

future, the residents will be primed to understand and expect certain challenges that may arise. The educational experience fosters collaboration between prehospital and hospital-based providers. The sessions provide a reproducible, standardized experience for all participants; something that cannot be guaranteed with traditional EMS ride-alongs. Future sessions will evaluate participant satisfaction and self-efficacy with the use of a standard evaluation form including pre/post self-evaluations.

**Keywords:** emergency medical services, resident education

#### P056

##### **Rural versus urban pre-hospital and in-hospital mortality following a traumatic event in Québec, Canada**

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**Introduction:** Trauma remains the primary cause of death in people under 40 in Québec. Although trauma care has dramatically improved in the last decade, no empirical data on the effectiveness of trauma care in rural Québec are available. This study aims to establish a portrait of trauma and trauma-related mortality in rural versus urban pre-hospital and hospital settings. **Methods:** Data for all trauma victims treated in the 26 rural hospitals and 32 Level-1 and Level-2 urban trauma centres was obtained from Québec's trauma registry (2009-2013). Rural hospitals were located in rural small towns (Statistics Canada definition), provided 24/7 physician coverage and admission capabilities. Study population was trauma patients who accessed eligible hospitals. Transferred patients were excluded. Descriptive statistics were used to compare rural with urban trauma case frequency, severity and mortality and descriptive data collected on emergency department (ED) characteristics. Using logistic regression analysis we compared rural to urban in-hospital mortality (pre-admission and during ED stay), adjusting for age, sex, severity (ISS), injury type and mode of transport. **Results:** Rural hospitals (N = 26) received on average 490 000 ED visits per year and urban trauma centres (N = 32), 1 550 000. Most rural hospitals had 24/7 coverage and diagnostic equipment e.g. CT scanners (74 %), intensive care units (78 %) and general surgical services (78 %), but little access to other consultants. About 40% of rural hospitals were more than 300 km from a Level-1 or Level-2 trauma centre. Of the 72 699 trauma cases, 4703 (6.5%) were treated in rural and 67 996 (93.5%) in urban hospitals. Rural versus urban case severity was similar: ISS rural: 8.6 (7.1), ISS urban: 7.2 (7.2). Trauma mortality was higher in rural than urban pre-hospital settings: 7.5% vs 2.6%. Reliable pre-hospital times were available for only a third of eligible cases. Rural mortality was significantly higher than urban mortality during ED stays (OR (95% IC): 2.14 (1.61-2.85)) but not after admission (OR (95% IC): 0.87 (0.74-1.02)). **Conclusion:** Rural hospitals treat equally severe trauma cases as do urban trauma centres but with fewer resources. The higher pre-hospital and in-ED mortality is of grave concern. Longer rural transport times may be a factor. Lack of reliable pre-hospital times precluded further analysis.

**Keywords:** trauma, rural, mortality

#### P057

##### **Diagnosis for mild traumatic brain injury in three Canadian emergency departments: missed opportunities**

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**Introduction:** Patients with mild traumatic brain injury (mTBI) often present to the emergency department (ED). Incorrect diagnosis may delay appropriate treatment and recommendations for these patients, prolonging recovery. Notable proportions of missed mTBI diagnosis have been documented in children and athletes, while diagnosis of mTBI has not been examined in the general adult population. **Methods:** A prospective cohort study was conducted in one academic (site 1) and two non-academic (sites 2 and 3) EDs in Edmonton, Canada. On-site research assistants enrolled adult (>17 years) patients presenting within 72 hours of the injury event with clinical signs of mTBI and Glasgow comma scale score  $\geq 13$ . Patient demographics, injury characteristics, and ED flow information were collected by chart review. Physician-administered questionnaires and patient interviews documented the recommendations given by emergency physicians at discharge. Bi-variable comparisons are reported using Pearson's chi-square tests, Student's t-tests or Mann-Whitney tests, as appropriate. Multivariate analyses were performed using logistic regression methods. **Results:** Overall, 130/250 enrolled patients were female, and the median age was 35. Proportions of successfully diagnosed mTBI varied significantly across study sites (Site 1: 89%; Site 2: 73%, Site 3: 53%;  $p > 0.001$ ). Patients without a diagnosis were less likely to receive a recommendation to follow-up with their family physician (OR = 0.08; 95% CI: 0.03, 0.21) or advice about return to work (OR = 0.17; 95% CI: 0.08, 0.04) or physical activity (OR = 0.08; 95% CI: 0.04, 0.17). Patients with missed diagnoses had longer ED stays (median = 5.0 hours; IQR: 3.8, 7.0) compared with diagnosed mTBI patients (median = 3.9 hours; IQR: 3.0, 5.3). In the adjusted model, patients presenting to non-academic centers had reduced likelihood of mTBI diagnosis (Site 2: OR = 0.21; 95% CI: 0.08, 0.58; Site 3: OR = 0.07; 95% CI: 0.02, 0.24). **Conclusion:** The diagnostic accuracy of physicians assessing patients presenting with symptoms of mTBIs to these three EDs is suboptimal. The rates of missed diagnosis vary among EDs and were associated with length of ED stay. Closer examination of institutional factors, including diagnosis processes and personnel factors such as physician training, is needed to identify effective strategies to heighten the awareness of mTBI presentations.

