While, players that pass the concussion assessment may re-dress and return to play, the equipment removal and re-dressing delays their return into the game. The objective of our study was to develop and evaluate a new in-skates balance error scoring system (SBESS) to reduce the delay in returning to the game. **Methods:** A prospective randomized single blinded study was conducted with 80 healthy university hockey players split into two groups. An at-rest group performed the SBESS assessment at rest on two separate occasions. A post-exercise group performed the test once at rest and once after exercise. The SBESS consisted of performing 4 different stances for 20 seconds each without equipment removal. The assessments were video recorded, and 3 independent reviewers scored the videos. For both the at-rest and post-exercise groups, the primary outcome measured was the number of balance errors. The secondary outcome was the number of falls. Statistics: For the primary outcome, both inter-rater and intra-rater reliability were calculated. The concordance between the SBESS and the currently used baseline pre-season balance score (MBESS) was also assessed. **Results:** The number of cumulative balance errors for all four stances varied between 4 and 7 for both groups without any significant exercise effect. No athletes fell. For inter-rater reliability, the intra-class correlation (ICC) was above 0.86, ranging from 0.86-0.92 for most stances except for the easiest stance, for which it was 0.66. For intra-rater reliability, the ICC ranged from 0.88 to 1 for all stances and raters. There was a lack of concordance between the SBESS and MBESS. **Conclusion:** The SBESS is a reliable balance test that can be safely performed in healthy athletes wearing their full equipment. The next step will be to evaluate the use of this test on concussed hockey athletes.
Keywords: concussion, balance, hockey

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Introduction of extracorporeal cardiopulmonary resuscitation (ECPR) into emergency care: a feasibility study

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Introduction: Traditionally, out of hospital cardiac arrests (CA) have poor outcomes. Incorporation of extracorporeal cardiopulmonary resuscitation (ECPR) is being used increasingly to supplement ACLS to provide better outcomes for patients. Current literature suggests potentially improved outcomes, including neurological function. We assessed the feasibility of introduction of ECPR to a regional hospital using a 4-phase study. We report phase-1, an estimation of the number of potential candidates for ECPR in our setting. **Methods:** Following development and agreement on local criteria for selection of patients for ECPR using a modified Delphi Technique, inclusion and exclusion criteria were applied retrospectively, to a database comprising 4 years of emergency department (ED) cardiac arrests (n = 395). This provided estimates of the number of patients who would have qualified for EMS transport for ECPR and initiation of ECPR in the ED. **Results:** Application of criteria would result in 20.0% (95% CI 16.2-24.3%) of CA being transported to the ED for ECPR (mean 18.5 patients per year). In the ED 4.6% (95% CI 2.83-7.26%) would be eligible to receive ECPR (4.3 patients per year). Incorporating downtime criteria, 3.0% (95% CI 1.6-5.3%) qualify. After considering local in-house cardiac catheterization hours 9.4% (95% CI 6.8-12.9%) and 5.4% (95% CI 3.5-8.2%), without and with EMS rhythm assumptions respectively, would be eligible for transport. For placement on pump, 3.0% (95% CI 1.6-5.3%) and 2.4% (95% CI 1.2-4.6%), without and with use of total downtime respectively, were eligible. **Conclusion:** If historical patterns of CA were to continue, we believe that an ECPR program may be feasible in our regional hospital setting, with a small number of selected cardiac arrest patients meeting eligibility for transportation and initiation of ECPR. These numbers suggest that an ECPR program would not be resource intensive, yet would be sufficiently busy to maintain adequate team competency.
Keywords: extracorporeal cardiopulmonary resuscitation, resuscitation, cardiac arrest

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Development of inclusion and exclusion criteria for ECPR in a regional hospital

