(ETI); non-invasive ventilation(NIV); diagnosis of acute myocardial infarction(AMI); or death within 30 days. Using a validated approach, an ED physician analyzed case summaries for flagged outcomes that were associated with ED care, designated as AEs. Preventable AEs had contributing errors in diagnosis, management, procedure, medications or unsafe disposition decisions. We analyzed these data using thematic coding and descriptive statistics. **Results:** Of 2,515 patients enrolled (1,100 HF and 1,415 COPD), 210 patients experienced flagged outcomes, 47.1% of which were female, 64.3% had HF and the remaining COPD. The majority (86.2%) of flagged outcomes were related to underlying disease, but 13.8% of cases met criteria for AE and all were deemed preventable. Of the identified AEs, 72.4% returned to the ED and required admission to hospital; 17.2% were admitted to ICU, CCU, or AMU; 6.9% of patients died; 3.4% were intubated; 3.4% had a diagnosis of AMI and 0% required NIV. We found 75.8% of preventable AEs resulted from a management error (eg. not prescribing steroids on discharge for moderate COPD exacerbation); 31.0% from an unsafe disposition decision and 10.3% of AEs resulted from diagnostic error. **Conclusion:** Patients with acute exacerbations of HF and COPD are at high risk of preventable AEs directly related to care provided in the ED. Management and disposition decisions were a concerning source of error and should compel and focus future quality improvement efforts.

Keywords: heart failure, chronic obstructive pulmonary disease patient safety

LO003

Outpatient referrals from the emergency department - a retrospective review

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Introduction: While a majority of patients presenting to the emergency department (ED) are discharged home without need for inpatient hospitalization, many require outpatient follow-up. Currently, outpatient referrals from our ED are made via a complex and error-prone series of manual steps which have the potential to be unreliable and negatively impact quality of care. We sought to perform a current state analysis of our outpatient referral processes across the hospital's specialties. **Methods:** We conducted a retrospective health records review at a tertiary academic centre (>160,000 ED visits/year) from January 1 to January 7, 2015. All consecutive outpatient consultation requests triggered by an ED physician were identified and included for chart review. All cases were subsequently followed up to 11 months. A single reviewer extracted data on demographics, actual referral attendance rates, incomplete referrals, return ED visits, and time intervals. The top 3 and bottom 3 performing services were identified for further analysis of their outpatient referral mechanisms and processes. We present descriptive statistics. **Results:** A total of 251 outpatient referrals to a broad range of specialty services were identified during the study period. 216 (86.1%) of patients attended the intended appointment, while 35 (13.9%) of referrals were incomplete at 11 months post index ED visit. The overall median time to successful outpatient follow-up appointments was 8.5 days [IQR = 3.8-24.2]. 8 (3.2%) patients had a return ED visit for a related complaint prior to being seen at their outpatient appointment. The top 3 performers were Ophthalmology [Median = 1.0 day, IQR = 0.0-1.0, Incomplete = 2.8%], Plastic Surgery [Median = 5.0 days, IQR = 2.8-6.0, Incomplete = 7.7%], and Orthopedics [Median = 8.0 days, IQR = 7.0-10.0, Incomplete = 0.0%]. The bottom 3 performers were Dermatology [Median = 52days, IQR = 41.5-92.5, Incomplete = 25.0%], Neurology [Median = 40.0 days, IQR = 2.5-43.5, Incomplete = 56.3%], and Urology [Median = 14.0 days, IQR = 10.5-48.0, Incomplete = 33.3%]. **Conclusion:** We found a tremendous range of variability in both the waiting times and actual reliability of outpatient referral processes from the ED. Future phases of this project will focus on examining specific processes of the top and bottom performing specialties in order to improve and standardize all outpatient referrals.

