors associated with a memorable death and to identify the needs of healthcare professionals in dealing with this event.
METHOD: A cross sectional survey using a self-administered questionnaire in a pediatric and neonatology department in a Canadian general hospital. Healthcare professionals completed the questionnaire assessing their emotional reactions to a child's death using the French version of the Texas Revised Inventory of Grief (TRIG), the use of coping strategies, and the expression of their needs when a child dies.
RESULTS: 101 healthcare professionals (22 doctors, 11 pediatric residents, 46 nurses, 13 respiratory therapists, and 9 physiotherapists, social workers, occupational therapists, psychologists, and nutritionists) completed the questionnaire. The present study corroborates many conclusions put forward in other descriptive studies about healthcare professionals' intensity of grief over the loss of a child. Respiratory therapists showed higher intensity of grief after a memorable death, measured by the TRIG, than other healthcare professionals (29.4 +/- 15 vs 16 +/- 14, p= 0.0024). Males had higher early grief score than females (26 +/- 19 versus 17 +/- 14; p = 0.06), although this result was not statistically significant. Younger healthcare professionals (20 to 25 years old) reported higher early grief score than older ones (> 50 years old) (22 +/- 16 vs 10 +/- 8; p = 0.01). If the respondent said he was comfortable caring for a dying patient, his intensity of grief tended to be lower (p = 0.02). There is no significant association between the TRIG score and the fact of being a parent, to have lost a child, to have received formation regarding palliative care, and the length of the relation with the children and his family. Seventy percent talked with their colleagues about the death and 48% with family and friends. Many respondents (37%) answered that this social support helped them the most to overcome this hardship.
CONCLUSION: For healthcare professionals, bereavement after a memorable death is intense. Difference between different professions raises concern about their training and the emotional support received following the death of a patient. We suggest that work-place-based training and debriefing sessions after the death of a patient should be more available for all healthcare professionals.

162
WITHDRAWAL OF VENTILATION IN A NON-ICU SETTING: MORE THAN A PROCEDURE, IT'S A PHILOSOPHY OF CARE

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BACKGROUND: Withdrawal of ventilation in a non-ICU setting in pediatrics has not been previously described. The emergence of pediatric hospice and home-based programs over the last 10 years have made the withdrawal of life-sustaining therapies in a non-ICU setting possible.
METHODS: A retrospective chart review from 2004 to 2009 of all cases of withdrawal of ventilation at one Canadian hospice was conducted. Medical interventions performed and supportive services provided to families were analyzed.
RESULTS: Over a five-year period 18 withdrawals of ventilation occurred in the hospice. There was a significant increase in the number of cases per year over that period. The patients ranged in age from 2 days to 16 years. Diagnoses included: hypoxic encephalopathy, cerebral palsy, metabolic and neuromuscular disease and congenital heart disease. Data collected included interval from extubation to death, drug and withdrawal protocols, psychosocial supports and memory making.
CONCLUSION: Withdrawal of ventilation is possible in a hospice setting. Multiple medical and emotional interventions can be achieved in a more family centered, home-like environment at the end of life. Further study as to the benefits of the setting with respect to patient comfort at the end of life and bereavement needs to be conducted.

163
PEDIATRIC PALLIATIVE CARE: A SURVEY OF PEDIATRICIANS' AND FAMILY PRACTITIONERS' KNOWLEDGE/EXPERIENCE, LEARNING NEEDS AND SELF CARE

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BACKGROUND: Pediatric and general practitioners often lack experience in dealing with the loss of a child. The advances of medicine and technology have brought up new challenges surrounding issues pertaining to the quality-of-life, expectations regarding medical outcomes, and communication difficulties.
METHODS: Two hundred rural and urban pediatricians and general practitioners were randomly selected to participate in a mailed survey. The survey consisted of 30 questions, covering 3 categories: demographic information, experience and knowledge of pediatric palliative care and self-care, and educational needs and preferences for learning.
RESULTS: The response rate was 58.5%. More pediatricians responded than general practitioners (61.9% vs. 38.1%). Only 40.1% of respondents felt their knowledge and experience was adequate. Overall, 73.5% of the respondents reported that they would like to learn more about pediatric palliative care. Topics for learning could be categorized as clinical and symptom management, psychosocial/family and health services/resources. Over 53% of those surveyed preferred that learning were offered remotely through either Internet or correspondence. Adequate or very adequate self-care experiences to meet their own needs of well-being were reported by 74% of respondents.
CONCLUSIONS: The results of the survey will guide the pediatric palliative care community to design programs that will better educate practicing physicians and future physicians about pediatric end-of-life caring, death and dying and parent support. It is also important to note that practicing physicians prefer learning to be offered remotely and at their convenience.

164
PAEDIATRIC ANTIVIRAL DRUG USE DURING H1N1 – ANY CAUSE FOR CONCERN?

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BACKGROUND: The 2009 influenza A H1N1 virus has reached pandemic level, also affecting the paediatric population. In this context, Health Canada issued an interim order for the use of oseltamivir in children under one year of age, given their increased risk for morbidity and mortality from influenza.
OBJECTIVES: To assess if Canadian paediatricians are prescribing antiviral drugs to the paediatric population, including children under one year of age and to document any serious and life-threatening adverse reactions that may be related to the use of oseltamivir and zanamivir in children and youth.
METHODS: The Canadian Paediatric Surveillance Program (CPSP) will conduct two one-time surveys, the first in November 2009 and the second in April 2010 to assess practices related to the use of antiviral drugs in children and youth.
RESULTS: Results will compare prescribing behaviours of Canadian paediatricians at these specific times in order to compare data at the beginning and near the end of the influenza A H1N1 season. Examples of serious and life-threatening adverse reactions will be presented.
CONCLUSION: Children and youth have the right to safe pharmaceutical treatments. An active surveillance program such as the CPSP can detect drug safety signals, and guide recommendations regarding the usage of antiviral medications in the paediatric population.

165
USE OF PDSA QUALITY IMPROVEMENT CYCLE TO DEVELOP INTERPROFESSIONAL ORAL FEEDING GUIDELINES FOR PREMATURE INFANTS

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BACKGROUND: A preterm infant's ability to successfully oral feed is one of the final challenges that must be overcome before hospital discharge. Successful progression of feeding holds great importance for parents and their relationship with their infant. Inconsistent and delayed progression is perceived as emotionally stressful. Delayed progression to full feeding contributes to extended hospital stays and use of finite Neonatal Intensive Care Unit (NICU) resources. This quality improvement (QI) proposal focuses on one team's experience in changing from the current inconsistent process of feeding progression to the development and use of a protocol-driven stepwise feeding guideline.

OBJECTIVE: To improve parent and staff satisfaction with the oral feeding progression of premature infants through development of a consistent step wise process acceptable to multi-professional healthcare providers and parents in the NICU utilising the Plan-Do-Study-Act (PDSA) quality improvement cycle approach.

DESIGN/METHODS: A step-wise oral feeding guideline based on the work of Glass and Wolf (University of Washington) for use in premature infants in the NICU was developed. A rapid cycle QI model was utilised to obtain iterative feedback from staff and parents/guardians to develop and trial the guideline between October 2007 and September 2009. The project was approved by local Health Research Ethics Board. Feedback mechanisms included a Likert scale questionnaire and open comments related to implementation. Frequencies of responses were calculated for the questionnaire and thematic analysis of the open comments was conducted for each of the PDSA cycles. Responses were compared between cycles for change. Demographic and feeding data was collected for a 6 month period prior to the start of the study in 2007 and again in 2009.

RESULTS: 3 PDSA cycles were conducted, with each cycle resulting in modifications to the proposed guidelines. With repeated PDSA cycles the step-wise guideline was seen to have more benefits and less negatives. Satisfaction regarding consistency in following a feeding plan and communication with other staff members and parents did not improve. Preliminary analysis revealed no differences between the preterm NICU population at the beginning and end of the study.

Year	n	Birthweight:grams	Gestation at birth: weeks	Corrected gestation at full oral feeds	Corrected gestational age at discharge
2007	48	1970.5 (520.9)	32.4 (3.0)	36.1 (1.9)	37.2 (2.5)
2009	31	1884.6 (616.4)	32.3 (2.7)	35.9 (1.1)	36.9 (1.3)

Mean (standard deviation)

CONCLUSIONS: An NICU infant feeding guideline has many stakeholders. Developing a structured framework with appropriate flexibility for the individual infant presents a challenge. A PDSA cycle approach can be used in guideline development involving interdisciplinary healthcare professionals. Frequent feedback maintains staff participation. Evidence of improved outcome may support guideline uptake.

166
EVALUATION OF A PATIENT MEDICATION LIST FOR AMBULATORY PEDIATRIC PATIENTS WITHIN A HOSPITAL-BASED COMPLEX CARE SERVICE

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Medication errors are common in the pediatric outpatient setting, with a reported preventable adverse drug event rate of 3 per 100 patients, and children with multiple prescriptions are at increased risk. Since 2005, medication reconciliation in the hospital setting has been an international patient safety priority, but little is known about its application in the ambulatory setting.

The objective was to evaluate a novel Patient Medication List (PML) created for medically complex children with special health needs based on its usability, perceived ability to increase medication knowledge, and content. Caregivers of children followed by a tertiary care hospital ambulatory Complex Care Service from February to November 2009 were enrolled. An electronic PML software was programmed and nested within a comprehensive clinical program database. At the clinic visit, the medications were updated in the database by a nurse practitioner, and a PML was automatically created and printed for the caregivers. Caregivers completed 2 questionnaires, one prior to using the PML and the second 12 wks later.

Results from Questionnaire 1 (n=27) showed that 18 (67%) caregivers expected the PML to be very helpful and 9 (33%) somewhat helpful. 18 (67%) and 21 (78%) caregivers expected the PML to be very helpful at clinic visits and at hospital admission respectively. When asked if the PML will increase their knowledge of their child's medications, 17 (63%) agreed, and 16 (59%) agreed the PML will help them to remember to administer medications at home. 15 of 26 (58%) caregivers already used a similar list. Preliminary results from Questionnaire 2 (n=11) showed that 8 (73%) caregivers found the PML very helpful. However, only 5 (45%) agreed that the PML increased their knowledge about their child's medication and 2 (18%) agreed the PML helped them to remember to administer medications at home. 10 (91%) agreed the PML contains all the necessary information. Informal staff feedback suggests there was a large time investment in the initial implementation, but once integrated into workflow, the PML was easy to use.

In conclusion, parental caregivers for patients in a hospital-based Complex Care Service reported a Patient Medication List is helpful during interactions with their medical team, but it is less helpful in increasing their medication knowledge or reminding them to administer their child's medications at home.

167
USES AND POTENTIAL ADVERSE EFFECTS OF LEVEL III (L3) NICU DISCHARGE SUMMARY (DS) IN LEVEL II (L2) NICU

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BACKGROUND: DS forms the single most important means of communication during interfacility transfer, especially when the recipient physician was not involved in the initial care.

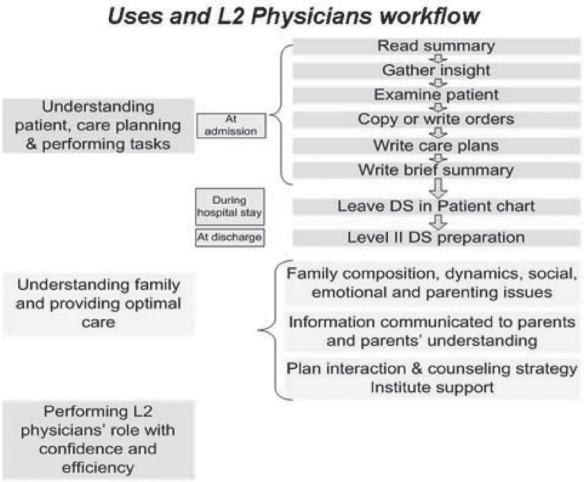
OBJECTIVE: To determine (1) the uses and potential adverse effects of L3 NICU DS in L2 NICU; (2) L2 physicians' workflow in relation to L3 DS.

DESIGN/METHODS: A qualitative study was conducted from 2006 to 2009. Based on literature review, document analysis (30 L3 DSs) and participant observation (12 months in 3 L3) a questionnaire was designed. Semi-structured interviews (n=3) and a focus group (n=5) with L2 physicians were conducted. Audiotapes were transcribed, analyzed qualitatively and results were triangulated to identify emerging themes.

