

Abstract Research Award Winners from the Section on Transport Medicine Academic and Scientific Program 2018

Stephanie Redpath MBChB FRCPC



C. Robert Chambliss, MD Best Paper Award recognizes the best abstract or poster presentation given during the Section Program education program by a non-student or non-resident transport professional. The winner receives a \$500 honorarium and a certificate plus a copy of the Field Guide for Air and Ground Transport of Neonatal and Pediatric Critical Care Patients.

Risk factors associated with severe IVH in outborn infants <33 weeks

Stephanie Redpath, MBChB, FRCPC (UK)¹; Kyong-Soon Lee, MD, FRCPC²; Prakesh Shah, MD, MRCP,

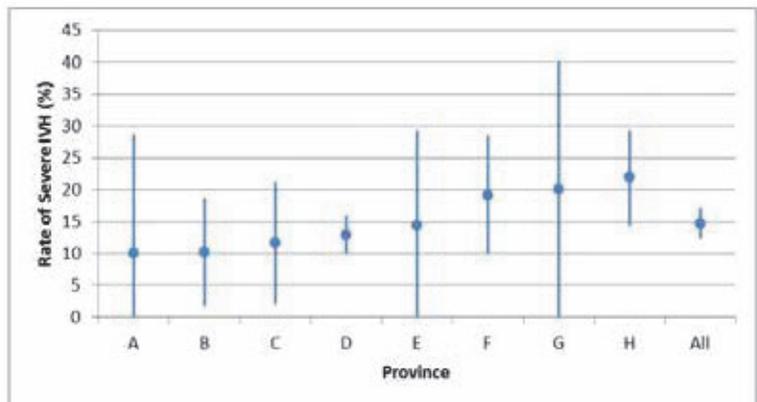
MSc, FRCPC³; Gregory Moore, Ontario⁴; Junmin Yang, MSc⁵, (1) Children's Hospital of Eastern Ontario, Ottawa ON Canada; Ottawa, ON, Canada, (2) Sick Kids Hospital, Toronto, Toronto, ON, Canada, (3) Director of the Canadian Neonatal Network, Toronto, ON, Canada, (4) Children's Hospital of Eastern Ontario, Ottawa, ON, Canada, (5) Maternal-Infant Care Research Centre, Mount Sinai Hospital, Toronto, Toronto, ON, Canada

Background: Severe intraventricular haemorrhage (IVH) increases the risk of adverse neurodevelopmental outcome in preterm infants. Birth in a non-perinatal center ("outborn") is associated with an increased risk of IVH; the risk factors for IVH in the outborn and subsequently transported population have been less studied. An evaluation of the risk factors for severe IVH among outborn preterm infants may provide insight into areas of opportunity for practice improvement. Objective: To examine if variation exists across Canada in rates of severe IVH for transported infants with GA <33 weeks and to determine risk factors for severe IVH among these outborn infants. Design/Methods: Retrospective review of data from the Canadian Neonatal Transport Network, between Jan 1st, 2014 to December 31st, 2015, of all infants born <33 weeks in a non-tertiary center and transported within 3 days of birth by a neonatal transport team to a Canadian Neonatal Network site. Results: Among 781 included infants, there were 115 (14.7%) cases of severe IVH, with inter-site variation ranging from 10.0 to 21.9%. In the severe IVH vs no severe IVH groups, there were no statistically significant differences (n (%)) in receipt of complete course of antenatal steroids (28 (44.4%) versus 190 (46.3%)); receipt of antenatal magnesium sulfate (35 (35.4%) versus 90 (13.5%)); and transport team arrival before delivery (40 (34.8%) versus 222 (33.3%)). In multivariate analysis, risk factors significantly associated with severe IVH were (OR (95% CI)), GA (0.77 (0.71, 0.85)) per week, need for chest compressions and/or epinephrine after delivery (1.81 (1.08, 3.05)) and fluid bolus (1.61 (1.00, 2.58)). Site remained a significant predictor of severe IVH after adjustment for covariates. Conclusions: These findings support the importance of in utero transfer to perinatal centers for the most immature infants to allow for optimal postnatal stabilization and potentially decrease the need for aggressive resuscitation. Premature resuscitation practices remain a high priority education topic for both referral sites and transport teams. Further research is required to elucidate the difference in IVH rates identified between transport teams and sites across Canada.

