LO92

Development of a predictive model for hospital admissions by utilizing frequencies of specific CEDIS presenting complaints

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Introduction: With hospital occupancy rates frequently approaching 100%, even small variations in daily admission numbers can have a large impact. The ability to predict variance in emergency admission rates would provide administrators with a significant advantage in managing hospital daily bed requirements. There is a growing interest in patterns of hospital admissions, and many EDs utilize historical admission patterns to attempt to predict daily bed requirements. Previous studies have utilized patient demographics and past medical history to develop an admission likelihood model. We wished to examine the predictive strength of individual CEDIS presenting complaints (PC) on admission likelihood **Methods:** Using a database analysis of over 285,000 ED presentations (2013-2017), we calculated visit frequencies and admission rates by PC. Using a logistic regression analysis PCs were ordered from high to medium predictive strength. **Results:** Of 285,155 presentations, there were 38,090 hospital admissions, a rate of 13.36%. Based on the number of visit frequencies and admission rates, the PCs demonstrating high predictive strength were Direct Referral (effect = 0.36, binomial CI: 0.28 to 0.44); Shortness of Breath (0.32: 0.26 to 0.41); General Weakness; Weakness/Query CVA; & Chest Pain Cardiac Features (each 0.30: 0.25 to 0.42); Altered level of consciousness (0.24: 0.16 to 0.31); and Confusion (0.18: 0.08 to 0.26). With our sample size, all remaining CEDIS PCs had low predictive value (the effect is <0.1), or were not predictive at all. **Conclusion:** We have demonstrated that, for our population, certain PCs are associated with an increased likelihood of admission and have quantified this effect using logistic regression analysis. Variance from the average daily admission rate may be predicted, in our population, by identifying these PCs at registration.We plan to develop a tool, based on this data and implemented at registration, to predict cumulative likely daily admission requirements as patients present over a 24hr period.

Keywords: predictive analytics, emergency department, hospital admission

Moderated Posters Presentations

MP01

Use of an unmanned aerial vehicle to provide situational awareness in a simulated mass casualty incident

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Introduction: Situational awareness (SA) is essential for maintenance of scene safety and effective resource allocation in mass casualty incidents (MCI). Unmanned aerial vehicles (UAV) can potentially enhance SA with real-time visual feedback during chaotic and evolving or inaccessible events. The purpose of this study was to test the ability of paramedics to use UAV video from a simulated MCI to identify scene hazards, initiate patient triage, and designate key operational locations. **Methods:** A simulated MCI, including fifteen patients of varying acuity (blast type injuries), plus four hazards, was created on a college campus. The scene was surveyed by UAV capturing video of all patients, hazards, surrounding buildings and streets. Attendees of a provincial paramedic meeting were invited to participate. Participants received a lecture on SALT Triage and the principles of MCI scene management. Next, they watched the UAV video footage. Participants were directed to sort patients according to SALT Triage step one, identify injuries, and localize the patients within the campus. Additionally, they were asked to select a start point for SALT Triage step two, identify and locate hazards, and designate locations for an Incident Command Post, Treatment Area, Transport Area and Access/Egress routes. Summary statistics were performed and a linear regression model was used to assess relationships between demographic variables and both patient triage and localization. **Results:** Ninety-six individuals participated. Mean age was 35 years (SD 11), 46% (44) were female, and 49% (47) were Primary Care Paramedics. Most participants (80 (84%)) correctly sorted at least 12 of 15 patients. Increased age was associated with decreased triage accuracy [-0.04(-0.07,-0.01); p = 0.031]. Fifty-two (54%) were able to localize 12 or more of the 15 patients to a 27x 20m grid area. Advanced paramedic certification, and local residency were associated with improved patient localization [2.47(0.23,4.72); p = 0.031], [-3.36(-5.61,-1.1); p = 0.004]. The majority of participants (78 (81%)) chose an acceptable location to start SALT triage step two and 84% (80) identified at least three of four hazards. Approximately half (53 (55%)) of participants designated four or more of five key operational areas in appropriate locations. **Conclusion:** This study demonstrates the potential of UAV technology to remotely provide emergency responders with SA in a MCI. Additional research is required to further investigate optimal strategies to deploy UAVs in this context.