RESULTS: Three overarching themes emerged for the use of L3 NICU DS within the L2 NICU; understanding patient in-depth and providing optimal care, understanding family to plan interactions and institute support, and empowering L2 physicians to perform their role with confidence. L2 physicians considered the psychosocial transition of parents was more challenging and complex than the transition of infant care. Relevant information in L3 DS allowed L2 physicians to meet parents' expectations and align L2 care plans with L3. Physicians' workflow after receiving DS had a consistent pattern; reading, interpretation, gaining insight, physical examination of infant, order entry, care planning, writing admission note, leaving DS in patient chart for future reference, interacting with family, revisiting DS when necessary during L2 stay and finally in L2 DS preparation. Several potential adverse effects affecting the infants' care (vulnerability for under/over investigations and treatment, generic rather than personalized care, missing opportunities for early diagnosis and treatment); family (aggravation of emotional problems and hurt feelings, negative attitude on health care system, suboptimal family support) and physicians (inefficiency, negative feeling and predisposition for committing errors) emerged. Adverse effects were mostly attributable to deficits in content and format of L3 DS.

CONCLUSIONS: Understanding patient and family, followed by decision making and care planning are the major uses of L3 DS. Careful

consideration of L2 physicians' workflow and attention to their information content and formatting needs in a L3 DS may have a role in minimizing potential adverse effects and improving patient safety.



168
MATERNAL ANXIETY SURROUNDING BREASTMILK FEEDS IN THE NICU

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BACKGROUND: Having an infant admitted to the NICU is a stressful experience for parents. Breastmilk can have a positive impact on infants' outcome and therefore mothers are encouraged to pump and provide expressed breastmilk even for the most preterm. In preparation for a quality improvement project in our NICU we assessed if there were any stressors specifically related to the provision of breastmilk as identified by mothers once their infants were medically stable.

OBJECTIVE: To determine if pumping and expressing breastmilk impacts maternal anxiety levels in a tertiary NICU.

DESIGN: Mothers of stable infants in the NICU were asked to complete a validated questionnaire STAI (State-Trait Anxiety Inventory) to assess their degree of anxiety as it related to expressing their breastmilk and potential safety concerns with breastmilk delivery to their infant. There are two components to the STAI, Trait Anxiety and State Anxiety. Mothers' Trait Anxiety levels reflect their proneness to anxiety or their perception of anxiety. Their State Anxiety levels are situation specific and reflect anxiety related to their current circumstance. We asked mothers to reflect upon their breastmilk expression experience and their infant's feeding while completing the State Anxiety section.

RESULTS: Fifty-two mothers completed their surveys. The mean maternal age was 34 years and 63% had no prior breast feeding experience. The mean gestational age of their infants was 31.4 weeks and mean birth weight 1750 grams. Mothers completed the survey at a mean of 32 days post delivery. The Trait and State Anxiety scores were compared using a paired t-test and no significant difference was found (Trait 35.7+/-11.1; State 35.6+/-8.3). These numbers are similar to normative data for females aged 19 to 39 years (mean Trait 35.6+/-9.8; State 36.5+/-10.2). There were however 10 mothers in whom the State Anxiety scores were greater than one standard deviation above their Trait Anxiety scores indicating that breast feeding may be a stressor for them. In contrast one mother added "Pumping gives me a purpose and a way to help my son".

CONCLUSIONS: Despite the significant time commitment, physical stress and discomfort required to pump 8 times per day, we were not able to demonstrate that this task adds significantly to the stress or anxiety of mothers in the NICU. Any interventions designed to improve the process of breastmilk delivery, e.g. barcoding mothers' bottles, needs to be evaluated from the maternal perspective.

169
PHARMACY STUDY OF NATURAL HEALTH PRODUCT ADVERSE REACTIONS (SONAR): ACTIVE SURVEILLANCE INCREASES AR REPORTING AND REVEALS TWO NEW INTERACTIONS

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BACKGROUND: Natural Health Products (NHPs) are defined as vitamins, minerals, herbal medicines, traditional medicines, probiotics, amino acids, and fatty acids. Patients using NHPs concomitantly with prescription medications are at risk of experiencing adverse events (AEs) due to herb-drug interactions. We have launched a prospective community-based active surveillance study to identify NHP AEs, particularly NHP-drug interactions.

PURPOSE: To conduct an active surveillance model in community pharmacies to systematically detect adverse events (AEs) associated with the use of natural health products (NHPs) and NHP-drug interactions and assess the feasibility of this surveillance model.

METHODS: Pharmacists were instructed to ask each person dropping off or picking up a prescription about NHP use, concurrent NHP-drug use, and the occurrence of any potential AE. Telephone interviews conducted by a study team member were used to follow up if an AE was reported.

RESULTS: 2480 patients have been screened, 946 reported using drugs and NHPs concurrently, 65 were identified as having suspected AEs, 27 agreed to participate in the in-depth interview, and 15 have been interviewed. Two not previously described NHP-drug interactions have been identified and the CYP450 pharmacokinetic mechanism has been analysed.

CONCLUSION: Active surveillance of NHP-drug interactions and NHP-related AEs in community pharmacies is feasible and effective to increase number of reports multiple thousand fold as compared to passive surveillance and discover unknown pharmacokinetic and pharmacodynamic interactive potential.

170
USE OF MEDICATIONS FOR PEDIATRIC SLEEP DISTURBANCES IN ALBERTA

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BACKGROUND: Sleep disturbances in infants and children is one of the most common problems pediatricians encounter in clinical practice. U.S. studies have shown that the use of medications for treating children with sleep problems is common practice. No similar data exists in Canada.

OBJECTIVES: Our aim is to examine prescribing practices, beliefs and attitudes of pediatricians and pediatric subspecialists in treating sleep problems in children.

METHODS: The Revised Pediatric Sleep Medication Survey was mailed to 465 practicing general pediatricians and pediatric subspecialists in Alberta in 2008.

RESULTS: After 2 mail outs, 165/465 (35%) were returned. 36 were excluded from the analysis because of incomplete data. The final sample of 129 were: general pediatricians (36%) and pediatric subspecialists (58%). On average, 7% (SD = 16%) of practice visits were for significant sleep problems. 44% of physicians had recommended over-the-counter medications and about 51% recommended prescription medications. Bedtime struggles/delayed sleep onset and insomnia were the most common reasons for medication use. The most common comorbid conditions in which physicians reported medication use for significant sleep problems were in children with special needs: mental retardation/developmental delay (60%), autism (50%) and ADHD (49%). Melatonin was the most commonly used non-prescription medication to treat sleep problems across all age groups. Alpha agonists (Clonidine) were the most commonly used prescription medications for pre-schoolers (18%), school-aged children (30%) and adolescents (24%) but rarely recommended for the infant/toddler age group

(only 2%). Practitioners who treated children with ADHD were more than seven times as likely to prescribe sleep medication.
CONCLUSION: The use of medications is a common practice among pediatricians and pediatric subspecialists for treating sleep disturbances in children in Alberta. Further studies are needed to determine optimal pharmacological treatments for pediatric sleep problems.

171
INTERVENTIONS TO IMPROVE OUTPATIENT FOLLOW-UP IN CHILDREN WITH ASTHMA WHO HAVE ATTENDED THE EMERGENCY DEPARTMENT: A SYSTEMATIC REVIEW AND META-ANALYSIS

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BACKGROUND: Asthma is a leading cause of chronic disease in children associated with morbidity and mortality. There is poor adherence to outpatient follow-up after an emergency room (ED) visit for asthma, which is a key aspect of management endorsed by national guidelines.
OBJECTIVE: Our primary objective was to systematically review the effectiveness of professional, financial and organizational interventions initiated in the ED for asthma-related outpatient follow-up within 1 month in children aged 1 to 18 years old. Secondary outcomes were follow-up from 1 month to 1 year, ED visits, hospital admissions, controller medication use, having an asthma action plan and quality of life.
DESIGN/METHODS: We performed a literature search of MEDLINE, EMBASE, CENTRAL, CINAHL, PsycINFO, Scopus and Science citation index up to October 2009. We included RCTs, quasi-RCTs and controlled clinical trials comparing any intervention vs. usual care in asthmatic children to improve follow-up and asthma-related outcomes after an ED visit. Methodological quality was assessed with Cochrane Collaboration's tool for assessing risk of bias. We calculated pooled relative risk with inverse variance random effects models.
RESULTS: We included 7 RCTs with a total of 1867 children. The methodology was of moderate quality in 6 trials and low in 1. Interventions were clinically heterogeneous and included assistance in making follow-up, telephone contact after the ED visit, specialized clinics, addressing beliefs/barriers to follow-up and coaching with monetary incentives. Any intervention compared to standard care led to increased chances of outpatient follow-up within 1 month (5 trials, RR 1.40; 95% CI 1.06, 1.86). There was no statistical difference between groups for follow-up from 1 month to 1 year (1 trial), asthma-related ED visits at 1 month (2 trials, RR 0.95; 95% CI 0.77, 1.28) or 6 months (2 trials, RR 1.00; 95% CI 0.77, 1.29), asthma-related admissions at 1 year (2 trials, RR 1.45; 95% CI 0.64, 3.28), controller medication use (3 trials, RR 0.96; 95% CI 0.88, 1.05), missed schooldays and workdays, asthma-related quality of life scores and symptoms. One trial reported more asthma action plans with the intervention.
CONCLUSIONS: Moderate quality evidence supports interventions to improve outpatient follow-up within 1 month of an ED visit for childhood asthma. However, these do not necessarily lead to improved long-term outcomes.

172
IS ASPIRATION DURING SWALLOWING MORE COMMON IN CHILDREN WITH INDIGENOUS HERITAGE?

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BACKGROUND: Children with indigenous heritage (IH) have several risk factors that predispose them to lower respiratory tract infections (LRTI). Whether an increased incidence of aspiration during swallowing is also a factor in the occurrence of LRTI in children with IH has not been explored. This study examines which clinical and demographic factors, including IH, correlate with aspiration during swallowing demonstrated on videofluoroscopic swallowing study (VFSS).
METHODS: Ethics approval was obtained from the University of Manitoba Health Research Ethics Board to review the records of 325 consecutive children undergoing VFSS at Children's Hospital Winnipeg from 2004 – 2006 for potential correlates of aspiration during swallowing.
RESULTS: Of the 325 children, 35% percent had IH. The group with IH was younger (27 vs. 30 months, p<.0001) and more likely to have neurodevelopmental impairment than the children without IH (p<.019.) However, there were no differences in health except for LRTI, which affected 60% of children with IH compared to 32% of others. Both on univariate and on logistic regression analysis, LRTI was strongly correlated with IH (p<.0001) and aspiration (p<.0001) on VFSS.
Thirty-seven percent of 325 children demonstrated aspiration during swallowing. Of the 113 children with IH, 49% demonstrated aspiration during swallowing compared to 30% without IH. Both on univariate and logistic regression analysis, the association between IH and aspiration was significant (p<.001).
Thirty-six of the 113 children with IH (65%) who aspirated on VFSS had LRTIs compared to 29 of 64 children (45 %) with demonstrated aspiration who were not indigenous (p<.03).
Thirty-four percent of all 325 children undergoing VFSS had upper airway congestion and 41% had coughing when eating or drinking. This correlation achieved statistical significance on both univariate and logistic regression analysis (p<.0001 and p=.001 respectively).
CONCLUSIONS: While more good quality evidence is required, this review suggests there is an increased incidence of aspiration during swallowing in children with indigenous heritage. Furthermore, children with indigenous heritage who aspirate during swallowing are more likely to have LRTIs than other children, suggesting that aspiration during swallowing contributes to the increased incidence of LRTI in children with indigenous heritage. There is a strong correlation between aspiration and the clinical finding of cough or congestion while eating or drinking, and this should lead to earlier recognition and management of aspiration, thereby eliminating a factor potentially contributing to recurrent LRTI in children of indigenous heritage.