Table 1: Risk factors for intraventricular hemorrhage

Infant Variable n (%), median (IQR), mean (SD)	Severe IVH (grade 3-4) [N=115]	IVH grade 1-2 or No IVH [N=666]	p-value
GA, mean (SD)	26.6 (2.7)	28.4 (2.4)	<0.01
BW, mean (SD)	1028 (411)	1267 (419)	<0.01
Male, n (%)	64 (55.7)	379 (57.0)	0.79
Cesarean, n (%)	63 (54.8)	333 (50.2)	0.37
Multiple births, n (%)	14 (12.2)	132 (19.8)	0.05
Antenatal steroids (complete), n (%)	28 (44.4)	190 (46.3)	0.88
Antenatal magnesium sulfate, n (%)	35 (35.4)	195 (33.7)	0.75
Prophylactic indomethacin, n (%)	13 (11.3)	54 (8.1)	0.26
Apgar at 5 min, median (IQR)	6 (3, 7)	7 (5, 8)	<0.01
Resuscitation required at delivery, n (%)			
• Compressions	34 (29.6)	88 (13.2)	<0.01
• epinephrine	16 (13.9)	34 (5.1)	<0.01
Compressions or epinephrine	35 (30.4)	90 (13.5)	<0.01
TRIPS score team arrival, median (IQR)	22 (14, 31)	14 (5, 21)	<0.01
TRIPS score NICU admission, median (IQR)	20 (14, 30)	15 (6, 21)	<0.01
TT Arrived prior to delivery, n (%)	40 (34.8)	222 (33.3)	0.76
Fluid bolus received; n (%)			
By team	30 (27.9)	109 (16.4)	0.01
By referral	17 (16.7)	52 (7.8)	0.01
By team or referral	43 (37.4)	149 (22.4)	<0.01
Hypothermia, n (%)	14 (12.2)	30 (4.5)	<0.01

Figure 1. Rate of severe intraventricular hemorrhage by province



Courtney Mangus MD



Best-in-Training Award recognizes the best abstract or poster presentation given by a student, resident, or post-graduate fellow during the Section Program. **The winner receives a \$250 honorarium and a certificate plus a copy of the Field Guide for Air and Ground Transport of Neonatal and Pediatric Critical Care Patients.**

Interhospital Transport of Children by Personal Vehicle vs Ambulance: What Do Caregivers Value?

Courtney W. Mangus, MD¹; Martha Stevens, MD²; Therese Canares, MD², (1) Johns Hopkins Hospital, Baltimore, MD, (2) Johns Hopkins University School of Medicine, Division of Pediatric Emergency Medicine, Baltimore, MD

Purpose: Most children seeking emergency care are initially evaluated in community emergency departments. For those requiring secondary transport to a tertiary care center for further management, interhospital transport via ambulance or patient's own vehicle (POV) is considered depending on a patient's clinical acuity and physiologic stability. For low-acuity patients, medical practitioners commonly cite family-centered barriers to pediatric transport by POV, including concerns about caregiver preference, compliance, and general comfort with the transport process. However, caregiver attitudes have not yet been formally evaluated. This study examines caregiver preferences related to mode of interhospital transport and identifies themes important to their transport experience. **Methods:** This is a mixed-methods, prospective cohort study over a 12-month period of children aged 4-17 years with pre-specified low-acuity medical conditions who presented to a single community hospital and subsequently required transfer to a tertiary pediatric hospital. Caregivers of eligible patients were given the choice of transport by POV or ambulance. Participating caregivers were purposefully sampled through anonymous surveys after transport. Dichotomous and 5-point Likert scale responses assessing satisfaction and perceptions on comfort, safety, ease of trip were quantitatively analyzed and are reported separately. Open-ended questions explored reasons for choosing mode of transport. Content analysis of free-text responses was triangulated by two independent investigators and was applied to identify major themes of caregiver preferences and values related to transport. Survey collection continued until thematic saturation was reached. **Results:** In total, 54 of 58 eligible patients were enrolled. All caregivers (n=54, 100%) elected transport by POV, and all enrolled patients presented to the tertiary center for further management. Of those enrolled, 44 (81%) completed surveys with 36 (67%) completing the qualitative free-text questions. Surveyed patients were 55% male, and mean age was 9.3 (SD±4.2 years). Demographics of surveyed patients did not differ from those of the entire cohort. Qualitative analysis identified themes of child comfort, efficiency of transport, convenience, and medical acuity as being important to surveyed caregivers (Table 1). Heavy traffic and navigational difficulties were the only identified sources of dissatisfaction. **Conclusion:** Caregivers of children with low-acuity medical conditions overwhelmingly prefer interhospital transport by POV rather than ambulance. Caregivers' values in selecting mode of transport include their child's comfort, time efficiency, and convenience.