Keywords: mass casualty incident, unmanned aerial vehicle, emergency medical services

MP02

Paramedic recognition of paroxysmal supraventricular tachycardia

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Introduction: Paroxysmal supraventricular tachycardia (PSVT) is a common group of arrhythmias that Advanced Care Paramedics (ACPs) can often manage with vagal maneuvers, adenosine, and/or cardioversion, provided that they correctly identify the rhythm. The purpose of this study is to determine the accuracy of ACP identification of PSVT. **Methods:** Following ethics approval, all calls for patients 18 years with a 12-lead ECG available, who were assessed by ACPs within a region of western Ontario between July 2015 - December 2015 and had a documented heart rate >150bpm, were included. Paramedic call reports were retrospectively reviewed for study data, including documentation of ACP identified PSVT. The reference standard was consensus between an EMS fellow and prehospital physician who adjudicated each ECG for the presence of PSVT in a blinded, independent fashion. In the event of a disagreement, a third, blinded prehospital physician was used for consensus. **Results:** Of the 442 patients included, 197 (45%) were male and the median age [Interquartile range(IQR)] was 70.0 (58.0-82.8). ACPs identified 74 (16.7%) patients as having PSVT while 38 (8.6%) were identified by physicians as having PSVT. 44.7% of patients with physician identified PSVT had a history of previous arrhythmia, compared to 30.9% of patients with no physician identified PSVT (p = 0.10). They were also significantly younger 58.5 (48.5-72.0) compared to those without physician identified PSVT 69.0 (60.0-84.0) (P = 0.0010). Sensitivity of ACP identified PSVT was 97.4% (95% CI:86.2%-99.9%) and specificity was 90.8% (95% CI:87.6%-93.5%). The positive predictive value (PV) of ACP identified PSVT was 50.0% (95% CI:42.3%-57.7%), the negative PV was 99.7% (95% CI:98.1%-99.9%), the

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positive likelihood ratio (LR) was 10.6 (95% CI:7.8-14.5) and negative LR was 0.03 (95% CI:0.0-0.2). Moderate inter-rater agreement was seen between initial ECG interpretations (kappa = 0.42, 95% CI:0.29-0.54) by the fellow and prehospital physician, while agreement was higher (good) between the two prehospital physicians (kappa = 0.76, 95% CI:0.55-0.96). **Conclusion:** These results indicate that ACPs are adept at identifying PSVT, but are prone to false positives. Given the relatively good sensitivity and specificity seen in this investigation, future studies should investigate ACP recognition of specific rare arrhythmias (antidromic accelerated atrial fibrillation) that may require different management including avoidance of adenosine.

Keywords: paroxysmal supraventricular tachycardia, emergency medical services

MP03

The epidemiology of mortality in patients transported by emergency medical services (EMS)