173
FACTORS PREDICTIVE OF HOSPITAL ADMISSION IN PAEDIATRIC PATIENTS WITH ECZEMA HERPETICUM

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BACKGROUND: Atopic dermatitis (AD) is a common dermatologic condition in children that can be complicated by bacterial and viral suprainfections. Eczema herpeticum (EH) refers to Herpes Simplex Virus (HSV) infection superimposed on AD, which presents as a vesicular eruption and can cause significant systemic disease. Currently, there is a lack of clear guidelines for the management of EH, specifically for determining which patients should be hospitalized for intravenous acyclovir and/or because of the severity of their disease.
OBJECTIVES: Our aim is to determine predictors of disease requiring hospital admission.
METHODS: This case-control retrospective study was done by reviewing electronic patient charts for all patients diagnosed with EH (n=122) between May 2000 and April 2009. Patients were excluded if they were not treated for EH. Data collected included: demographics, historical and clinical features, treatment, and outcomes. The primary outcome was hospitalization, and secondary outcomes were recurrence (within 1 month) or repeat episodes (after 1 month) of EH. Statistical analysis (Chi-Square, ANOVA, logistic regression) was performed to determine the association of each variable with hospitalization, as well as which of these were associated with recurrence or repeat episodes.
RESULTS: A total of 79 patients met inclusion criteria and were included in the analysis. The mean age was 4.3 +/- 4.4 years, with 28 patients (35%) 1 year of age or younger. At presentation, 76% had a generalized eruption, 57% had fever, 37% had systemic symptoms, and 10% had eye involvement. Overall, 46 patients (57%) were hospitalized. Predictors of hospitalization included male sex (P=0.03), fever (P<=0.001) and systemic symptoms (P=0.02). Younger age was also a significant predictor, especially if age <1 yr (P=0.001).

There was an 8.8% recurrence rate, and a 12.4% repeat rate. A significantly greater proportion of those with recurrence had systemic symptoms at presentation (P=0.04). In addition, hospitalization was associated with an increased risk for repeat episodes (P=0.02).
CONCLUSION: Our results suggest that EH affects young children, and that hospitalization should be considered for those 1 year of age or younger. Other indications for hospitalization may include fever and systemic symptoms at presentation. Recurrence risk appears highest in those with systemic symptoms, and risk for repeat episode of EH is increased in those who are hospitalized, possibly because of more severe disease at presentation.

174
COMPLEMENTARY MEDICINE IN CANADIAN PEDIATRIC PATIENTS WITH ATOPIC DERMATITIS: A CROSS SECTIONAL SURVEY

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The use of complementary and alternative medicine (CAM) is increasing among patients with atopic dermatitis (AD), despite the lack of safety and efficacy data for these treatments. Our objective was to determine what proportion of AD patients use CAM, which CAM strategies are being tried, which factors have contributed to decision-making regarding the use of CAM and if there are any predictors of CAM use. A detailed questionnaire was administered to parents of children with AD attending clinic at an academic paediatric dermatology center. Two-hundred and six parents participated in the study. Sixty eight percent of patients had used CAM in the past, and 40% were using CAM at the time of the survey. The most commonly used types of CAM were vitamins and topical herbal preparations. When asked about their motivations for using CAM, 66% of participants stated they wished to "minimize their child's symptoms", 42% wanted to "avoid the side-effects of conventional medicines" and 42% wanted "to cure their child's eczema." When asked about the safety of CAM, only 21.6% of respondents felt that CAM was safer than conventional medicine, and 45% of participants felt that CAM was "more natural" than conventional medicine. Forty-three percent of participants believed CAM improved their child's atopic dermatitis, while 71.4% of participants felt that conventional medicine improved their child's AD. Patients with no family history of AD (OR 2.5, CI 1.3-4.7) and parents who believed that topical steroids thin the skin (OR 2.2, CI 1.1-4.4) were more likely to use CAM. In conclusion, parents felt that CAM was "more natural", but less efficacious compared to conventional medicine. CAM use was more prevalent among children with no family history of eczema and children whose parents believed that topical steroids thin the skin. Interestingly, socioeconomic status and ethnicity were not predictive of CAM use.

175
FECAL CALPROTECTIN IN AUTISTIC CHILDREN

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BACKGROUND: Autism is a complexed neurodevelopmental-neurobiological disorder of behaviour, which is characterized from loss in three domains: social behaviour, status of contact-speech, interests. From the other hand, gastrointestinal problems like constipation, diarrhea or vomiting are often seen in autistic children, are very difficult to resolve and we don't know if these are caused by the main disorder (are part of it) or are 'side effects'.
OBJECTIVES: The investigation of the degree of possible inflammation of the autistic children intestine mucosa by measurement of fecal calprotectin levels.
DESIGN/METHOD: A total number of 45 children aged 2.5 to 8 years were checked. All of them were diagnosed with pervasive developmental disorder (international criteria 1994) and were divided in two groups: group-A with mild disorder and group-B with severe disorder. The count of the levels of calprotectin was done in fecal samples using Elisa method. Statistical analysis was performed using SPSS 14.0 statistical software. The study was accepted by the hospital ethics committee.
RESULTS: Statistical significant differences ($p<0.001$) were found in fecal calprotectin levels, between groups A and B and also in comparison with healthy children normal values.
CONCLUSION: Children suffering from pervasive developmental disorder have increased levels of fecal calprotectin. Althouth these are preliminary results, we have much more to investigate this finding by measuring calprotectin plasma levels and examine the gastrointestinal tract by other methods in order to find 'places' of inflammation.

176
IS PERCEIVED INJURY RISK A BARRIER TO PHYSICAL ACTIVITY PARTICIPATION IN CHILDREN?

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BACKGROUND: Recent trends indicate a decrease in physical activity participation and a rise in overweight and obesity among Canadian children, placing children at risk for poor long term health outcomes. In developing strategies to reverse and prevent this trend it is important to understand the potential etiological factors involved. According to the Health Belief Model, the presence of perceived barriers decreases the likelihood of engaging in preventative health practices. One such potential barrier to participation is the injury risk posed by common physical activities.
OBJECTIVE: To examine the association between physical activity participation, body mass index and injury risk perception in children.
DESIGN/METHODS: A cross-sectional study obtained information from fifth-grade students at a public school in Toronto, Ontario. Activity levels were measured using a 24-h recall instrument, the Self-Administered Physical Activity Checklist. Children completed measures of self-reported physical activity (minutes of participation) and injury risk perception (3-point Likert scale) for 25 physical activities and 3 sedentary activities. Height and weight were measured and body mass index was calculated for each child. Correlations were assessed using Spearman's correlation coefficient.
RESULTS: 20 students (9 boys, 11 girls), all of Asian background, participated in the study. Mean age was 10.6±0.6 years. Boys and girls did not differ in any of the reported measures. Although not statistically significant, children perceiving a higher injury risk had a lower self-reported participation in physical activities ($r = -0.313$, $p > 0.05$), a higher level of sedentary behaviour ($r = 0.185$, $p > 0.05$) and a higher BMI ($r = 0.023$, $p > 0.05$) than those who reported a lower perceived injury risk. Reported participation was decreased in activities for which children perceived a higher injury risk ($r = -0.512$, $p < 0.01$). Such activities included hockey, bicycling and football.
CONCLUSIONS: This study suggests there may be an association between children's perception of injury risk and participation in physical activities. This study also acknowledges role of injury risk as a barrier to participation in physical activity. Future health promotion strategies should focus on physical activities that are perceived as safe. To more definitively determine the strength and magnitude of this relationship a larger sample of children from diverse socio-economic areas is required.

177
EVALUATING THE IMPACT OF ONTARIO'S BOOSTER SEAT LEGISLATION AND DETERMINANTS FOR THEIR USE

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BACKGROUND: Motor vehicle collisions remain the leading cause of death and serious injury for children in Canada. In September 2005, legislation was passed in Ontario mandating that all children between four and seven years of age be properly restrained in a booster seat when riding in a motor vehicle.

OBJECTIVE: The objective of this study is twofold: (1) assess the effectiveness of Ontario's booster seat legislation; and (2) understand the determinants of booster seat usage by examining the various family- and community-level predictors.
METHODS: This research utilized population-based telephone surveillance data from the Rapid Risk Factor Surveillance System (RRFSS) Survey: Booster Seat Module. Data on booster seat usage were collected between January 2005 and December 2007.
A multinomial logistic regression analysis was conducted to assess the impact of the legislation on the change in the usage of child restraining devices (car seats, booster seats, and seat belts). A multivariate logistic regression for clustered categorical data was then employed to examine the relationship between compliance with the booster seat legislation and selected predictors. Since age of a child was expected to be the likelihood of booster seat usage, interaction effects between child's age and the predictors were examined.
RESULTS: The percentage of parents of children four to seven years of age who indicated using booster seats when travelling with a child increased significantly, from 56.6% to 69.4%, after the legislation took effect in September 2005. A more detailed analysis indicated that the increase was statistically significant only among six (from 59.0% to 81.2%) and seven (from 38.5% to 76.9%) year-old children. Multivariate analysis of the post-intervention data indicated that parent's age, educational attainment, and income, as well as number of siblings and population density (measured at the census sub-division level) had some effect on booster seat usage. However, the nature of these effects was varied and was dependent on child's age.
CONCLUSION: Although booster seat use increased considerably post implementation of the legislation, a substantial proportion of children six to seven years of age may be travelling unprotected. Thus, an important step in reducing the risk of childhood injuries involves encouraging parents to adhere to the best practices regarding child restraint system use.

178
EDUCATIONAL VALUE OF A COLLABORATIVE ORAL HEALTH GLOBAL UNIVERSITY PARTNERSHIP

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BACKGROUND: For more than 5 years, medical and dental students in a Canadian university have collaborated with peers in a university in Kampala to deliver school-based oral health programs for school children in Ugandan rural villages under the umbrella of The Brighter Smiles Africa Program. The entire collaborative project from its design, to the delivery, to its continual evaluation, creates educational opportunities for not only the subjects served but also participating university students from both countries. The 2009 global program in Uganda included an interactive poster presentation for children linking cavity formation to proper nutrition.
OBJECTIVES: To assess the continual provisioning and impact of a four-year dental study in five rural communities of Uganda.
METHODS: The core educational components include: working with local Ugandans to identify cultural-socially appropriate goals, developing and delivering child oral health promotion that is relevant, learning to implement oral health evaluation methodology (Decayed, Missing, Filled teeth Score–DMFS), providing preventative dental care measures including topical fluoride, and acquiring the problem solving and researching skills in an international setting.
RESULTS: Each year's collaborative teams are comprised of Ugandan dental students, multi-disciplinary Canadian students including: medicine, dentistry, engineering, accounting and post-graduate studies. Team members involved visit the rural communities for health promotion and for provide oral examinations of Ugandan school children. This is followed by written evaluations and personal reflections. All core educational components are highly valued, with particular focus on hands-on experience of provisioning dental care through examinations, DMFS scoring of teeth and topical fluoride application. University students are exposed to a range of oral health pathology which create learning opportunities, stimulate future research ideas and foster cross-cultural interactions. Poor posterior teeth were common among children examined. One suggestion for improvement was to include conduct of minor surgical procedures during oral program delivery.
CONCLUSIONS: The success of the Brighter Smiles Africa Program extends beyond oral implications, as described by a student, "Working with the children and seeing their knowledge and attitudes to oral health change over the years has been amazing." Participating university students have a better understanding of "global citizenship" in the health context. More importantly, initial success reinforces the importance of continual oral health promotion in schools. The established trust and working relationships with local Ugandan students and communities build the necessary foundation for future endeavours, not limited to the dental field.

