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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