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Introduction: Outside of key conditions such as cardiac arrest and trauma, little is known about the epidemiology of mortality of all transported EMS patients. The objective of this study is to describe characteristics of EMS patients who after transport die in a health care facility. **Methods:** EMS transport events over one year (April, 2015-16) from a BLS/ALS system serving an urban/rural population of approximately 2 million were linked with in-hospital datasets to determine proportion of all-cause in-hospital mortality by Medical Priority Dispatch System (MPDS) determinant (911 call triage system), age in years (≥18 yrs. - adult, ≤17 yrs. - pediatric), sex, day of week, season, time (in six hour periods), and emergency department Canadian Triage and Acuity Scale (CTAS). The MPDS card, patient chief complaint, and ED diagnosis category (International Classification of Disease v.10 - Canadian) with the highest proportion of mortality are also reported. Analyses included two-sided t-test or chi-square with alpha <0.05. **Results:** A total of 239,534 EMS events resulted in 159,507 patient transports; 141,114 were included for analysis after duplicate removal (89.1% linkage), with 127,867 reporting final healthcare system outcome. There were 4,269 who died (3.3%; 95% CI 3.2%, 3.4%). The proportion of mortality by MPDS determinant was, from most to least critical 911 call, Echo (7.3%), Delta (37.2%), Charlie (31.3%), Bravo (5.8%), Alpha (18.3%), and Omega (0.3%). For adults the mean age of survivors was less than non-survivors (57.7 vs. 75.8; $p < 0.001$), but pediatric survivors were older than non-survivors (8.7 vs. 2.8; $p < 0.001$). There were more males that died than females (53.0% vs. 47.0%; $p < 0.001$). There was no statistically significant difference in the day of week ($p = 0.592$), but there was by season with the highest mortality in winter (27.1%; $p = 0.045$). The highest mortality occurred with patients presenting to EMS between 0600-1200 hours (34.6%), and the lowest between 0000-0600 hours (11.8%; $p < 0.001$). Mortality by CTAS was category 1 (27.1%), 2 (36.7%), 3 (29.9%), 4 (4.3%), and 5 (0.5%). The highest mortality was seen in MPDS card 26-Sick Person (specific diagnosis) (19.1%), chief complaint shortness of breath (19.3%), and ED diagnoses pertaining to the circulatory system (31.1%). **Conclusion:** Significant all-cause in-hospital mortality differences were found between event, patient, and clinical characteristics. These data provide foundational and hypothesis generating knowledge regarding mortality in transported EMS patients that can be used to guide research and training. Future research should further explore the characteristics of those that access health care through the EMS system.

Keywords: emergency medical services, mortality, epidemiology

MP04

Analysis of a needs-based assessment of paramedic continuing education

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Introduction: To determine trends in identified self-perceived knowledge deficits of paramedics, training barriers and desired methods of self-directed education. **Methods:** A written survey was delivered to all paramedics in an Ontario base-hospital. Respondents were asked to identify deficits from a 37-point, anatomic systems-based list. Preferred educational modalities to address knowledge deficits and factors taken into consideration when choosing self-directed education were captured. Top 5 perceived deficit topics, number of perceived deficits, top 5 factors associated with training modality chosen and factors taken into consideration for choosing training modalities, were compared against paramedic age, training (Advanced Care Paramedic; ACP, or Primary Care Paramedic; PCP) and primary location of practice (urban, rural, mixed setting). **Results:** Of 1262 paramedics, 746 (59.11%) completed the survey. PCPs had a higher report of deficit in both neonatal resuscitation and arrhythmia than ACPs (48.3% vs. 58.8%, $p = 0.015$; 40.3% vs. 58.5%, $p < 0.001$). Paramedics who listed rural as their primary practice location were more likely to report a deficit in pediatric respiratory disorder than those with a mixed urban/rural and primary urban practice (65.9% vs. 46.3%, $p = 0.000$; 65.9% vs. 45.9%, $p = 0.001$;) as well as a higher median number of listed deficits (9.00 vs. 6.00 vs. 6.00, $p < 0.001$). ACPs were more likely to consider scheduling, location/ease of attending and cost as barriers than PCPs (85.4% vs. 63.8%, $p = 0.000$; 69.5% vs. 51.4%, $p = 0.002$; 69.5% vs. 39.5%, $p = 0.000$) while reporting an increased desire for webinar material than PCPs (56.1% vs. 40.4%, $p = 0.007$). There were no significant differences found by age. **Conclusion:** Targeted educational needs-based assessments can help ensure appropriate topics are delivered in a fashion that overcomes identified barriers to self-directed learning. From our analysis, increased awareness of ease of attending sessions and preferred modalities, such as webinars may be beneficial; especially for ACPs who require more annual continuing educational hours. Paramedics in rural locations may require increased continuing education, especially for rarely encountered, high risk situations, such as pediatric critical care. These findings can help direct future education in our system and others.

Keywords: education, paramedic, prehospital

MP05

Injuries in refugee children presenting to a paediatric emergency department

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Introduction: The number of refugees accepted to Canada grew from 24,600 in 2014 to 46,700 in 2016. Many of these refugees have young families and the number of child refugees has increased accordingly. Although child refugee health care has been in the forefront of media and medical attention recently, there is limited data on injury patterns in this population. Canadian Hospitals Injury Reporting and Prevention

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