179
WEB 2.0 AT WORK: BUILDING HEALTHY HOSPITAL POLICY

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BACKGROUND: Many hospitals have banned access to social media (SM) sites (eg. Facebook, YouTube etc.) on hospital computers. Hospital administrators feel that allowing staff to access these sites at the hospital decreases productivity. While restricting access to these sites may optimize efficiency, it does not prevent staff from using these technologies for personal and work-related activities at home, including some activities which may be inappropriate.
OBJECTIVE: To qualitatively describe patterns of SM use and issues encountered by staff at the Hospital for Sick Children in Toronto, Canada.
DESIGN/METHODS: 24 hospital staff, representing a cross section of departments and roles participated in three focus groups. Open-ended written questionnaires and group discussions were used to explore patterns of SM use, rewards and risks. Focus groups were conducted by an external individual and all data were recorded anonymously. A content analysis was used to determine themes within the focus groups. This study was approved as a Quality Improvement project.
RESULTS: SM are being used by many staff for shift management, scheduling, research on best practices and new developments in their fields and to anonymously monitor patients' lifestyle choices, progress and behavior. Staff felt that hospital had not put enough effort into providing safe online communities for patients and their families, driving families to use harmful online support groups. Furthermore, patients have limited connectivity to the Internet at the hospital, making it difficult to maintain connections with their social supports. With increasing use of SM, many staff find it difficult to maintain appropriate professional boundaries with patients and maintain a professional amongst their colleagues. Other concerns raised related to SM use during work hours, corporate email overload and a lack of virtual collaboration between staff.
CONCLUSIONS: SM use by staff, patients and their families is increasing at an exponential rate. Rather than reflexively prohibiting SM use at the Hospital for Sick Children, out of concern that these technologies may compromise healthcare quality, a proactive approach is being taken to understand risks and rewards of SM, in order to develop a comprehensive SM policy that reflects the opportunities in innovation, excellence and collaboration that these technologies present.

180
CONSORT EXTENSION FOR N-OF-1 TRIALS (CENT) GUIDELINES

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INTRODUCTION: By current standards, there are frequently insufficient data about the effectiveness of health care interventions in pediatric populations. Although the randomized controlled trial (RCT) is

recognized within evidence-based medicine (EBM) as the gold standard for evaluating treatment efficacy, pediatric RCTs face unique challenges: (i) as pediatric illness is relatively rare, they necessitate complex multicentre trials to address relatively common pediatric problems; (ii) RCTs most often exclude patients with co-morbid conditions or concurrent therapies, limiting their generalizability; and (iii) the feasibility of RCTs is limited for those with rare conditions or for individualized therapies, thereby creating an evidence-gap regarding best care. Also, as only a small proportion of national funding in Canada and the US is devoted to pediatric research, large scale RCTs seldom address conditions that occur in infancy, childhood and adolescence despite their potential implications later in life. One cost-effective approach that offers pediatric patients and clinicians the benefit of rigorous evaluation, such as that offered by RCTs, is the N-of-1 trial – a randomized, multiple cross-over evaluation performed in a single patient. N-of-1 trials are highly appealing to families since they offer information about treatment benefit for their child, as opposed to a population mean that may or may not be applicable.

OBJECTIVES: To develop the CONSORT Extension for N-of-1 Trials (CENT).

METHODS: Checklist items for the CENT guidelines were derived from three ongoing systematic reviews on N-of-1 conduct, analysis and meta-analysis. A structured process of obtaining information from a group of experts began with a two round Delphi process. Participants were asked to rate the relative importance of each suggested checklist item; each questionnaire was refined based on participant feedback from the previous version. Items included after the Delphi process were be debated and the checklist finalized during the CENT meeting of an invited group of the experts in May 2009.

RESULTS: 44 unique respondents between Delphi Round 1 and Round 2. Response rate: Round 1 - 75%, Round 2 - 62%. 45/55 items remained after Delphi. A 25-item checklist was developed from the CENT meeting and currently undergoing refinement.

SIGNIFICANCE: CENT will facilitate critical appraisal and interpretation of N-of-1 trials by providing authors with guidance on how to improve reporting and help families, health care providers and policy-makers make informed treatment decisions.

181

IS PROLONGED BOTTLE USE ASSOCIATED WITH CHILD TEMPERAMENT? A TARGET KIDS! STUDY

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BACKGROUND: Prolonged bottle use has been associated with iron deficiency, dental decay and obesity. Parents frequently report intense child motivation for continued bottle use. Understand how child temperament relates to prolonged bottle use may lead to more effective interventions for bottle cessation.

OBJECTIVE: To assess the relationship between prolonged bottle use and child temperament.

DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children 2-5 years attending well-child visits were recruited through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. Prolonged bottle use was assessed by parent report and was defined as using the bottle during the daytime or nighttime in children over 2 years of age. Child's temperament was assessed using the Child Behaviour Questionnaire (CBQ) subscales. Children with high Negative Affect have high anger, frustration, and difficulty with soothability. Children with high Effortful Control take pleasure with low stimulus intensity and maintain attentional focus. Children with high Surgency are impulsive and show high gross motor activity. Logistic regression was used to assess the relationship between prolonged bottle use and each temperament subscale.

RESULTS: The CBQ was completed in 988 children between 2 and 5 years of age. The mean age was 44 months, 50% were male and 15% were using a bottle. The mean Negative Affect, Effortful Control, and Surgency scores were 3.8, 5.5, and 4.5, respectively. Univariable analysis suggested that prolonged bottle use was negatively associated with Effortful Control (p=0.01). However, after controlling for age, gender and maternal education only Negative Affect was associated with prolonged bottle use (p=0.0003). The adjusted odds of prolonged bottle use increased by 1.5 (95%CI: 1.2-1.9) for each point on the Negative Affect subscale with the odds of prolonged bottle use being 2.4 times greater (95%CI: 1.4-4.3) for children in the 4th quartile relative to children in the 1st quartile of the Negative Affect subscale.

CONCLUSIONS: Prolonged bottle use is associated with temperaments consistent with high Negative Affect. Interventions aimed at promoting bottle cessation should consider coping strategies for children with high Negative Affect.

182

BOTTLE USE, OBESITY AND IRON DEPLETION: A TARGET KIDS! STUDY

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BACKGROUND: Iron deficiency during young childhood has been associated with behavior problems and cognitive delay. Emerging evidence suggests that iron deficiency may be associated with bottle use, milk intake and obesity.

OBJECTIVE: To determine whether iron depletion is associated with bottle use, milk intake and obesity in an urban population of toddlers with moderate milk intake.

DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children 1-5 years attending well-child visits were recruited between Sept 2008 and Sept 2009 through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. Questionnaires on demographics and child and parent health and lifestyle factors were administered. Iron depletion was defined as serum ferritin < 12 g/L. Bottle use was defined as daytime or nighttime bottle use and obesity was defined as BMI > 95 percentile. Logistic regression was used to assess for confounding.

RESULTS: One hundred eighty seven children age 1 to 5 years were recruited and 18 (10%) had iron depletion. Mean age was 39 months, 93 (50%) were male, 49 (26%) were using a bottle, 33 (20%) were using a bottle in bed, median milk intake was 24 ounces, and 14 (10%) were obese. Compared to children without iron depletion, those with iron depletion were younger (31 vs. 39 months, $p < 0.08$), but were of similar sex (56% male vs. 50%, $p = 0.8$), and had similar level of maternal education (94% with postsecondary degree vs. 93%, $p = 0.9$). Children with iron depletion were more likely to be using a bottle [9/18 (50%) vs. 40/167 (24%), $p = 0.02$], more likely to be using a bottle in bed [7/15 (47%) vs. 26/148 (18%), $p = 0.02$] and more likely to be obese [3/10 (30%) vs. 11/128 (9%), $p = 0.04$]. Parent reported milk intake was similar between children with and without iron depletion [28 ounces vs. 22 ounces, $p = 0.31$]. After adjustment for age, both bottle use in bed [OR 4 (95%CI: 1-20)] and obesity [OR 7 (95%CI: 1.1-49)] remained significantly associated with iron depletion.

CONCLUSIONS: In an urban population of toddlers with moderate milk intake using a bottle in bed and obesity were associated with iron depletion. When assessing for risk factors for iron deficiency, using a bottle in bed and obesity should be considered.

183

COMPARISON OF PARENT-PERCEIVED ACCEPTANCE OF TWO VITAMIN D SUPPLEMENTATION MODALITIES IN NEWBORN INFANTS

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BACKGROUND: Rickets is an ongoing health issue; vitamin D supplementation is recommended for all breastfed infants. Adherence to this

advice appears to be low in Canada and internationally, with about 60% of infants receiving supplementation. However, not all of these infants received vitamin D on a daily basis. We explored whether the standard vitamin D formulation (syrup) was a barrier to use. We compared the syrup with a novel formulation of vitamin D in film strip format to determine infant and parental preference.

METHODS: A randomized two period cross-over design was utilized to compare standard 400 IU/ml vitamin D syrup with 400 IU film strips, small rapidly dissolving thin strips containing 4000 IU vitamin D. Each dosing period lasted 3 weeks and a validated infant medication acceptance and a parental preference score were determined at the end of each period. At study completion, overall parental preference was elicited. Compliance was reported by the parents and validated by bottle weighing and counting remaining film strips.

RESULTS: Forty-three healthy full term infants were recruited and 41 completed the study; infant and parental characteristics were approximately comparable to Canadian census data. Parents overwhelmingly preferred the film strip (85.4%; 95%CI: 70.1-93.9%, $p<0.001$); this was corroborated by the better infant acceptance and itemized parental preference scores. The infants frequently gagged and choked with the syrup; this was not observed with the new formulation likely due to its fast dissolution. Despite this being a short study and a highly motivated set of parents, most having had experience giving the vitamin D syrup, compliance with the strips was significantly better than with the liquid (20.2 + 1.0 vs. 18.0 + 4.5 doses, $p<0.006$). Nine repeat doses were required with the syrup compared to 3 with the strips, ($p<0.05$).

INTERPRETATION: This short-term study suggests that the formulation of the standard supplement is a barrier to use and reduces compliance. Additional studies will need to assess whether novel formulations may increase adherence rates and decrease the incidence of rickets.

ABSTRACT PRESENTATION C (PLATFORM) PRÉSENTATION D'AFFICHES C (PLATEFORME)

184

SCREENING FOR DEVELOPMENTAL DELAYS IN PRIMARY CARE USING THE NIPISSING DISTRICT DEVELOPMENTAL SCREEN (NDDS)

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BACKGROUND: Recent Canadian and American recommendations suggest routine screening for developmental delays by primary care providers. The NDDS has been proposed for routine use as a screening measure as it is brief, easy to administer (parent completed), has an educational component and is cost effective. However, little is known about the accuracy of the NDDS when used in primary care settings.

OBJECTIVES: (1) To determine the sensitivity and specificity of the NDDS for use in preschoolers presenting for primary care; (2) To compare the differences in accuracy of various cut off points of the NDDS; (3) To compare the accuracy of a new revision of the NDDS to that of the original test.

DESIGN/METHODS: 334 children aged 12 – 60 month were recruited from the offices of 80 primary care providers in Northern Ontario. Parents completed the NDDS, and all children concurrently underwent an evaluation by a clinical psychologist. This evaluation included a battery of standardized psychological measures including measures of: (1) cognition/development; (2) speech/language; (3) adaptive functioning; and (4) behavioral functioning. Children were identified with a developmental delay if they scored <= 10th percentile on any test of cognition, development or speech/language in addition to adaptive functioning. Two cut-off scores were analyzed: 1 or more abnormal responses (1-Rule) or 2 or more abnormal responses (2-Rule). A new revision of the NDDS was also administered to 151 children.

RESULTS: A total of 34 children were identified by the psychologist as having a developmental delay. Using the NDDS (1-Rule) proved to have good sensitivity (81%) and reasonable specificity (72%). Using the NDDS (2-Rule) significantly lowered the sensitivity (69%) but improved the specificity of the test (87%). Further, the new revised version of the NDDS offered little advantage over the earlier version.

CONCLUSIONS: The NDDS shows good potential for use as a developmental screening tool in primary care settings. It provides an opportunity for physicians and parents to dialogue about their child's development, with little impact on the primary care provider's time. The current study demonstrates that the test also has adequate sensitivity to be used in clinical practice, though specificity is slightly below acceptable standards. The presence of one or more abnormal items should be considered the preferred cut-off for an abnormal screen on the NDDS. Future research should examine the psychometric properties of this screener further with view to improving the specificity of the test.

185

WAIST CIRCUMFERENCE IS ASSOCIATED WITH NUTRITIONAL RISK AND BMI IN PRESCHOOL CHILDREN IN PRIMARY CARE PRACTICE

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BACKGROUND: Waist circumference (WC) is associated with diabetes and cardiovascular disease in adults, and cardiometabolic risk in older children. WC has not been thoroughly explored in healthy preschool children.

OBJECTIVE: To describe waist circumference in a large cohort of preschool children, and to evaluate associations with BMI.

DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children 2-5 years attending well-child visits were recruited through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. Questionnaires on demographics, lifestyle factors were administered. Height, weight, and WC of children and their accompanying parent were measured. WC was categorized into categories based on published normative data from the US. Associations between WC and BMI percentiles were measured using regression analysis.

RESULTS: 1007 children 2-5 years old were assessed. The mean age was 44 months, and 50% were male. The mean (SD) BMI %ile was 51.3 (30.8). 2.3% were underweight (BMI <5%), 13% were overweight (BMI 85-95%ile), and 5.7% were obese (>95%ile). The mean (SD) WC was 51.6 cm (4.7), and the mean (SD) WC %ile was 56.7 (30). When categorized according to published percentile groups, 6.2, 8.5, 22.4, 28.7, 24.3, and 10% of children were in the <10th, 10-24th, 25-49th, 50-74th, 75-90th, >90th%ile for WC, respectively. Higher WC was strongly associated with higher child BMI, parent BMI, parent WC ($p<0.0001$), and lower maternal education ($p=0.02$).

CONCLUSIONS: WC was measured in a large cohort of healthy preschool children and was associated with child and parent BMI, and parent WC. Longitudinal data on WC in preschool children and associated health outcomes is needed.

186

EVALUATION OF A GASTROENTERITIS SEVERITY SCORE FOR USE IN AN OUTPATIENT SETTING

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BACKGROUND: Gastroenteritis research is hindered by the lack of availability of validated clinical scores to serve as measures of disease severity. Scores currently employed have been developed on small samples, have not undergone formal analyses and employ variables that may be difficult to obtain in the outpatient setting.

OBJECTIVE: The objective of this study was to evaluate the internal reliability, construct validity and ease of administration of a global gastroenteritis disease severity score (Modified Vesikari Score).

DESIGN/METHODS: The Modified Vesikari Score was created by replacing one variable (percent dehydration) in the original Vesikari Score by the need for future health care visits. We used the Modified Vesikari Score to assess the global severity of disease in children aged 3-48 months with acute gastroenteritis who were evaluated in one of 11 pediatric emergency departments across Canada. Caregivers recorded symptoms following the initial evaluation at home on a diary and reported the results via telephone at follow-up 14 days later. To evaluate internal reliability, we examined correlations between the items included in the score. To evaluate construct validity, we examined the correlation between the total score and other proxy outcomes of disease severity with very clear clinical implications, the scores distribution relative to normality, and consistency between sites.
RESULTS: A total of 455 children were enrolled; 415 were successfully contacted for follow-up. The internal reliability of the score was acceptable with a Cronbach's alpha of 0.59. Disease severity correlated with daycare and work absenteeism (P=0.01 and 0.002 respectively). The score assumed a normal distribution with minimal degrees of kurtosis (–0.14, standard error = 0.24) and skewing (0.39, standard error = 0.12). The scoring system had a reasonable distribution of severity scores across the cohort (49% – mild; 21% – moderate; 30% – severe). The variation in the distribution of severity between institutions was not achieve significant (P=0.11).
CONCLUSIONS: The Modified Vesikari Score seems to measure effectively the global severity of disease amongst a cohort of children with acute gastroenteritis. These data support the use of the score as a measure of outcome in future clinical trials.

187
THE IMPACT OF MATERNAL OBESITY IS MORE DELETERIOUS REGARDING INTRAUTERINE CARDIAC ADAPTATION THAN GESTATIONAL DIABETES

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BACKGROUND: Increasing observations show that obesity and its associated cardiovascular conditions may start during fetal development. This intrauterine adaptation may be attributable to different maternal factors such as diet and metabolic control. The objective of the present study was to determine if, in the presence of well controlled gestational diabetes, maternal anthropometric parameters and/or environmental factors are modulating fetal anthropometric and/or cardiac parameters.
METHODS: Sixty-nine (69) fetuses and their well-controlled gestational diabetic mothers were compared, retrospectively, to a control group of 12 normal mothers and fetuses. Fetal and maternal anthropometric and fetal parameters, as well as environmental factors were assessed and compared based on the presence of gestational diabetes. Glycated hemoglobin level (HbA1c) was used as a marker of good metabolic control. Echocardiographic variables, including the Tei index, were measured between the 19th and 25th week of gestation.
RESULTS: The two groups were comparable based on age. The HbA1c for the GDM group was of 6.4%. However, mothers with gestational diabetes were heavier than controls (over 25kg difference). Although results were within normal values, differences ($p <= 0.05$) were found between GDM fetuses compared to normal-weight pregnancies for interventricular septal thickness (2.12±0.03 and 1.94±0.05mm), left ventricular posterior wall thickness (2.11±0.04 and 1.89±0.05mm), cardiac circumferences (7.6±0.2 and 6.7±0.2mm), myocardial performance (0.230±0.002 and 0.219±0.006) and diastolic filling time (178±3 and 201±6ms), respectively. When adjusting for confounding factors (such as maternal smoking, preclampsia and gestational length), babies born from mothers with gestational diabetes were also characterized by bigger placentas: GDM's placenta being around 100g over that of normal pregnancies (p=0.048).
CONCLUSION: This is the first evidence, that a very good maternal metabolic control does not necessarily prevent early alterations in cardiac morphology and myocardial function in fetuses. This effect may be attributable to the presence of maternal obesity with associated bigger placental weights, therefore providing the fetal milieu with an increased nutrient blood flow and predisposing the fetus to anatomic and functional developmental differences. However, this is the first evidence suggesting that maternal obesity may be more damageable than gestational diabetes itself.

188
ARE INTERVENTIONS AIMED AT REDUCING SCREEN TIME AMONG CHILDREN EFFECTIVE? A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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BACKGROUND: Interventions aimed at reducing screen time have been a focus of childhood obesity prevention and treatment.
OBJECTIVE: To conduct a systematic review and meta-analysis of the impact of interventions aimed reducing screen time (television, computer use, video games).
DESIGN/METHODS: We searched six databases: Medline, EMBASE, Cochrane Central Register of Controlled Trials, CINAHL, Psycinfo, and ERIC from inception until September 2009. Inclusion criteria: randomized controlled trials; children 18 years of age; and interventions aimed to reduce screen time. The two primary outcomes were amount of screen time and body mass index (BMI). Two authors independently screened articles, selected studies, extracted data, and assessed methodological quality.
RESULTS: 847 articles were identified; 163 were duplicates. After independent review, 56 full text articles were retrieved; 15 met eligibility criteria: 11 were unique trials and 4 were secondary publications. The chance-adjusted between-reviewers agreement on the application of study inclusion criteria to full text articles was 0.92. When assessing methodological quality, 4 trials lost greater then 20% of participants to follow-up, indicating potential recruitment bias; 8 of the trials did not blind participants; 5 trials did not report if outcome assessors were blinded to the allocation of participants. Six studies reported the change in screen time as an outcome with a total of 1174 participants. The standard mean difference (SMD) between the changes within the intervention versus the control groups was –0.32 (95%CI: –2.67, 2.04). There was no heterogeneity in the pooled estimate ($I^2 = 0\%$, $p = 1.00$). For BMI, 5 studies were quantitatively pooled, representing 1146 participants. The SMD of the change between the intervention versus control groups was –0.10, (95%CI: –0.50, 0.31), $p = 0.64$. There was no heterogeneity in the pooled estimated ($I^2 = 0\%$ and $p = 0.99$).
CONCLUSIONS: This systematic review and meta-analysis showed no significant reduction in screen time or BMI. Limitations to this review include variations in interventions delivered, including differences in age groups, settings and type of interventions. Further studies with longer periods of follow-up that target focused interventions to prevent and treat obesity would further this important child health issue.

189
ENDOGENOUS METHANOL DERIVED FORMIC ACID CORRELATES WITH COGNITIVE DYSFUNCTION IN CHILDREN BORN TO DRINKING MOTHERS

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BACKGROUND: We have recently shown that formic acid (FA) can be produced from methanol, either present endogenously or as a congener in alcoholic beverages, in concentrations that can cause neuronal cell death. There is evidence that the enzymes required to metabolize methanol to FA, such as cytochrome P450 2E1, are present in the fetal compartment, suggesting that FA formation may contribute to the brain injury induced by prenatal exposure to alcohol.
PURPOSE: The purpose of this study was to test the hypothesis that FA present in the maternal-fetal unit is associated with cognitive and motor deficits in young children born to alcohol drinking mothers.
METHODS: Maternal and cord blood samples were obtained at the time of delivery and tested for FA by gas chromatography-mass spectroscopy. Routine biochemical tests including cortisol, ACTH, plasma folic acid

were also done. Information on maternal drug and alcohol use was collected for all mother-baby pairs. Bayley Scales of Infant and Toddler Development, 3rd Ed. was administered to infants/toddlers at 6 month intervals from 16 days to 3 years of age. The Scales measured cognition, motor functioning, language, and adaptive behavior.
RESULTS: This interim report describes outcome measurements obtained in eighteen babies who have reached 12 months of age. The average age of mothers in this study was 27.15 years old (range 16 to 41 years). 17 mothers admitted to drinking regularly, 16 used crack cocaine, 5 smoked marijuana, 2 used opiates and 1 used MDMA during pregnancy. FA measurements were obtained for twelve mother-baby pairs. (FA mom: 43.9 + 31.9nmol/L; cord blood 159.6 + 148ng/mL (normal <140ng/mL). Cognitive function in the children was negatively correlated to formic acid concentration in maternal/ cord blood at 12 months of age (r=–6154, p=0.025, n=12).
CONCLUSION: These preliminary data suggests that FA formed in the maternal-fetal unit during pregnancy contributes to cognitive dysfunction in this cohort of children.

ABSTRACT PRESENTATION B (PLATFORM) PRÉSENTATION D'AFFICHES B (PLATEFORME)

190
IS POLICY RELATED TO BODY CHECKING A RISK FACTOR FOR INJURY IN YOUTH ICE HOCKEY PLAYERS?

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INTRODUCTION: Ice hockey has one of the highest sport participation and injury rates in youth in Canada. Body checking is the most frequent mechanism of injury in leagues allowing body checking.
PURPOSE: The purpose of this study was to determine if the risk of concussion, concussion severity, all injury, and injury severity differ for Pee Wee (11-12 years) and Bantam (13-14 years) ice hockey players in a league where body checking is permitted starting at age 11 (Alberta, Canada) versus players in a league where body checking is not permitted until age 13 (Quebec, Canada).
METHODOLOGY: This was a two-year prospective cohort study. In year 1 (2007-2008), Pee Wee teams were recruited to participate from the provinces of Alberta and Quebec. In year 2 (2008-2009), Bantam teams were recruited from Alberta and Quebec. Seventy-four Pee Wee teams from Alberta (n=1108 players) and 76 Pee Wee teams from Quebec (n=1046 players) completed the 1st year of this study. Sixty-eight Bantam teams from Alberta (n=995 players) and 62 Bantam teams from Quebec (n=976 players) completed the second year of the study. A previously validated injury surveillance system was used, including injury assessment by a study therapist and physician referral. The injury definition included any ice hockey injury that required medical attention and/or resulted in time loss from hockey.
RESULTS: Multivariate Poisson regression analysis incidence rate ratios (IRR), adjusted for clustering by team, covariates (i.e. previous concussion or injury, level of play, body weight, year of play, position of play, attitudes toward body checking) and exposure hours, were used to estimate risk of concussion and all injury. Univariate were used to estimate risk of more severe injury (>7 days time loss), and more severe concussion (>10 days time loss) based on body checking policy. For Pee Wee these were 3.37 (95%CI: 1.66 – 6.86) for concussion, 2.73 (95%CI: 1.98 – 3.77) for all injury, 2.91 (95%CI: 1.65 – 5.14) for severe injury and 2.71 (95%CI: 0.95 – 7.70) for severe concussion. For Bantam these were 0.92 (95%CI: 0.55 – 1.53) for concussion, 0.98 (95%CI: 0.75 – 1.28) for all injury, 0.77 (95%CI: 0.55 – 1.08) for severe injury, and 0.61 (95%CI: 0.25 – 1.45) for severe concussion.
CONCLUSIONS: These findings indicate a 3-fold increased risk of concussion, all injury, severe concussion and severe injury in Pee Wee ice hockey players in a league where body checking is permitted compared to a Pee Wee cohort where body checking is not permitted. In addition, two years of body checking experience was not protective of concussion or other injury in Bantam ice hockey players. These findings will have important implications for policy decisions related to body checking in youth ice hockey.

