

interpretation of the CCR between paramedics and study investigators was 0.94 (95% CI 0.92-0.95). Paramedics were comfortable or very comfortable using the CCR in 89.8% of cases. Mean scene time was 3 min (15.6%) shorter for those not immobilized (17 min vs. 20 min;  $p = 0.0001$ ). A total of 2,569 (63.7%) immobilizations were safely avoided using the CCR. **Conclusion:** Paramedics could safely and accurately apply the CCR to low-risk trauma patients. This had a significant impact on scene times and the number of prehospital immobilizations.

**Keywords:** clinical decision rule, c-spine injury, emergency medical services

#### PL04

##### Initial serum lactate predicts deterioration in emergency department patients with sepsis

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**Introduction:** Early Emergency Department (ED) identification of septic patients at risk of subsequent deterioration is necessary in order to optimize disposition. High-risk patients admitted directly from the ED to the ICU have better outcomes than those admitted to the floor first. Initial ED serum lactate level has been associated with 28-day mortality in admitted patients, but there is little evidence on its use in predicting short-term deterioration. Furthermore, it is unclear whether the addition of respiratory rate (RR) to lactate would create a stronger predictive model of deterioration than either alone. **Methods:** Prospective cohort study of ED patients (age  $\geq 18$ ) screened and treated for sepsis (defined as physician suspicion of infection and 2 or more of the SIRS criteria). Lactate and vital signs were obtained within 2 hours of ED arrival. Main outcome was deterioration (defined as any of the following: death; ICU admission  $>24$  hours; Intubation; Vasoactive medications for  $>1$  hour; or Non-invasive positive pressure ventilation for  $>1$  hour) within 72 hours. Patients meeting an endpoint within 1 hour of arrival were excluded. Discharged patients were contacted at 72 hours to ensure that they had not met the endpoint or presented to another institution. **Results:** 985 patients presenting to either of two urban high-volume EDs were enrolled, of whom 84 (8.5%) met the primary outcome. Initial serum lactate  $\geq 4.0$  had a specificity of 97.4% (95% CI, 94.1-100%), but a sensitivity of 27.4% (95% CI, 17-36.9%) for predicting deterioration. Of patients with a lactate  $\geq 4.0$ , 4 (8.7%) were discharged home, and did not reach an endpoint at 72 hours. Lactate  $<2.0$  had a sensitivity of 95.5% (95% CI: 93.4-97.1%) and specificity of 84.5% (95% CI: 80.4-88.6%) for ruling out 72-hour deterioration. Of patients with a lactate  $<2.0$ , 224 (56.1%) were discharged home. Combining lactate with RR (AUC: 0.72, 95% CI: 0.66-0.79) did not yield better predictive capability than lactate alone (AUC: 0.70, 95% CI: 0.64-0.76). **Conclusion:** Initial ED lactate is predictive of deterioration within 72 hours in patients with sepsis. The combination of lactate and RR was not more predictive of deterioration than lactate alone. This suggests that serum lactate has a role in predicting deterioration in patients with sepsis, and has utility in determining disposition.

**Keywords:** sepsis, risk stratification, lactate

## Oral Presentations

#### LO01

##### Prevalence of pulmonary embolism among Canadian emergency department patients with syncope: a multicenter prospective cohort study

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**Introduction:** A recent cross-sectional study reported a 17.3% prevalence of pulmonary embolism (PE) among patients with syncope. However, the study had several flaws including spectrum and work-up bias with over-diagnosis due to excessive investigations. We sought to evaluate the prevalence of PE among Canadian emergency department (ED) patients presenting with syncope. **Methods:** We enrolled adults with syncope at 5 EDs and collected demographics, proportion of patients evaluated for suspected PE, their Wells PE score values and results of investigations [d-dimer, computed angiography (CT) of chest or ventilation-perfusion (VQ) scan]. 30-day adjudicated outcome included diagnosis of PE requiring treatment. We used descriptive statistics to report the results. **Results:** 4,739 patients [mean age 54.3 years, 54.4% females, and 587 (12.4%) hospitalized] were enrolled. 323 patients (6.8%) had further evaluation and investigations performed for suspected PE: 255 patients had D-dimer performed, 140 had CT chest and 17 had VQ performed. Of the 323 patients, 300 patients were low risk (Wells score  $\leq 4$ ) and 23 were high-risk (score  $>4$ ). A total of 16 patients (0.3%) in the study cohort were diagnosed with PE: 10 patients were diagnosed in the ED, 5 patients were diagnosed while hospitalized as inpatient, and 1 patient was diagnosed on a return ED visit. Overall the prevalence of PE was 0.3% among all ED patients with syncope; and a 0.9% among those hospitalized for syncope. **Conclusion:** Our study shows that the prevalence of PE is very low among all patients presenting to the ED with syncope. The prevalence is also very low among those hospitalized for syncope than previously reported. While PE should be suspected and further investigations performed among syncope patients if clinically appropriate, caution should also be taken against indiscriminate over-investigations for PE.