**Keywords:** mild traumatic brain injury, concussion, practice variation

#### P058

##### **Morbid obesity association with return of spontaneous circulation from sudden cardiac arrest treated in a large, urban EMS system in the United States**

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**Introduction:** Patient co-morbidities contribute to survivability from out-of-hospital sudden cardiac arrest. Many studies have been conducted regarding contributing factors to sudden cardiac arrest survival, though very few studies have been published detailing specific analysis of morbid obesity association with return of spontaneous circulation (ROSC) in adults treated by paramedics. **Methods:** Adults in sudden cardiac arrest with resuscitation initiated, including at least one defibrillation, between July 1, 2016 and December 1, 2016 were enrolled. Due to an increasing prevalence of morbid obesity in the United States adult population, a novel defibrillation strategy, involving weight-based joule settings and double sequential external defibrillation (DSED) was initiated in June 2016. As exact body weight is logistically difficult to obtain in the EMS care environment, a paramedic-estimated weight at

the time of resuscitation to be 100 kg or greater was deemed representative of “morbid obesity” for this analysis. All resuscitations were reviewed from electronic medical records (EMRs) completed by treating paramedics, alongside telemetry and defibrillation events recorded, transmitted, and analyzed in proprietary software (CODE-STAT, Physio-Control Corporation, Redmond, WA). ROSC was determined from both paramedic and hospital clinician EMRs reviewed by a paramedic researcher. **Results:** During the 5 month study period, paramedics involved treated 133 adults in sudden cardiac arrest involving perceived ventricular fibrillation that was treated with at least one defibrillation. 49/90 (54.4%) with weight <100 kg as estimated by paramedics at the time of resuscitative care achieved at least transient ROSC. Only 17/43 (39.5%) with estimated weight  $\geq$ 100 kg achieved any ROSC, despite paramedics authorized to perform defibrillations at higher joule energy settings for such weight. The OR for ROSC if <100 kg estimated weight is 1.83 (95% CI 0.87-3.83), though given limited sample size  $p = 0.11$ . **Conclusion:** While survival from out-of-hospital sudden cardiac arrest in adults is multi-factorial, the presence of morbid obesity, defined as estimated weight  $\geq$ 100 kg, trends towards less ROSC. Continued community health efforts to decrease the prevalence of morbid obesity in the adult population may confer improved ability to survive out-of-hospital sudden cardiac arrest.