191
THE USEFULNESS OF CARE PLANS FOR CHILDREN AND YOUTH WITH SPECIAL HEALTH CARE NEEDS

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BACKGROUND: Current AAP guidelines recommend that all Children and Youth with Special Health Care Needs (CYSHCN) receive a written care plan to facilitate transitions through the health care system. A care plan is a written document created by the health care provider (HCP) with the family that outlines the major medical issues and care needs for a specific child. While this recommendation seems important, the creation and maintenance of care plans is time and labor intensive and evaluative research is lacking.
OBJECTIVE: To explore how parents and HCPs of CYSHCN perceive the usefulness of a care plan.
DESIGN/METHODS: This qualitative study was informed by a grounded theory approach. Theoretical sampling of parents and HCPs of medically complex, technology dependant CYSHCN who have frequent admissions to a children's hospital and who have used a care plan was utilized. Fifteen semi-structured interviews with parents and focus groups with a total of 15 HCPs were conducted. The data was analyzed iteratively for predominant themes and emerging theory.
RESULTS: Both HCPs and parents overwhelmingly identified the care plan as a beneficial and important tool in the care of CYSHCN. Analysis of the data revealed several key themes that were unique to either parents or HCPs. From these themes emerged a theory of why and how care plans are useful. For parents, themes related to patient centeredness and timeliness of care were dominate. Parents felt the care plan increased their credibility in interactions with the health care team by clarifying the child's needs utilizing medical terminology from a perceived authoritative source, thereby facilitating the timely and safe delivery of care. Furthermore, it allowed them to focus their time and energy on being a parent rather than providing and coordinating medical care. For HCPs, themes related to efficiency and safety were dominant. HCPs described the care plan as a 'roadmap' that directed their care and facilitated focused assessments and frank discussions with the family. HCPs also identified challenges regarding authorship and ownership of care plans.
CONCLUSIONS: While parents and HCPs articulated many of the same perceptions regarding care plans, the usefulness and benefits of the care plan were distinct between groups. Findings informed a comprehensive care plan template as well as a model of why and how to best utilize care plans within family centered models of care.

192
QUALITY OF LIFE 4 YEARS AFTER NEONATAL COMPLEX HEART SURGERY

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BACKGROUND: Improved perioperative care of children with complex congenital heart disease has led to decreased mortality. Increasing attention is now being given to the long-term outcome of children surviving after cardiac surgery. Health related quality of life (HRQL) is a multidimensional construct that includes physical, mental and social well-being dimensions and not merely the absence of disease.
OBJECTIVES: To determine the HRQL at 4 years of age in children who had cardiac surgery for congenital heart disease in the neonatal period, and compare the results with population normative data.

METHODS: We designed a prospective cohort study including all neonates having complex surgery for congenital heart disease between July 2000 and June 2005, excluding patients with chromosomal abnormalities. HRQL was assessed using the PedsQLTM 4.0 Generic Core Scales completed by the children's parents at the time of 4-year follow-up. Data from patients with single ventricle and biventricular repairs were compared with published normative values for the same age. We also compared the results of patients with single ventricle and biventricular repairs within our cohort. Data analysis was performed using t-test for independent samples with Bonferonni correction.
RESULTS: Two hundred and seven neonates underwent open heart surgery during the study period; 48 died, 17 had chromosomal abnormality, 24 parents did not receive the forms, 4 refused to complete the questionnaire, 1 was too ill to be seen, and 8 were lost to follow-up, leaving 105 survivors for analysis. There was no significant difference between the Total PedsQL (P=0.17) in children with single ventricle repairs versus biventricular repairs. The only score that was significantly different was physical functioning (P=0.007), where the single ventricle patients had a lower score. When compared to normative data, children with biventricular repair had significantly lower Total PedsQL (P=0.001) and Psychosocial Health Summary (P<0.001) scores. When compared to normative data, children with single ventricle repair had significantly lower Total PedsQL (P<0.001), Psychosocial Health Summary (P=0.001) and Physical Health Summary (P=0.003) scores.
CONCLUSION: At 4 years of age Total PedsQL and Psychosocial Health Summary scores were significantly lower in children who had surgery for congenital heart disease in the neonatal period when compare to normative data. Children with single ventricle repair also had lower Physical Health Summary score compared to patients with biventricular repairs and normative data. These findings invite greater consideration of potential resources fostering HRQL, and research examining key elements determining and contributing to outcomes for these children.

193
THE EFFECTIVENESS OF A COMBINED SPORT INJURY AND OBESITY PREVENTION PROGRAM IN JUNIOR HIGH SCHOOL

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INTRODUCTION: There are high sport injury rates in youth in Canada. The rate of overweight and obesity are also rising.
PURPOSE: The purpose of this research was to examine the feasibility and effectiveness of a combined sport injury and obesity prevention training program in reducing the risk of injury and increasing healthy outcomes in a junior high school population.
METHODOLOGY: This was a pilot cluster-randomized controlled trial (RCT). The participants were 725 male and female physical education (PE) participants (ages 11-15) from two junior high schools. Study participants were randomized to the training group or control group by school. All training school classes completed a 12 week, 3x/week, 15 minute moderate to high intensity neuromuscular warm-up routine in each PE class. The training group warm-up included components of dynamic stretching, lower extremity and core strength, agility and balance training exercises. The control group warm-up was equivalent in length but contained components of a more standard of care warm-up practice. A physiotherapist, blinded to the training group allocation, assessed any sport injury on a weekly basis. The injury definition included any sport injury occurring during the study period that required medical attention and/or removal from a session and/or missing a subsequent session. Changes in VO2 maximum was estimated based on the 20 m shuttle run.
RESULTS: Individual level univaiate analysis demonstrates that the warm-up program was protective of injury (IRR = 0.47 [95% CI; 0.3-0.72]), lower extremity Injury (IRR = 0.3 [95% CI; 0.18-0.48) and injury resulting in more than one week of time loss from sport (IRR = 0.42 [95% CI; 0.15-1.1]). In addition, there was evidence of a greater improvement in VO2 maximum in the training group (2.14 ml/kg/min [95% CI; 1.17-2.59]) compared to the control group (0.91 ml/kg/min [95% CI; 0.46-1.36]) (t= –3.86, p=0.0001).
CONCLUSIONS: This pilot study suggests that a neuromuscular training program which incorporates a high intensity exercise component is protective of overall sport injury, lower extremity injury and injury resulting in greater than 1 week time loss from sport when delivered in PE class in a junior high school setting. There is also some indication of a greater improvement in VO_2 maximum in the training group compared to the control group. A follow-up quasi-experimental study is underway to examine the effectiveness of the training program in the control study school the following school year. This study demonstrates the feasibility of such a cluster-RCT in a junior high school setting. The analysis is limited to an individual level analysis in this pilot study because of only two schools, but the results will inform a larger cluster-RCT study.

194
PREDICTORS OF SCREEN TIME IN PRESCHOOL CHILDREN: A TARGET KIDS! STUDY

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BACKGROUND: Parent rules about screen use and meals in front of the television are two modifiable factors that have been shown to be associated with increased screen time in a small cohort of 3 year old children. Understanding predictors of screen time may lead to effective interventions in preschoolers.
OBJECTIVE: To describe predictors of increased screen time in a large cohort of 1-5 year old children.
DESIGN/METHODS: A cross-sectional, prospective observational design was used. Healthy children 1-5 years attending well-child visits were recruited between Sept 2008 and Sept 2009 through the TARGet Kids! Network, a Primary Care Research Network including 10 community pediatrician practices and 2 large family medicine group practices, in Toronto, Canada. A questionnaire was administered to parents on demographics, child and caregiver screen time use and behaviours. Descriptive statistics and regression models were used to test univariate associations between total screen time per week and predictors. Multivariate linear regression models were developed using univariate analysis variables with p<.1.
RESULTS: Data on screen time was available for 1272 subjects. 746 (49%) were male. Mean age was 34 months. 91% of mothers completed at least a university/college degree. 14% of subjects ate dinner while watching TV. 75% of parents reported having household rules about screen time. The mean parent BMI was 23.8 (19.3-33.5). In the multivariate analysis, controlling for maternal education, parent BMI, child temperment, and age, eating dinner while watching TV, increased total screen time by 288 minutes per week (95% CI: 224, 352) and the presence of a family rule about screen time decreased screen time by 151 minutes per week (95% CI:101, 200).
CONCLUSIONS: Strategies to reduce screen time in preschool children should include decreasing meals in front of the television, and promoting family rules for screen time.

195
PREDICTORS OF PROLONGED HOSPITALIZATION IN PEDIATRIC EMPYEMA TREATED WITH CHEST TUBE INSERTION

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BACKGROUND: Since long term outcomes for children with pleural empyema are generally favorable, treatment interventions have been directed at improving short term outcomes such as length of stay (LOS) via interventions such as chest tube insertion with fibrinolytics or video-assisted thorascopic surgery (VATS). Surgical interventions have been shown to be more cost-effective when LOS from other therapies exceeds 10 days. Little is known about predictors of prolonged LOS which may identify those children who would most benefit from aggressive interventions.

OBJECTIVE: To identify clinical, laboratory and radiographic features at the time of intervention which predict a LOS greater than 10 days after chest tube insertion in children hospitalized with empyema.
DESIGN/METHODS: We conducted a retrospective cohort study of children hospitalized in a tertiary pediatric centre with empyema between January 2000 and December 2007 treated with chest tube insertion. Bivariate and multivariate logistic regression analyses were used to evaluate factors that could predict a LOS > 10 days, including admission demographics, clinical features, laboratory tests and radiographic features controlling for intervention characteristics including the timing of tissue plasminogen activator (tPA) administration and complications (pneumothorax, broncho-pleural fistula, bleeding).
RESULTS: One hundred and thirty-one patients were included; 41 had a LOS > 10 days after chest tube insertion. Mean (SD) age was 5.2 (3.7) years. A positive blood or pleural culture (OR 2.39, 95% CI: 1.07-5.36), evidence of necrosis on imaging (OR 5.79, 95% CI: 2.53-13.24), and the presence of complications (OR 5.09, 95% CI: 2.10-12.33) were independent predictors of a LOS > 10 days after chest tube insertion. Echogenic fluid with multiple complex septations was associated with a decreased risk (OR 0.40, 95% CI: 0.18-0.89) of LOS > 10 days after chest tube insertion. After adjusting for tPA timing and complications, necrosis on imaging (AOR 4.01, 95% CI: 1.59-10.14) was associated with LOS > 10 days after chest tube insertion.
CONCLUSIONS: Evidence of necrosis on initial imaging is independently associated with prolonged LOS in children hospitalized with empyema. This subpopulation of children may be an important target for aggressive interventions such as VATS aimed at shortening LOS.

POSTER SESSION
SÉANCE DE RÉSUMÉS PAR AFFICHES

196
REGIONAL VARIATION IN OUTCOME OF VERY LOW BIRTHWEIGHT INFANTS ADMITTED TO CANADIAN NICUS

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OBJECTIVE: The main objective of this study is to examine the regional variations in mortality and composite morbidity rate of very low birth weight (VLBW, less than 1500g) infants admitted to level III Neonatal Intensive Care Units of Canadian Neonatal Network (CNN) from January 1st, 2006 to December 31st, 2007.
DESIGN AND METHODS: This is a retrospective observational study. The data were collected from CNN database. There were 4561 VLBW infants admitted to NICU of CNN during the period of Jan 2006 and Dec 2007. 48 moribund infants were excluded. Therefore, our study population consisted of 4513 infants. Multivariable logistic regression models were used to examine the risk factors associated with mortality and composite morbidity. The variations in mortality and composite morbidity rate across provinces were estimated, adjusting for the risk factors identified.
RESULTS: The overall mortality of the 4513 VLBW infants was 10.7%, survival rate without major morbidity was 54.61%. Being premature, male, small for gestation age, outborn, SNAP-II score greater than 20 on admission, Apgar score less than 7 at 5 minutes of life are significant ($p<0.05$) predictive factor of mortality and composite morbidity. Being transported before 2 days of life is a significant predictive factor for mortality and a significant protective factor for composite morbidity if infants survived. Antenatal steroid is a significant protective factor for mortality. Having congenital anomalies is a significant predictive factor for composite morbidity. There was significant variation in risk-adjusted regional mortality and composite morbidity. Alberta had the lowest risk-adjusted mortality (5.3%) but the highest adjusted composite morbidity (50%). BC had the second lowest mortality (6.9%) and the lowest adjusted composite morbidity (33.7%).