**Keywords:** syncope, pulmonary embolism, prevalence

#### LO02

##### Heart failure and palliative care in the emergency department

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**Introduction:** Heart failure (HF) is a common ED presentation that is associated with significant morbidity and mortality. Despite recent evidence and recommendations for early palliative care (PC) involvement in these patients, they are still significantly under-served by PC services, often resulting in multiple ED visits. We sought to evaluate use of PC services in patients with HF presenting to the ED. Secondary objectives of the study were to investigate: 1) one year mortality, ED visits, and admissions; 2) application of a novel palliative care referral score. **Methods:** We conducted a health records review of 500 consecutive HF patients who presented to two academic hospital EDs. We included patients aged 65 years or older who were diagnosed as having a HF exacerbation by the emergency physician (ICD-10 code 150.-). Our primary outcome was PC involvement. Secondary outcomes included one year mortality rates, ED visits, admissions to hospital, as well as the application of a novel PC referral score developed by the institutional cardiac Palliative Care Committee. The score consisted of 6 different aspects of the patient's illness, including laboratory tests, hospital usage, and markers of decompensation. We conducted appropriate univariate analyses. **Results:** Patients were mean age 80.7 years, women (53.2%), and had significant comorbidities (atrial fibrillation (51.2%), diabetes (40.4%) and COPD (20.8%)). Compared to those

with no PC, the 79 (15.8%) patients with PC involvement had a higher one year mortality rate (70.9% vs. 18.8%,  $p < 0.0001$ ), more ED visits/year for HF (0.82 vs. 0.52,  $p < 0.0001$ ), and more hospital admissions/year for HF (1.4 vs. 0.85,  $p < 0.0001$ ). Using the heart failure palliative care score criteria, 60 patients had scores  $\geq 2$ . Compared to those with scores  $< 2$ , these patients had a higher 1-year mortality rate (50% vs. 24%,  $p < 0.0001$ ) and more ED visits/year for HF (0.83 vs. 0.54,  $p < 0.01$ ). Only 40.0% of these high risk patients had any PC involvement. **Conclusion:** We found that few HF patients had PC services involved in their care. Using this novel HF palliative care referral score, we were able to identify patients with a significantly greater risk of mortality and morbidity. This study provides evidence that the ED is an appropriate setting to identify and refer high risk HF patients who would likely benefit from earlier PC involvement and may be a future avenue for PC access for these patients.

**Keywords:** palliative care, heart failure, emergency department

### LO03

#### Application and usefulness of outpatient cardiac testing among emergency department patients with syncope

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**Introduction:** 2.6% of emergency department (ED) syncope patients will have underlying cardiac serious conditions (e.g. arrhythmia, serious structural heart disease) identified within 30-days of disposition. If those at risk are discharged home, outpatient cardiac testing can detect underlying arrhythmias and structural heart disease, and thereby improve patient safety. We describe the frequency of outpatient referrals for cardiac testing and the proportion of cardiac serious adverse events (SAE) among high risk and non-high (low and medium) risk ED syncope patients, as defined by the Canadian Syncope Risk Score (CSRS). **Methods:** We conducted a multicenter prospective cohort study to enroll adult syncope patients across five large tertiary care EDs. We collected demographics, medical history, disposition, CSRS value, outpatient referrals and testing results (holter, echocardiography), and cardiac SAE. Adjudicated 30-day SAE included death due to unknown cause, myocardial infarction, arrhythmia, and structural heart disease. We used descriptive analysis. **Results:** Of 4,064 enrolled patients, a total of 955 patients (23%) received an outpatient referral (mean age 57.7 years, 52.1% female). Of the 299 patients (7%) hospitalized, 154 received outpatient cardiac testing after discharge. Among the 3,765 patients discharged home from the ED, 40% of the non-high risk patients (305/756) and 56% of the high risk patients (25/45) received outpatient cardiac testing. Of all patients who received outpatient cardiac testing, 4 patients (0.8%) had serious cardiac conditions identified and all were arrhythmias. Among those with no cardiac testing, 5 patients (0.9%) suffered cardiac SAE (80% arrhythmias) outside the hospital. Of the 20 (44%) high risk patients who did not receive outpatient cardiac testing, 2 (10%) patients suffered arrhythmias outside the hospital. While among the 451 non-high risk patients, only 0.8% suffered arrhythmia outside the hospital. **Conclusion:** Outpatient cardiac testing among ED syncope patients is largely underutilized, especially among high risk patients. Better guidelines for outpatient cardiac testing are needed, as current practice is highly variable and mismatched with patient risk.

