

(RoCKAS) questionnaire immediately before and after a Concussion-U educational presentation on the subject. *Results:* Concussion knowledge and attitude scores significantly ( $p < .001$ ) increased from pre-presentation to post-presentation by 13.1% and 8.7%, respectively. *Discussion:* A Concussion-U educational presentation designed to improve concussion knowledge and attitudes in youth hockey players resulted in increased knowledge and improved attitudes towards concussion in elite male Bantam and Midget hockey players. Future research should examine the long-term effects of such presentations.

## P.068

### Epidemiological patterns of traumatic brain injury identified in the emergency department in Ontario, 2002-2010

*T Fu (Toronto)\* R Jing (Toronto) M Cusimano (Toronto)*

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*Background:* Traumatic brain injury (TBI) is the leading cause of traumatic death and disability, and most TBIs are treated in the Emergency Department (ED). We examined the incidence and epidemiological patterns of TBIs presenting to Ontario EDs over an eight-year period. *Methods:* All TBI-related ED visits between April 2002 and March 2010 were identified using a population-based database that is mandatory for ambulatory care facilities in Ontario. Incidence rates were reported across multiple strata, including age group, sex, and mechanism of injury. *Results:* From 2002-2010, there were 1,032,249 ED visits for TBI in Ontario. Peak rates occurred among young children ages 0-4 (349 per 10,000) and elderly adults ages 85+ (243 per 10,000). Overall, males experienced a 53% greater rate of TBI compared to females. Falls (47%), motor vehicle crashes (MVC; 10%), and sports-related injuries (9%) were the most common causes of TBI. The highest rates of TBI-related falls, MVCs, and sports-related injuries occurred among young children (0-4) and elderly adults (85+), adolescents/young adults (15-24), and children (5-14), respectively. *Conclusions:* Our study reveals a substantial health system burden associated with TBI in the ED setting, underscoring the need for enhanced surveillance and prevention efforts targeted to vulnerable demographic groups.

## P.069

### Lifetime costs of traumatic brain injury identified in the emergency department in Ontario

*T Fu (Toronto)\* R Jing (Toronto) M Cusimano (Toronto)*

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*Background:* Traumatic brain injury (TBI) is a leading cause of death and disability, yet there is limited research on its economic burden. We estimated the incidence and lifetime costs of TBI identified in the Emergency Department (ED) in Ontario, Canada between April 2009 and March 2010. *Methods:* ED visits for TBI were identified using a population-based database that is mandatory for ambulatory care facilities in Ontario. The authors calculated unit costs for medical treatment and productivity loss, and multiplied these by incidence estimates to determine the lifetime costs of identified TBI cases. *Results:* In 2009, there were over 133,000 ED visits for TBI in Ontario, resulting in a conservative estimate of \$945 million in total lifetime costs. Costs were greater for males than females across

nearly all age groups, with males incurring two-fold higher costs overall. Together, falls (\$407 million), struck by/against (\$309 million), and motor vehicle injuries (\$161 million) represented 93% of lifetime costs associated with TBI. *Conclusions:* This study revealed a high incidence and economic burden associated with TBI identified in the ED. More research is needed to fully appreciate the burden of TBI across a variety of healthcare settings.

## P.070

### Violence-related brain injuries sustained in youth ice hockey

*M Shirazi (Toronto) MD Cusimano (Toronto)\* S McFaull (Ottawa)*

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*Background:* Violence is a frequent occurrence in ice hockey and has been associated with an increased risk of injury. *Methods:* Case-control study. The study population consisted of youth aged 0-19 years who presented to a participating emergency department (ED) with an injury resulting from participation in ice hockey. In order to examine the outcomes following brain injuries in ice hockey, the outcome was admission to the hospital (cases) or discharge from the ED (controls). In order to examine the relationship between brain injury and violence, the outcome was brain injury (cases) or a non-brain injury (controls). Logistic regression was used to determine the associations controlling for potential confounders. *Results:* In total, 56,835 youth suffered an injury related to ice hockey. 11.0% ( $n=6,293$ ) were brain injuries. Youth who engaged in violence were at significantly higher odds of sustaining a brain injury as opposed to an injury to another body part (OR: 1.67; 95% CI: 1.55-1.80). Youth who sustained violence-related injuries were at significantly higher odds of being admitted to the hospital compared to youth who sustained non-violence related injuries (OR: 2.34; 95% CI: 1.49-5.68). *Conclusions:* Youth who engage in violence are at higher odds of sustaining a brain injury and of being admitted to the hospital.

## P.071

### Brain injuries sustained by Canadian youth participating in Rugby Union

*M Shirazi (Toronto) MD Cusimano (Toronto)\* J Di Michele (Toronto) S McFaull (Ottawa)*

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*Background:* Rugby is a high-intensity, full-body contact sport in which there is an increased risk of injury associated with participation. The objectives of this study were to identify the mechanisms and characteristics of rugby-related injury sustained amongst Canadian youth. *Methods:* Data were obtained from the Canadian Hospitals Injury Reporting and Prevention Program database. The study population consisted of individuals aged 10-19 who sustained an injury while participating in rugby between the years 1990 and 2014. Proportions of body parts injured, mechanisms of brain injury, and nature of injury were calculated with 95% confidence intervals. *Results:* There were a total of 6200 rugby-related injuries sustained among individuals aged 10-19 between the years 1990 and 2014. 16.0% ( $N=993$ ) of all injuries were brain injuries, 48.9% ( $n=486$ ) of which were concussions. 70.7% ( $n=4838$ ) of all injuries were sustained by males. The predominant mechanism of brain injury was

tackling which accounted for 48.3% of all brain injuries  $n=480$ . *Conclusion:* Participation in rugby is rapidly increasing, and brain injury as a result of participation is a common occurrence. Possible changes to reduce injury include stricter penalties for high tackles to the head and neck area, and rules against blindside tackles.