Table 1: Thematic Analysis of Caregiver Values on Interhospital Transport

Themes and Illustrative Quotes
Theme 1: Caregivers chose transport based on physical and emotional comfort of their child
"It is less anxiety for my daughter, one less new environment to be scared about"
"Comfort of child most important. Child was in no pain. Ambulance would have escalated the drama"
"It was much less stressful for my daughter to be in our car"
Theme 2: Caregivers preferred the mode of transport that was fastest or most efficient
"Son did not have a major injury so it was more efficient to transport ourselves"
"Driving was the fastest option"
"Saving time was the reason to drive. Everything was moving in slow motion at [referring hospital]"
Theme 3: Caregivers valued the convenience of POV transport
"Transporting by car allowed us to stop by our house and pack an overnight bag"
"It's nice to have my car here"
"Using our own car was quicker and more convenient"
Theme 4: Transport by POV fostered family unity
"All of our family was able to come to the hospital together"
"Both ways we need to be with her. It is better to go with our car"
"My child feel good with his family and his own environment"
Theme 5: Caregivers recognized that medical acuity may influence mode of transport
"No reason for ambulance in a non-emergency"
"Because it was not a severe injury, it was easier, faster, and cheaper to drive my son to the ER"
"Would transport child in an ambulance only in life-threatening situation"
Theme 6: Traffic and navigational difficulties were a source of frustration
"Given a chance to do it over, we would have opted for ambulance. Less stress trying to navigate to hospital"
"Dark, rain fog and I did not know where I was going"
"Only negative was traveling during rush hour"

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Walter Miller RRT



Allied Health Professional Best Paper Award recognizes the best abstract or poster presentation given by an allied health professional during the Section Program. **The winner receives a \$250 honorarium and a certificate plus a copy of the Field Guide for Air and Ground Transport of Neonatal and Pediatric Critical Care Patients.**

Standardizing transport handoff, a quality improvement, MOC initiative

Walter Miller, RRT¹; Ladonna K. Bingham, MD²; Aaron M. Germain, MD³; Anthony A. Sochet, MD, MS⁴, (1) Johns Hopkins All Childrens Hospital, St Petersburg, FL, (2) Johns Hopkins All Children's Hospital, St Petersburg, FL, Seminole, FL, (3) Johns Hopkins All Childrens Hospital, St Petersburg, FL, (4) Johns Hopkins All Children's Hospital, Tierra Verde, FL