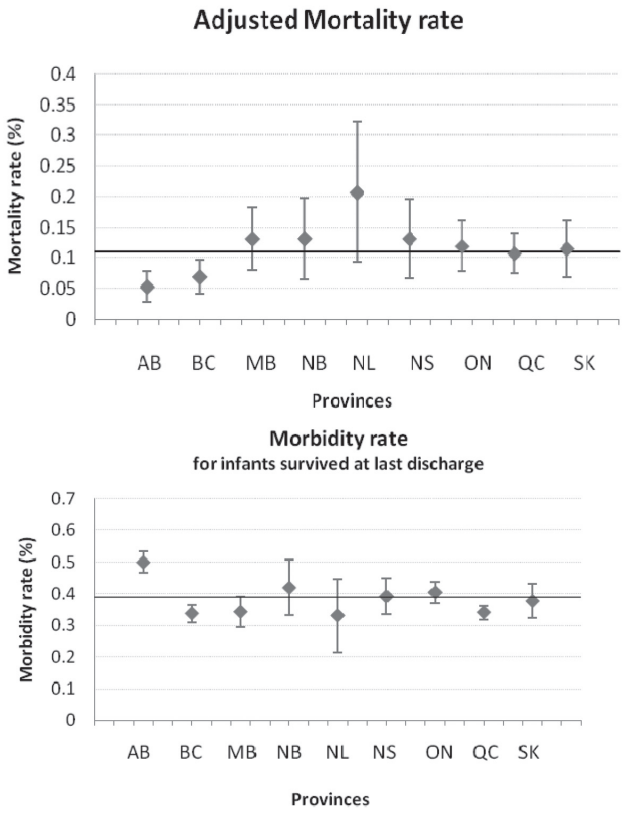

Figure 1) *Risk-adjusted mortality rate*. **Figure 2)** *Risk-adjusted composite morbidity rate*.
INTERPRETATION: Variation in risk-adjusted mortality and composite morbidity rate representing variation in clinical practice. Quality improvement and national standard guideline may help improve the general outcome.
PS: Our study is the largest cohort study of VLBW infants all over Canada, representing majority of VLBW population. It took a while to finalize some extreme data with participating centers. We apologize for the delay.

197
PRACTICING WHAT WE PREACH PART 2: A FOLLOW-UP LOOK AT HEALTHY ACTIVE LIVING POLICY AND PRACTICE IN CANADIAN ACADEMIC PAEDIATRIC HEALTH CENTRES (CAPHC) – HAS ANYTHING CHANGED?

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BACKGROUND: Twenty six percent of Canadian children/youth are overweight/obese. Public perception indicates hospitals should promote health and disease-prevention through institutional policy, long-range planning and resource budgeting. In 2007, we performed a survey of all Canadian Paediatric Academic Health Centres [CAPHC] demonstrating inadequate healthy active living (HAL) policy and practices. Fast food vending and patient sedentary activities were prevalent. A strong policy framework was recommended to create and implement HAL guidelines.
OBJECTIVES: i) To perform a follow-up survey of all CAPHC to detect changes in HAL policy/practice since 2007. ii) To host a multi-disciplinary, pan-Canadian task force to create a compendium of HAL strategies.
METHODS: In 2009, a modified HAL survey was completed by all 16 CAPHC. Local CAPHC champions collected and submitted data. A multi-disciplinary, pan-Canadian task force met to share best HAL practices and create novel hospital-based HAL strategies through several small group sessions.

RESULTS: Survey 2009: Health Promoting Committees were similar at 56%. Although nonsmoking policy prevalence was unchanged, only partial adherence was reported by 93% of CAPHC. A mere 19% of CAPHC have written nutrition policy. Most CAPHC cafeterias had limited hours of operation. Sixty two percent of CAPHC had fast food/coffee franchises. In 81% of centres, the vendor determined vending machine content; 38% of CAPHC increased vending machine numbers. No CAPHC had Physical Activity (PA) promotion policies. Outdoor walking trails increased 27-50%. Thirty eight percent of CAPHC children's playrooms offered Wii fit. Thirty one percent of CAPHC had outpatient Child Life workers. None had incentives for staff PA other than discounted fitness club memberships.

SUGGESTED STRATEGIES FROM TASKFORCE: Unique nutrition initiatives: "Dial for dining" room service; phase out fast food restaurants; restriction of fast food advertisements; hospital-based farmers markets. Unique PA initiatives: Staff walking challenges; patient treasure hunts; active play in waiting rooms; Active living passports.

CONCLUSIONS: Canadian paediatric hospitals have demonstrated some improvement in HAL promotion since the first survey in 2007 but considerable effort is required to develop a more comprehensive and systematic approach. Urgent attention must be given to the common practice of fast food kiosks and vending machines with nutrition-poor content. The deficit of Child Life workers and lack of active play areas for children and teens must also be addressed. The taskforce developed a compendium of HAL strategies that will be published and shared with all Canadian Pediatric Hospital administrators to help facilitate improvements in HAL practice and policy.

AUTHOR INDEX TO ABSTRACTS / INDEX DES AUTEURS DES RÉSUMÉS

A

Aasland O . . . 38
Abdullah K . . . 103,138
Abeysekera JB . . . 12
Abu-Sa'da OS . . . 24
Adamo KB . . . 197
Adams S . . . 166,191
Agirembabazi N . . . 178
Akierman A . . . 76,89
Al-awad E . . . 76
Albersheim S . . . 34,35,93
Al-Hindi MY . . . 109
Allard-Dansereau C . . . 9
Allegro D . . . 57
Allen A . . . 8
Alloway C . . . 170
Alshaikh B . . . 89
Al-Sufayan F . . . 99
Alton G . . . 192
Al-wassia H . . . 117,121
Ambler K . . . 197
Amin H . . . 146
An D . . . 168
Andelfinger E . . . 187
Andelfinger G . . . 187
Anderson G . . . 119
Andrews D . . . 149
Andreychuk B . . . 88
Angeles H . . . 170
Ao PF . . . 147
Armstrong E . . . 24
Armstrong R . . . 64
Arnold DL . . . 157
Aronson L . . . 145
Asztalos E . . . 121
Aziz K . . . 8,25,28,59

B

Baerg K . . . 74
Bahm AL . . . 124
Baier RJ . . . 99
Bailey B . . . 131-133
Baker G . . . 24
Baker RG . . . 29
Balakrishnan S . . . 84
Bamehrez M . . . 99
Banihani R . . . 121
Bano A . . . 92
Bano S . . . 4
Banwell B . . . 157
Barnes J . . . 169
Barozzino M . . . 127
Barozzino T . . . 27,129
Barrington K . . . 30,96
Barrowman N . . . 71,180
Bartholomew L . . . 32
Baskin LB . . . 57
Beaunoyer M . . . 107
Beck CE . . . 77,79
Beck J . . . 3
Bennett D . . . 23,129,189
Benson B . . . 190
Bensouda Brahim BB . . . 48
Bernard-Bonnin AC . . . 9
Beyene J . . . 171
Bhanji F . . . 150
Bhatt M . . . 70
Birken CS . . . 77,79,103,105,126,137,138,139,141,176,181,182,185,188,194
Bishop C . . . 23
Bismilla Z . . . 82
Bitnum A . . . 83
Black K . . . 70
Blanchard A . . . 26
Blanchette VS . . . 77,79
Boag G . . . 72
Bohn V . . . 68
Boon H . . . 169
Bortolussi R . . . 143
Borton BL . . . 172
Bouthillier L . . . 107
Boutis K . . . 68
Boydell K . . . 77,79
Boyer K . . . 162
Brassard M . . . 115
Breakey V . . . 77,79,82
Brenner J . . . 143
Brintnell J . . . 102
Brulotte J . . . 169
Bukutu C . . . 180
Butt A . . . 101
Butt M . . . 45
Butterworth S . . . 34,35,93

C

Cadelina R . . . 147
Camera S . . . 23
Cammisuli S . . . 174
Campbell C . . . 128,156
Campbell D . . . 27,32
Campbell J . . . 179
Cannon WG . . . 106,144,147,178
CAPSNet , . . . 34,35
Carceller A . . . 26,96
Card D . . . 58
Caron B . . . 76
Carvalho J . . . 49
Chad Z . . . 118
Chan F . . . 65
Chan K . . . 69
Chapman LA . . . 15
Charbonneau J . . . 43
Charrois T . . . 169
Chemtob S . . . 115
Cheng A . . . 148,150,151
Chessex P . . . 6,90,100
Cheung PY . . . 24
Chevalier I . . . 81
Chinnery H . . . 28
Chirinian N . . . 5
Chiu A . . . 155
Cho D . . . 69
Chowdhury D . . . 13,14
Christianson H . . . 41,60
Chrousos GEO . . . 104,158,175
Chui N . . . 197
Clark BG . . . 149
Claydon J . . . 34,35
Clinical Committee CNN . . . 59
Coffey T . . . 166
Cohen E . . . 80,110,166,191,195
Cole G . . . 146
Collet JP . . . 147
Connolly B . . . 80,195
Connors L . . . 17
Cooke M . . . 140,142
Cousineau J . . . 26
Craw LA . . . 145
Creighton DE . . . 18,42
Crockett M . . . 85
Cronin CMG . . . 29
Cummings E . . . 197
Cvijovic K . . . 169
Cyr C . . . 123,161

D

Dai S . . . 60
Daneman A . . . 58
Davis P . . . 38
Dayneka N . . . 118
deForest EK . . . 72,73
Dell S . . . 80
Delvin E . . . 26
Demspey E . . . 38
Dersch-Mills D . . . 89
Deshpande P . . . 44
Diambomba Y . . . 44
Dinu I . . . 192
Doan Q . . . 70
Doctor S . . . 46,91
Dorval VG . . . 30,115
Dow KE . . . 40
Downey K . . . 22
Doyle-Baker PK . . . 193
Drover S . . . 33
Drucker AM . . . 174
Druker J . . . 147
Du L . . . 25
Dubrovsky AS . . . 130
Dudani A . . . 157
Duff J . . . 150
Dunand L . . . 134
Dunn M . . . 3
Dupont AT . . . 31

E

Eccles RC . . . 72,73
Ells A . . . 109
Eltorky M . . . 186
Elzinga KE . . . 67
Emery CA . . . 190,193
Estrabillo E . . . 32

F

Farrell C . . . 37
Faubert G . . . 43
Ferguson C . . . 11
Ferreira E . . . 43
Finch RA . . . 76
Findlater C . . . 46,91
Flavin M . . . 33
Flynn J . . . 20,21
Fontana MS . . . 37
Ford-Jones EL . . . 15
Ford-Jones L . . . 85
Foster B . . . 130,169
Fouron JC . . . 187
Francoeur D . . . 96
Frappier JYF . . . 61
Fraser D . . . 128
Freedman S . . . 68-70,186
Friedman J . . . 191

G

Gahlot L . . . 92
Gamache S . . . 187
Gander S . . . 33
Garcia Guerra G . . . 192
Gaucher N . . . 112,131-133
Gauthier M . . . 81
Geerlinks A . . . 128
Gerges S . . . 49
Ghassemi R . . . 157
Goldade R . . . 10
Goldman R . . . 135,147
Gorelick M . . . 186
Gorgos A . . . 134
Gouin K . . . 50
Gouin S . . . 70
Goulet C . . . 190
Gover A . . . 34,35,93
Grant E . . . 150,152
Grant VJ . . . 148,150-153
Gravel J . . . 131-133
Gray D . . . 57
Greenberg S . . . 174
Grenier D . . . 164