## P.072

### A pilot study exploring pupil response measurement in mild traumatic brain injury

W Ting (Toronto)\* J Topolovec-Vranic (Toronto) M McGowan (Toronto) MD Cusimano (Toronto)

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*Background:* Pupillometry, the measurement of pupil response dynamics via the pupillary light reflex, is seldom used in the assessment of mild traumatic brain injury (mTBI). We hypothesized that there would be quantifiable differences in detailed pupil response measurements in patients with acute and chronic mTBI. *Methods:* We conducted 49 bilateral pupillometry measurements, in acute mTBI patients at 1-week ( $N=11$ ), 2-4w ( $N=9$ ), and 3-7mo post-injury ( $N=3$ ); 14 patients with persistent post-traumatic symptoms (PTS) once, and healthy controls across a first visit ( $N=7$ ) and second visit 2-4w later ( $N=5$ ). *Results:* The percentage of left pupil diameter change was significantly greater in the acute mTBI group at second visit (mean=36.3% (2.96)), compared to controls at second visit (mean=31.6% (4.39)) ( $F=5.87$ ,  $p=0.0321$ ). We did not identify significant differences between acute mTBI patients and controls at first visit, PTS patients versus controls, and within the acute mTBI group across three longitudinal visits. *Conclusion:* While these preliminary data suggest that pupillometry under these conditions does not distinguish between patients who had a recent mTBI or those with PTS and healthy controls, further research is warranted investigating pupil behavior and its clinical utility in mTBI.

## P.073

### Compliance with brain trauma foundation (BTF) guidelines for management of traumatic brain injury (TBI) patients: systematic review and meta-analysis

YH Khormi (Edmonton)\* C O'Kelly (Edmonton)

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*Background:* TBI is a leading cause of death and disability. Management based on the BTF guidelines is widely accepted and thought to improve outcome. The objectives of this study were: 1) to review the rate of adherence to BTF guidelines; 2) to identify factors influencing adherence; and 3) to determine the effect of guideline-based management on outcome. *Methods:* We searched all electronic bibliographic databases. In duplicate and independently, two investigators screened titles, abstracts and articles to select appropriate studies reporting compliance rate, factors influencing compliance, and adjusted mortality or morbidity. Data extraction and assessment of bias risk were performed independently by both investigators. We excluded pediatric and military-related TBI studies. *Results:* A total of 30 articles met inclusion/exclusion criteria out of 1153 papers screened. Most are retrospective and cross-sectional observational studies; there were no randomized control trials. Preliminary analysis showed considerable variation in compliance rate with BTF

guidelines ranging from 5.6-96%. *Conclusions:* Variation in the care of TBI patients persists across the world. Compliance with BTF guidelines was strongly influenced by implementing a guidelines-based protocol. Heterogeneity of the article prevents outcome assessment. Well-conducted study to support the existing literature of the beneficial effect of current guidelines is needed.

## NEUROSURGERY (GENERAL NEUROSURGERY)

## P.074

### Emergent and urgent transfers to neurosurgical centres: examining access in Ontario

Z Merali (Toronto)\* S Sharma (Toronto)\* R MacDonald (Mississauga) E Massicotte (Toronto)\*

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*Background:* Critically ill neurosurgical patients require expedient access to neurosurgical centers (NC) to improve outcome. In Ontario, many patients are initially evaluated at a non-neurosurgical center (NNC) and subsequently transferred to a NC by a provincial service using air or ground vehicles. We characterized transfers from NNC to NC for critically ill patients. *Methods:* A retrospective observational analysis was undertaken. The cohort included patients in Ontario with emergent and urgent neurologic pathologies who underwent transfer from a NNC to NC between January 1, 2011 and December 31, 2013. Timing, clinical, and geographic data were collected for each transfer. *Results:* We identified 1103 emergent/urgent transfers. The mean transfer time to a NC was 3.4hrs (SD = 3.0) and varied by the geographic region of origin. 17% of patients bypassed a closer NC during transfer to their destination NC. Transfers that bypassed a closer NC travelled further (162km vs. 477km,  $p<0.001$ ), took longer (3.1hrs vs. 3.9hrs,  $p<0.001$ ), and in some regions were associated with a higher risk of in-transit clinical decline (3.0% vs. 8.3%,  $p<0.05$ ) when compared with transfers that ended at the closest NC. *Conclusions:* Transport time to a NC varied across Ontario. Transfers occasionally bypassed the nearest NC, which may reflect neurosurgical bed availability, resource limitations, or patient needs.

## P.076

### Use of drains versus no drains after burr-hole evacuation of chronic subdural hematoma

M Moores (Halifax)\* L Fenerty (Halifax) G Thibault-Halman (Halifax) N Kureshi (Halifax) S Walling (Halifax) DB Clarke (Halifax)

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*Background:* Chronic subdural hematomas (cSDH) are a common neurosurgical problem with significant morbidity and mortality. Current treatment methods are variable. Post-operative subdural drain used in conjunction with burr-hole craniostomy may reduce recurrence. This study compared recurrence rates for cSDH between two surgical practices with and without use of post-operative subdural drain at the QEII Health Sciences Center. *Methods:* A retrospective chart review was conducted to compare recurrence rates between surgical patients treated with or without a post-operative