Keywords: outpatient referrals, follow-up, quality improvement

LO004

Short-term risk of arrhythmias among syncope patients presenting with atrial fibrillation/flutter to Canadian emergency departments

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Introduction: Short-term risk of arrhythmia or death among emergency department (ED) syncope patients with atrial fibrillation/flutter (AFF) has not been reported in the literature. Our objectives were to assess the incidence and the independent risk of 30-day arrhythmia or death for syncope patients with AFF after ED disposition. **Methods:** We conducted a prospective study at 6 Canadian academic EDs to include adults with syncope. We collected demographic, clinical and ECG characteristics while our outcome assessments were completed by medical records review and by telephone follow-up of patients after 30 days. Primary outcome was arrhythmia or death within 30-days after ED disposition and secondary outcomes included non-arrhythmic cardiac and non-cardiac outcomes. We performed descriptive and logistic regression analyses. **Results:** We enrolled 4,266 patients: mean age 53.4 years, 55.4% females, and 8.5% with AFF. After excluding those with outcomes in the ED, lost to follow-up and those with other non-sinus rhythms, 3,417 patients in the sinus and 280 patients in the AFF groups were analyzed. The incidence of arrhythmia or death was significantly higher in the AFF group (Relative Risk 5.1; 95% CI 3.1-8.4; $p < 0.0001$) but there were no significant differences in secondary outcomes between the groups. The unadjusted odds ratio for 30-days arrhythmia or deaths among ED syncope patients with AFF was 5.4 (95% CI 3.2- 9.2). After adjusting for important baseline risk factors by multivariable analysis, the odds ratio for arrhythmia or death in patients with AFF was 1.5 (95% CI 0.8-2.7). **Conclusion:** The risk of AFF for 30-day arrhythmia or death among syncope patients after ED disposition is higher but is attenuated when adjusted for important patient characteristics. Future research should assess long-term outcomes among syncope patients with AFF to guide follow-up after ED discharge.

Keywords: arrhythmia, atrial fibrillation/flutter, syncope

LO005

Association between emergency department chest pain volume and outcomes among patients presenting with chest pain

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Introduction: Chest pain is one of the most common reasons for emergency department (ED) visits in developed countries. Patients discharged after ED assessment remain at risk for adverse cardiac events. Although a volume-outcome relationship has been shown for myocardial infarction, it is uncertain whether a similar relationship exists with ED chest pain volume. Accordingly, we aimed to determine whether ED chest pain volume influences outcomes of patients presenting to the ED with chest pain who were discharged home. **Methods:** This was a retrospective cohort study using population-based

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data from Ontario, Canada. Patients who were discharged home from an ED in Ontario with a primary diagnosis of chest pain from April 1, 2004 to March 31, 2010 were included. High-risk patients were defined as the presence of diabetes or pre-existing cardiovascular disease, while low-risk patients were defined as the absence of these conditions. ED volume was categorized as low, medium, or high, based on tertiles of annual chest pain patient volume. The primary outcome of this study was all-cause mortality one year after the index ED visit. Mantel-Haenszel Chi-Square was used to compare crude outcome rates. **Results:** There were 56,767 high-risk patients. The average age was 66 years and 53% were male. All-cause mortality rates were 6.8%, 6.3%, and 6.0% ($p = 0.028$), and rates of hospitalization for acute coronary syndrome were 5.8%, 4.6%, and 4.0% ($p < 0.001$) among low, medium, and high volume EDs respectively. There were 216,527 low-risk patients. The average age was 64 years and 42% were male. All-cause mortality rates were 2.0%, 1.9%, and 1.6% ($p < 0.001$), and rates of hospitalization for acute coronary syndrome were 1.5%, 1.4%, and 1.0% ($p < 0.001$) among low, medium, and high volume EDs respectively. **Conclusion:** Higher volume EDs were associated with decreased rates of all-cause mortality and admission for acute coronary syndrome among chest pain patients who were discharged home. Future research should study the reasons for this finding and attempt to improve outcomes in lower volume EDs.
Keywords: chest pain

LO006

Interarm blood pressure differential as a clinical marker for acute aortic dissection in the emergency department