Background: Transport literature does not recognize a preferred handover method as best practice following interfacility transport. Yet, failures in communication from poor handover are associated with adverse patient events. The Joint Commission has prioritized standardizing transitions in care to improve safety and quality outcomes. Problem: In our hospital, transport handover varied depending on receiving unit, providers involved, and patient acuity. We sought to improve communication, teaming, and shared mental model development by standardizing interfacility transport handover between our critical care transport team and receiving units within our tertiary, pediatric referral center. Specific Aims: 1. Improve notification of patient arrival to receiving clinical providers to enhance attending physician presence at the time of arrival to 80% within 3 months. 2. Decrease distractions and interruptions during handover by 20% within 6 months. 3. Improve provider summarization and provision of anticipatory guidance by 20% within 6 months. Strategy/Implementation: We completed a quality improvement project by implementing PDSA cycles with tests of change for the specific aims described above. By incentivizing with MOC credit, 81% of the NICU, PICU, CVICU, and ED physicians participated in this project. Baseline data was collected using questionnaires distributed after transport handover. Additionally, the transport team collected data on staff presence, arrival times, environmental data, interruptions, behaviors of participants, and handover content. Initial data revealed attending presence at <60% of handovers, and showed that >70% of the handovers had distracting interruptions. PDSA cycles were completed quarterly for 12 months. In PDSA cycle #1, we developed an institution-wide standardized handoff template (Figure 1) and created a video for physician and transport education. Nurses and RTs were educated at staff meetings and via email. Notification of transport arrival was initiated by the transfer center. In cycle #2, physicians were re-educated on summarization, providing a care plan and anticipatory guidance. The staff was empowered to speak up if the room was not quiet or distractions were noted during handoff, and there was additional education on the notification call tree. During cycle #3, we educated the residents to participate in standardized handoff and asked the faculty to supervise. PDSA cycle #4 tested sustainability. Results: Standardized handover occurred in 100% of the transports. The mean duration of handover remained 4 minutes. Interruptions decreased from 70% to <10% in all units except for one. Attending participation improved in all units. Initially, attendings prompted questions 87% of the time, this improved to 100% by 6 months. Physician summarization and provision of anticipatory guidance improved from 42% pre-standardization to 85% at 1-year follow up. (Figure 2) Conclusion: We achieved sustained improvement in communication and team participation in transport handovers with clinician buy-in and re-education. Additional work on handovers is needed between other units in our institution.

Alyssa Morgan RN



Best Poster Award recognizes the best poster presented during the Section Program. **The winner receives a certificate plus a copy of the Field Guide for Air and Ground Transport of Neonatal and Pediatric Critical Care Patients.**

Minimizing surfactant wastage on transport

Alyssa Morgan, RN; Sheree Kuo, MD; Wayne Takenaka, BBA, RRT-NPS; Kyle Tadaki, BS, BCPS, BCPPS, Kapiolani Medical Center for Women and Children, Honolulu, HI

Background Surfactant replacement therapy decreases pulmonary morbidity and mortality in premature infants with respiratory distress syndrome. It may also benefit patients with conditions associated with surfactant inactivation and secondary dysfunction, such as acute respiratory distress syndrome. Specialty Neonatal and Pediatric Transport Teams often carry surfactant when the patient condition potentially warrants administration. Because surfactant replacement therapy is costly, proper storage and handling is essential to minimize wastage. Without a process in place to maintain proper refrigeration of surfactant on transport, all vials of surfactant were discarded after our Transport Team returned their medications to the pharmacy. A pharmacy audit revealed that an average of 25-30 vials were wasted per month between January-June 2016 (estimated loss of \$9k-\$11k/month), prompting the following quality improvement project. AIM Statement We aim to decrease surfactant vial wastage on transport by 60% within the next 24 months by implementing a new process to track warmed surfactant vials after they are returned to the pharmacy and minimize warming of surfactant on transports. Methods A multidisciplinary team (RN, RT, MD, management, pharmacist) was assembled to brainstorm how best to address surfactant wastage. Following review of the manufacturer's package insert, a new labeling/tracking system was implemented to identify vials that had been warmed once and returned to inventory. Process mapping of the current process for taking surfactant on transport helped to identify potential barriers to process change in the context of existing Transport Team workflow. Use of a cooler to maintain refrigeration of surfactant on transport was then proposed. Numerous tests of change (Plan-do-study-act cycles) were performed to refine the type of cooler used, packaging details, and medication request process. Finally, a new algorithm for restocking surfactant to general inventory (if returned within recommended storage temperatures) vs. NICU inventory (if returned warmed once) was implemented to further minimize waste. Results Early audit of surfactant temperatures following transport using a cooler revealed that 100% of vials returned within the manufacturer's recommended storage temperature range (data not shown). Over the past 21 months, surfactant wastage has decreased from 100% in the baseline data collection period to 9.6% during project year 1 and 2.8% during project year 2 (Figure 1). Discussion To date, our project results have exceeded our initial goal of decreasing surfactant vial wastage by the transport team. Moreover, efforts to conserve surfactant extended beyond the transport team to hospital practices. Multidisciplinary involvement (in particular by pharmacy) is felt to be one of the main reasons for our project's success. Use of the cooler on transport is now being considered for other medications that require refrigeration to decrease wastage.