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Introduction: Extracorporeal cardiopulmonary resuscitation (ECPR), a method of cardiopulmonary bypass, is increasingly being used to supplement traditional CPR to improve outcomes for cardiac arrest (CA). CA and particularly out of hospital CA (OHCA) have poor outcomes. Prior to development of a 3 phase ECPR program in a Canadian regional hospital, we wished to identify and optimize a practical selection process (inclusion and exclusion criteria) for patients who may benefit from ECPR. **Methods:** Using a locally modified Delphi technique, we followed a literature review to construct a proposed set of evidence based criteria with a questionnaire, where inclusion and exclusion criteria were scored by a selected group of 13 experts. Following 3 rounds, and additional review by an international expert in the field of ECPR, consensus was achieved for patient selection criterion. **Results:** First round responses achieved 87.5% agreement for selection of exclusion criteria. Inclusion criteria had agreement 62.5%. Responses to the second round for selection of inclusion criteria were unanimous at 100% with the exception of age parameters (<65 years vs. < 70 years). The third and final set of criteria achieved 100% consensus though subsequent expert review refined a single exclusion criteria (asystole). Agreed inclusion criteria were: witnessed CA, age <70, refractory arrest, no flow time <10min, total downtime <60min, and a cardiac or select non-cardiac etiology (PE, drug OD, poisoning, hypothermia). Exclusion criteria were : unwitnessed arrest, asystole, certain etiologies (uncontrolled bleeding, irreversible brain damage, trauma), and comorbidities (severe disability limiting ADLs, standing DNR, palliation). Simplified criteria for EMS transport included witnessed OHCA, age, and no flow time. **Conclusion:** Selection criteria of candidates for ECPR are important components for any program. Expert consensus review of current evidence is an effective method for development of ECPR selection criteria.
Keywords: extracorporeal cardiopulmonary resuscitation, resuscitation, selection

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A prospective study of the management and outcomes of patients with symptomatic atrial fibrillation and/or flutter presenting to emergency departments

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Introduction: Patients with new onset and chronic atrial fibrillation and/or flutter (AFF) present to emergency departments (ED) with symptoms requiring acute management decisions. Most research has

focused on patients with acute (<48 hours and/or <7 days with adequate anticoagulation) presentations of AFF and for whom rhythm control is considered safe. This study explored the demographic characteristics, risk factors, anticoagulant/anti-platelet prescription, and outcomes for patients with symptomatic AFF. **Methods:** A convenience sample of adult patients presenting to the one of three hospitals affiliated with the University of Alberta with symptoms of acute AFF were enrolled, within a fee-for-service billing environment. Following informed consent, a trained researcher administered a survey to each patient, recorded administrative details (e.g., triage, times, laboratory tests) from the ED information system, a chart review on treatments was conducted and patients were contacted for follow-up at 7 days via telephone. Descriptive (median and interquartile range {IQR} and proportions) and simple (t-tests, chi-square) statistics are presented for continuous and dichotomous outcomes, respectively. **Results:** Overall, 217 patients were enrolled; the median age was 64 (IQR: 55, 73) and 132 (61%) were male. Overall, 42 (19.4%) patients arrived by ambulance; 8 (4%) spontaneously converted or were diagnosed with another arrhythmia between arrival and obtaining an ECG. A prior history of AFF was common 152 (71%), as were the following cardiovascular and other risk factors: 176 (81.1%) consumed alcohol, 104 (48%) were current or former smokers, 86 (39.6%) had hypertension, 22 (10%) had CAD, and 10 (5%) had COPD. These patients most commonly reported palpitations 183 (84%) as their dominant symptom. Anti-platelets and anticoagulants were common prior to the ED 145 (67%), and 36 (17%) of patients were discharged from the ED without one of these medications. Overall, 80 (37%) patients had chronic AFF or an unknown timeline; no efforts were made to restore NSR in these patients. A dominant pattern for electrical cardioversion was observed; of 129 cases where cardioversion was attempted, 84 (65%) had electrical first and 45 (35%) had chemical first cardioversion attempts. Overall, 22 (49%) of 45 patients receiving chemical first were successfully converted to NSR. Patients with AFF history who were cardioverted were less likely hospitalized than those not-cardioverted (3% vs. 16%, p = 0.006); 21 (10%) were admitted to hospital. **Conclusion:** In this center, patients with AFF often present to the ED with high acuity, with severe symptoms and receive aggressive care. The use of anticoagulants suggests an appreciation of thrombo-embolic risks, both in the community and ED settings. Like many EDs, this center appears to have a signature for AFF management, related to evidence gaps, physician preferences, and perhaps funding models.