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Introduction: Acute Aortic Dissection (AAD) is life threatening, requiring early diagnosis. Although previous literature suggest interarm BP differential is an independent predictor of AAD, up to 20% of a healthy population can have a significant differential. Our objectives were to assess the rate of bilateral BP measurement in acute non-traumatic truncal pain patients, and the association of BP differential with non-traumatic AAD. **Methods:** This is a historical matched case control study: participants were adults >18 years old presenting to two tertiary care EDs with a triage diagnosis of truncal (i.e. chest, abdominal, flank, back) pain. Cases were selected based on an ED or in-hospital diagnosis of non-traumatic AAD confirmed by CT or Echo. Controls were from a single calendar year matched in a 1:1.5 ratio by sex and age within 5 years. ED and referral consult BP measurements were used. Exclusion criteria: clear diagnosis on basic investigation (i.e. UTI, pneumonia, pneumothorax, acute fracture) or pain >14 days/no pain. Sample size of 126 cases and 183 controls was calculated based on 20% exposure in controls (80% power and alpha of 5%), to detect an OR >2. P-values were calculated using chi square analysis. **Results:** A total of 294 (119 cases, 175 controls) patients were included (mean 66+/-14.5yrs, 59.5% male). Cases (199 potential: 119 included; 80 excluded). Controls (8239 potential: 305 reviewed; 175 included; 130 excluded). Bilateral BP was measured in 70.6% of cases (n = 84, mean difference = 15.5mmHg) versus 31.3% of controls (n = 55, mean difference = 10.9mmHg). Among included controls, most common diagnoses were: Unspecified Chest (36.0%) or Abdominal (9.7%) Pain, ACS (12.6%), Muscular Back Pain (5.1%), and Renal Colic (4.0%). BP differential >10mmHg was found in 58.8% of cases and 40.7% of controls ($P = 0.10$). A BP differential >20mmHg was found in 31.3% of cases and 22.2% of controls ($P = 0.37$). BP differential >20mmHg did not significantly increase the odds of AAD (OR 2.0 (95%CI 0.82-4.90), $p < 0.129$). **Conclusion:** Interarm BP differential is not routinely measured in ED patients with acute non-traumatic truncal pain, and there is no significant difference in the presence or magnitude of differentials in patients with or without AAD. Therefore, physicians should not rely on BP differentials to aid in their diagnosis or exclusion of AAD.
Keywords: aortic dissection, blood pressure

LO007

A pragmatic randomized and controlled evaluation of nurse-initiated protocols

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Introduction: Emergency department (ED) overcrowding is a common and complicated challenge for EDs worldwide. Nurse-initiated protocols, diagnostics and/or treatments implemented by nurses prior to patients being seen by a physician or nurse practitioner, have been suggested as a potential strategy to improve patient flow. **Methods:** This randomized, pragmatic, controlled evaluation of 5 nurse-initiated protocols occured in a crowded inner-city ED. Six physicians and 44 registered nurses, 3 clinical nurse educators and 3 unit managers were involved in revising 5 patient-complaint focused protocols prior to evaluation. Thirty (30/180) emergency nurses were provided 1 hour of training on inclusion and exclusion criteria, procedure and evaluation methods. Data was abstracted in a manner concealing patient allocation. Primary outcomes evaluated included time to diagnostic test, treatment, consultation or ED length of stay. This evaluation was completed following both the CONSORT and SQUIRE guidelines. **Results:** Time to acetaminophen for the intervention group (n = 11) was 1h:04 min on average (95%CI 30min to 1h:37min) whereas the control group (n = 9) was 3h:35min (95%CI 2h:21min to 4h:48min). The average length of stay of a suspected fractured-hip in the intervention group (n = 5) was 3h:34min (95%CI 1h:49min to 5h:19min) and 7h:34min for the control group (n = 4) was (95%CI 5h:26min to 9h:42min). Time to troponin in the intervention group (n = 29) was one quarter (average 48min, 95% CI 32min to 64min) of the time it was in the control group (n = 14) (average 3h:16min, 95%CI 1h:53min to 4h:39min; $p < 0.001$). The vaginal bleeding in pregnancy protocol reduced length of stay by roughly fifty-percent; the intervention group (n = 11) had a length of stay of 4h:57min (95%CI 3h:46min to 6h:08min) compared to 8h:33min (95% CI 6h:23min to 10h:44min) for the control (n = 7) ($p < 0.001$). There was no statistical difference in the length of stay for patients who received protocolized diagnostics for abdominal pain. **Conclusion:** Targeting specific patient groups with carefully written protocols can improve the timeliness of care. A cooperative and collaborative interdisciplinary group are essential to success. Having a system in place to ensure ongoing quality in protocol application and interdisciplinary support has proven more difficult than improving the primary outcomes in this evaluation.
Keywords: nurse protocols, standing orders, order sets

LO008

Assessment of the need for diagnostic imaging in extremity injuries by advanced care paramedics

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Introduction: Emergency department (ED) crowding is a national challenge. Initiatives to help address this at our ED include the use of a six-bed fast-track unit staffed by advanced-care paramedics (ACPs). Institutional byelaws only allow diagnostic imaging (DI) ordering by