Guest JF 16
Guimont C. 70
Guttmann A 110,119,171
Gysler M. 75

H

Hagel B. 136,190
Halperin S 84
Ham J 160
Hamilton J 139
Hanlon-Dearman A. 11
Hansen T 38
Harrison A 165
Harrison ME 122
Hartfield DS. 125
Hartling L. 125
Hasan SU. 4,76,89,92,
Hébert M 9
Hervouet-Zeiber C. 134
HISTORY Team 103,105,137,138,139,
. 141,181,182,194
Ho NTC. 174
Hochwald O. 36,116
Holland J 13,14
Hoogenboom A 177
Hopman WM. 40
Howard J 136
Hui C 85,118
Hunter AJ 120
Hutchinson P. 13,14
Hutchison J 128

I

Iaboni D. 46
IMPACT 88
Ipsiroglu O 65

J

Jaeger W. 169
James A 56,167
Jang W 106,144,178
Janvier A 30,31,37,38
Jean-Philippe S 183
Jednak R 130
Jefferies A 155
Jefferies A. 113,114
Jeffs L 129
Jimenez EM 11
Joffe AR 18,192
Johnson D 68,70
Joshi H 46,91
Joubert G 70
Joyce DP. 184

K

Kabakyenga, J. 143
Kaczorowski J 147
Kagoda M. 106,178
Kalyesubula N 178
Kamaluddeen M. 76
Kang J. 190
Kapur B 189
Karkelis SAV 104,158,175
Kasangaki A. 106,178
Kastner M. 17
Keats K. 159,160,162
Keystone J 85
Khovratovich M 103,105,126,137,138,139,
. 141,181,182,185,194
Khurshid F 58,121
Khuu M 189
Kin Fan YT 27
King J 118
Kipruto K 106,178
Kisakye D. 178
Kizito N 106
Klassen A 63
Klassen TK. 125
Koelink E 145
Kong C. 156
Koopman K 66
Koot D 153
Kotsopoulos K 168
Kuhn S. 85
Kulik DM 82,83
Kuzeljevic B 34,35
Kwok HY 125

L

Lacaze-Masmonteil T. 28
Lacroix J. 37
Laferrière C 96
Laird H. 129
Lalari V 93
Lam K 110,119
Lanctot KL. 86,87
Landry B. 22
Lara-Corrales I 173
Larson C. 143
Latchman A. 45
Lau F 56,167
Laventhal N. 38
Lavoie E 123
Lavoie JC 6,100
Lavoie PM 6
Law B 84
Leblanc CMA 197
Lee S 155
Lee A 39
Lee DSC. 94
Lee K-S 121,127
Lee S 1,5,8,52,196
Lee SK 2,25,29,59,94
Lefebvre AM 179
Lemale J 107
Lemire EG 74
Lemyre B 102
Levin HME 40
Li A 86,87
Li P. 119,171
Lianou LOU. 104,175
Limbos MM 184
Linegar S 54,55
Llewellyn-Thomas H. 77,79
Lockyer J 25,150
Lodha A. 2,41,42
Loock CA 65,111
Lopes R 95
Lougheed J 19
Low-Décarie C. 96
Luca NJC 173
Luca P 166
Lumb KJ 4
Lykogeorgou MAR. 104,158,175
Lynam M J 111
Lyon M. 57

M

Ma X 25
Macartney J 155
Macculloch R. 191
MacDonald N 143
Mackinnon K. 165
MacKinnon Y 92
Macnab AJ. 106,144
Maguire JL 103,105,126,137,138,139,
. 141,181,182,185,194
Mahant S 80,191,195
Malo J. 43
Manlhiot C 103,105,137,138,139,
. 141,181,182,185,194
Marcellus L. 165
Marchand V. 43,107
Marczinski C 152
Margolis I. 20,21
Marquis E. 118
Martin B. 115
Martincevic I 44
Mateo P 127
Matlow A. 166
Matthew D. 94
McBride ER 78
McConnell A. 88
McCrindle BW 103,105,137,138,139,
. 141,181,182,185,194
McDuff PM 61
McFadyen K. 32
Mcgillivray D 130
McLaren A. 32
McLean J 106
McMahon J 43
McMillan D 25,29
McNeill T 15
Meeuwisse WH 190
Mekky M 83
Merko S 46,91
Metthews L 65
Millar K 136
Miller A 63
Miller T 160,163
Miller W. 15
Milner RA 135
Miro J 115
Mistry ND 176,179,195
Mitchell I. 86,87
Moddemann DM 18
Mohamed A. 44
Mohamed ISI 43
Mohamed T 1
Moher D. 180
Moodley S 144
Moore A. 49,58,97,121
Morinis J 45
Morneau S 81
Morrison KM 108
Munroe V 111
Murphy K. 50
Murty M. 169
Musante G 38

N

Nabeel Ali NA 48
Narayan B 147
Narayanan S. 157
Narciso J. 52
Nasef N 154
Nash A. 46,91
Natsheh S 33
Nettel-Aguirre A. 18
Newman JE 42
Newman JL 42
Ng E 3
Nguyen LN. 19
Nicholas D. 191,192
Norris ML 122
Nourijelyani K 170

O

O'Donnell M 63
Obeid N 122
O'Brien K. 168
O'Connell CM. 12
O'Connor DL. 97
O'Donnell M 64
Ohlsson A 8,29,94
Ornstein AE. 12
Orrbine E 197
Ortuoste B. 145
Osiovich H. 36,116,155
Owens J 170

P

Paes BA 86,87
Pai N 15,82
Palmer B. 111
Panagiotou IOA. 158
Panczuk J K 98
Papadaki OUR. 104,158,175
Papandreou THA. 104
Parkin PC. 77,79,83,103,105,119,126,137,
. 138,139,141,176,181,182,185,188,194
Parmar SM 57
Parshuram CS 82
Patterson K. 129,189
Payot A 112,115
Pearlman L 128
Pendlebury J 4
Petrie-Thomas J 101
Pignotti M 38
Piteau SJ. 71
Plakkal N 47
Plante J. 161
Plint AC 71
Poirier P 187
Pope E 173,174
Porter R 70
Powell E 68

Q

Qiu X 25,155
Quigley A. 75

R

Radziminski N 144
Ragone A 80
Rajakumar D 88
Rami J. 57
Rashid N 99
Rastelli L 118
Rea DJ 195
Read KL 78
Rebeyka IM 18,192
Redlick F 174
Reilly M 3
Rempel GR 172
Reynolds J 129
Richmond SA 193
Rieder MJ 124
Rigaux A 92
Robert M 187
Robertson CMT. 18,192
Robertson S 65
Robinson T 153
Roccamatisi D 106,144,178
Rodd C. 183
Rogers M 101
Rollo L 20,21
Roma ELE 158
Romain Mandel RM 48
Romoff S 179
Ross D 192
Ross DB 18
Roth J. 145
Roth S 145
Rousseau E 107,134
Rouvinez Bouali N. 102
Roxborough L 63
Ryan M. 75

S

Samar El Tarazi SET 48
Sammons H 124
Sampson M 180
Sandor P. 129
Sanghera M 106,144,178
Sangster Bouck M 142
Sankaran K 2,8
Saunders NR 145
Sauve KA. 64
Sauve LJ. 84
Sauve R 41,42,47,109,192
Sauve RS 7,18,60
Scheifele D. 84
Schiariti V 63,64
Schneider JM 4
Schuler J. 118
Schurr P 3
Scolnik D. 145
Scott L 111
Seabrook JA. 124
Seshia MMK 2,8,29,99
Sgro M 23,27,127
Shah J. 51
Shah P 1,121,154,171
Shah PS 2,8,39,50,51,53,117
Shah V 5,44,49,52,59,113,114,117
Shamseer L. 180
Shefrin AE 135
Shen J. 63
Shen K 24
Sherlock R 34,35,54,55,93,95,98
Shivananda S. 1,56,167
Shrier I. 190
Shroff M. 58
Siden H 159,160
Sigalet E. 153
Silverman MS 145
Simmons B 155
Singh A 93
Singhal N. 7,25,146
Sivabalasundaram V 68
Skidmore M 154
Sladkevicius E 16
Sled JG. 157
Smart K 67
Smith RG. 66
Smith RW 22
Smith WG 22
Smythe JS 19
Soboleski D 33
Soraisham AS 7,42,47,59
Spence G 197
Stade B C. 23,129,189
Stang AS 72,73
Stasiulis E. 77,79
Stawiarski K. 17
Stephens D. 70
Stephens R. 129
Sterescu A 107
St-Pierre J. 187
Straatman L 159,162,163
Stritzke A 100
Swarnam K. 41
Synnes AR 95,101

T

Taddio A 49
Tam T. 169
Tamim H 174
Tan B 88
Tang S 41,42,60
Taranik R 128
TARGet Kids! 103,105,126,137,138,
. 139,141,181,182,194
Taylor M. 58
Thibault M. 43
Thompson GC. 72,73
Tijssen JA. 108
Till C 157
To T 119
Tortorelli C 10
Toulouse K 123
Toye J 74
Tran S. 129,189
Traubici J 80
Trevenen C 7,47
Tung C 69

U

Umamaheswaran-Mahara M 120
Unger S 168

V

Van Wylick R. 70
Vandermeer B 125
VanHuyse J. 128
Vanstone C 183
Vaudry W. 84
Veer D 65
Veilleux-Lemieux MVL. 61
Verhagen E. 38
Vincent M 81
Vohra S 169,180
Vu D. 169

W

Wadsworth S 165
Wahi G 171,188
Wainer S 57
Waldin A 66
Walker R 94
Wang D 124
Wang Y. 106,144,178
Ward M 71
Ward WE 97
Waserman S. 17
Watson W 23
Webster C 174
Weiler H. 183
Weinstein M 80,174,195
Welch KA 97
Westergard S 32
Whitfield MF. 90
Whyte H 58,75,121
Wilejto M. 136
Wilk P 140,142,177
Witmans M 170
Wong S 111
Wood S 7
Wright S. 101

X

Xiu W. 102
Xu YS. 17

Y

Yager JJ. 24
Yang M. 83
Yang Q. 54,55
Yantzi N 110
Ye P 39,196
Ye X 114
Yee WH 2,59,60
Yee W. 109
Yeske M 136
Ying E. 27
Yoon W 44
Young-Tai K. 52
Yu G. 111
Yusuf K. 4,76,89,92

Z

Zao J 51-53,117
Zarembo M. 55
Zeller J 174
Zhao M. 196

Subspecialty Categories / Catégories de surspécialité	Abstract Numbers / Numéro de résumés
Adolescent medicine / Médecine de l'adolescent	61, 122, 123
Advocacy / Défense d'intérêts	13-15, 197
Allergy & immunology / Allergie et immunologie	16, 17, 118
Bioethics / Bioéthique	124
Cardiology / Cardiologie	18, 19
Child abuse & neglect / Maltraitance et négligence d'enfants	9-12
Community paediatrics / Pédiatrie générale	20-23, 125-127
Critical care (ICU) / Soins intensifs	128, 192
Dermatology / Dermatologie	173, 174
Developmental paediatrics / Pédiatrie du développement	63-66, 129, 184
Emergency medicine / Médecine d'urgence	67-73, 130-136, 186
Endocrinology & metabolism / Endocrinologie et métabolisme	74
Epidemiology / Épidémiologie	188
Fetal & maternal issues / Médecine fœtomaternelle	75, 76
Gastroenterology / Gastroentérologie	175
Haematology & oncology / Hématologie et oncologie	77, 78
Healthy active living / Vie active saine	137-142, 185, 194
Hospital paediatrics / Pédiatrie hospitalière	79-83, 191, 195
Infectious diseases / Infectiologie	84-88
Injury prevention / Prévention des blessures	176, 177, 190, 193
International health / Santé internationale	120, 143-145
Medical education / Formation médicale	149-155
Medico-legal / Médecine médicolégale	146-148
Neonatology & perinatology / Néonatologie et périnatologie	1-8, 24-60, 89-102, 112-117, 121, 196
Neurology / Neurologie	156-158
Nutrition / Nutrition	103-108
Obstetrics & gynecology / Obstétrique et gynécologie	187
Ophthalmology / Ophtalmologie	109
Oral health / Santé buccale	178
Other / Autre	179, 180, 189
Palliative medicine / Soins palliatifs	159-163
Patient safety / Sécurité des patients	164-169
Prevention & anticipatory guidance / Prévention et conseils préventifs	181-183
Respirology / Pneumologie	119, 170-172
Social paediatrics / Pédiatrie sociale	110, 111