Keywords: emergency department, atrial fibrillation or flutter, health outcomes

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Time of transfer of admitted patients from the ED: a potential area for improvement of patient flow in very high-volume emergency departments

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Introduction: Bed boarding of admitted patients in the Emergency Department (ED) is widely recognized as a major contributor to overcrowding, particularly in very high-volume hospitals. The issue of bed boarding is directly tied to hospital-wide capacity, flow and operations. Early morning discharge from inpatient units has been identified as a low-cost intervention to decrease bed boarding, as it allows earlier transfer of admitted patients from the ED. Several hospitals have instituted discharge before noon, or discharge before 10AM policies, practices and targets. Our objectives were 1) to assess the current status

of flow within 3 high-volume community hospitals with respect to time of day of discharges from the in-patient units and time of day of transfers from the ED to in-patient units, and 2) to assess the association between time of transfer from the ED and total ED Length of Stay (EDLOS) of admitted patients. **Methods:** We conducted a retrospective multi-centre observational study during the period of January 1, 2015 to December 31, 2015 at three high-volume community hospitals within Ontario, Canada. All patients admitted to the Medicine service were identified. Time of discharge from the in-patient units and time of transfer from the ED were collected for all patients. EDLOS was calculated for all patients as a function of time of transfer from the ED. **Results:** Preliminary findings show that, for the three community hospitals, only 11.7% - 19.6% of admitted patients were discharged from the in-patient units during the period between 6AM and 12PM, with a peak discharge time of 2PM in all three hospitals. A concurrent lag was observed in the time of transfer of patients from the ED, with peak transfer times occurring the late afternoon between 3PM and 9PM, and coinciding with a peak in patient volume in the ED. Patients transferred out of the ED earlier in the day (between 12AM 11:59AM) had between 1.4 hours to 8.0 hours lower mean EDLOS when compared to those patients transferred later in the day (between 12PM 11:59PM). **Conclusion:** Hospital-wide flow and operational issues have a significant impact on ED bed boarding, and potential efficiencies seem at the current time to be underutilized. Interventions aimed at optimizing flow must be implemented alongside those aimed at increasing capacity in order to improve bed boarding. ** These findings are best communicated in graphic form to better represent the dynamics of the flow in and out of the ED over a 24-hour period, and will be presented in graphic format if selected for the conference.

Keywords: emergency department overcrowding, hospital administration, length of stay

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Variability in ordering of computed tomography (CT) scans among emergency physicians

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Introduction: The increased availability and increased utilization of Computed Tomography (CT) imaging as a diagnostic tool has in the past several years led to concerns regarding the unknown and potentially harmful effects of ionizing radiation exposure to patients, as well as the increased cost to the health care system. Multiple education campaigns (e.g. Choosing Wisely) and institution-wide interventions have been implemented in order to limit the use of potentially unnecessary CT imaging. Two specific modalities CT head and CT angiography to rule out pulmonary embolism (CT PE) have been identified as potential targets of these interventions due to their likely overutilization in the clinical ED setting. The objective of this study was to determine the interphysician variability in the ordering rates of CT head and CT PE, and to determine if any correlation existed between CT head and CT PE ordering rates among physicians. **Methods:** Data was collected on all diagnostic imaging ordered by ED physicians at two very high volume community hospitals during the 4-year period between 2013 and 2016. Analysis was limited to those physicians who worked at least 3 of the 4 years at either site and saw at least 1000 patients per year. The ordering rates for each physician were calculated by dividing the number of the imaging modality ordered over the total number of patients seen. Correlation coefficients (r values) were calculated to determine if a linear correlation existed between increased CT head and increased CT PE ordering rates. **Results:** The DI ordering data for a