**Keywords:** cardiac arrest, morbid obesity, return of spontaneous circulation

#### P059

##### **Paramedic compliance with a novel defibrillation strategy in a large, urban EMS system in the United States**

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**Introduction:** Emergency Medical Services (EMS) care confers distinct impact upon survivability from sudden cardiac arrest. Many studies have been conducted regarding EMS interventions for cardiac arrest, though fewer studies have been published detailing specific analysis of paramedic compliance with standing orders, particularly those involving a novel energy strategy in defibrillation. **Methods:** Adults in sudden cardiac arrest with resuscitation initiated, including at least one defibrillation, between July 1, 2016 and December 1, 2016 were enrolled. Education on a novel defibrillation strategy, involving weight-based joule settings and double sequential external defibrillation (DSED) was delivered in classroom and internet-accessed settings. Paramedics then performed hands-on practice in DSED. All resuscitations were reviewed from electronic medical records (EMRs) completed by treating paramedics, alongside telemetry and defibrillation events recorded, transmitted, and analyzed in proprietary software (CODE-STAT™, Physio-Control Corporation, Redmond, WA). All ECGs and defibrillation events were reviewed by an emergency physician to determine energy settings used by paramedics for determining the accuracy of compliance with protocol-based standing orders. **Results:** During the 5 month study period, the paramedics involved treated 133 adults in sudden cardiac arrest involving perceived ventricular fibrillation that was treated with at least one defibrillation. 76/90 (84.4%) with estimated weight <100 kg were treated with correct joule settings, though only 7/43 (16.3%) with estimated weight  $\geq$ 100 kg received all defibrillations at 360J as protocol-specified. 26/44 (59.1%) in refractory ventricular fibrillation, defined as requiring a fourth defibrillation, received DSED as protocol-specified. **Conclusion:** Paramedics, when specifically trained on a novel defibrillation strategy, involving both weight-based joule settings and use of DSED for refractory ventricular fibrillation, are inconsistently able to quickly and successfully incorporate that strategy in EMS

resuscitation care. Further educational endeavours are warranted to achieve higher defibrillation strategy protocol compliance.

**Keywords:** cardiac arrest, ventricular fibrillation, paramedic

#### P060

##### **Imaging practices of emergency physicians for low risk non-traumatic low back pain**

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**Introduction:** Included in the first list of recommendations from the Choosing Wisely Canada (CW) Emergency Medicine (EM) group was to avoid ordering lumbosacral radiographs for patients with non-traumatic low back pain (LBP) in the absence of red flags. It has been suggested that these lumbosacral radiographs lead to unnecessary ionizing radiation and increase emergency department (ED) wait times without improving patient outcomes. This study evaluates lumbosacral imaging practices of emergency physicians (EPs) in four urban EDs. **Methods:** Data was retrospectively collected from patients, ages 18-60 and CTAS codes 2-5, who presented with non-traumatic LBP from April 1, 2014 to March 31, 2016 to four urban EDs. The time frame included both pre- and post-CW recommendation. Patients considered high risk, specifically with PTT >40 s or INR >1.2 s, neurology/neurosurgery/spine consults, admission to hospital, and history of cancer, were excluded. The primary outcome was to establish lumbosacral radiograph usage rates for non-traumatic LBP. The secondary outcome was to identify factors that influenced lumbosacral spine imaging. Factors analyzed included patient age, patient sex, ED wait times, physician age, physician experience, and physician sex. Statistical significance was determined by chi-squared analysis. **Results:** The data from 3140 low-risk patients showed that 16.5% of the patients received lumbosacral radiographs. Physician variation in X-ray ordering was 0% to 85.7% (IQR 4.6 to 25%). There was a significant difference between the X-rays ordered at each site (site 1 (23.1%) > site 2 (17.2%) > site 3 (14.9%) > site 4 (11.3%),  $p < 0.001$ ). CCFP-EM licensed physicians (17.9%) ordered more X-rays compared to licensed physicians (13.7%,  $p < 0.001$ ). Time of presentation, physician sex, and patient sex did not affect the imaging practices. There was a trend towards decreased ordering of X-rays (17.6% vs. 15.1%,  $p = 0.06$ ) post-CW recommendation. **Conclusion:** Considerable variation exists in the ordering practices of Calgary EPs; however, on average they are choosing wisely in terms of ordering imaging for non-traumatic LBP.

**Keywords:** non-traumatic low back pain, lumbosacral imaging, Choosing Wisely

#### P061

##### **Preventable adverse drug events in Canadian emergency departments**

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**Introduction:** Adverse drug events (ADEs), unintended and harmful events associated with medications, cause or contribute to 2 million emergency department (ED) visits in Canada each year. Our **objective** was to determine the proportion of preventable ADEs by event type, severity, drug and drug class, and describe associated factors. **Methods:** We reviewed the charts of ADE patients enrolled in 1 of 3 prospective studies conducted in 3 tertiary care and 1 urban community ED. In the parent studies, researchers enrolled patients by applying a systematic selection algorithm to minimize selection bias, and physicians and