**Keywords:** cardiac, syncope, resource utilization

### LO04

#### Very low concentrations of high-sensitivity troponin T at presentation can rapidly exclude acute myocardial infarction in a significant proportion of ED chest pain patients

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**Introduction:** Chest pain is one of the most common presenting complaints to emergency departments (EDs) across the world, and the exclusion of acute myocardial infarction (AMI) using troponin testing is central to the care of many of these patients. Testing strategies using conventional troponin assays require repeat testing over many hours to avoid missed diagnoses. This study aims to validate the ability of very low concentrations of troponin at presentation to exclude AMI in ED chest pain patients. **Methods:** This prospective cohort study was conducted at a single urban tertiary centre and regional percutaneous coronary intervention site in Calgary, Alberta. Patients were eligible for enrolment if they presented to the ED with chest pain, were 25-years or older and required biomarker testing to rule out AMI at the discretion of the attending emergency physician. Patients were excluded if they had clear acute ischemic ECG changes, new arrhythmia or renal failure requiring hemodialysis. High-sensitivity troponin-T (Roche Elecsys hs-cTnT) results were obtained in all patients at presentation. Relevant outcomes were obtained from administrative data. The primary outcome was AMI within 30-days of ED visit, the secondary outcome was 30-day major adverse cardiac events (MACE). The study was REB approved. **Results:** A total of 1,016 patients were enrolled from August 2014-September 2016, of which 174 (17.1%) patients had an initial troponin below the limit of blank ( $< 3$  ng/L) and 369 (36.3%) had a level below the limit of detection ( $< 5$  ng/L). The sensitivity and negative predictive value (NPV) of a troponin below limit of blank ( $< 3$  ng/L) for 30-day AMI were 100% (95% CI 89.3%-100%) and 100% (95% CI 97.8-100%), respectively. The sensitivity and NPV of a troponin below limit of detection ( $< 5$  ng/L) for 30-day AMI were 93.8% (95% CI 80.0-98.3%) and 99.5% (95% CI 98.1-99.9%) respectively. Sensitivity for 30-day MACE at both cutoffs was lower: 96.1% (95% CI 92.5-98.0%) for  $< 3$  ng/L, and 88.4% (95% CI 83.3-92.1%) for  $< 5$  ng/L, respectively. **Conclusion:** A high sensitivity troponin T result below the limit of blank is highly sensitive at excluding AMI and identifies patients at reasonably low risk of 30-day MACE. A result below the limit of detection will identify a larger population of patients as low risk but has a greater risk of missed AMI and MACE.

**Keywords:** chest pain, troponin, myocardial infarction

### LO05

#### In patients presenting to the ED with STEMI, is the provision of morphine associated with worse patient outcomes?

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**Introduction:** ST-elevation myocardial infarction (STEMI) presenting to the ED is a significant health burden. The provision of IV morphine with doses titrated to provide comfort is recommended in the AHA STEMI Guidelines, yet there is limited evidence of safety in this setting. The primary objective of this study was to measure potential harm associated with the provision of IV morphine in STEMI patients presenting to the ED. **Methods:** This was a two centre retrospective chart review from an urban, inner city, academic ED with an annual census of 85,000 visits, and an affiliated community hospital with 35,000 annual visits. Consecutive patients from April 2009 to January