Abbreviations:
PL = Plenary; OP = Oral presentation; LO = Lightning oral; MP= Moderated poster; P = Poster

*Corresponding authors are underlined.

Plenary Oral Presentations

PL001

Derivation of a 2-hour high-sensitivity troponin T algorithm for rapid rule-out of acute myocardial infarction in emergency department chest pain patients

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Introduction: Chest pain and symptoms of acute coronary syndrome are responsible for a large proportion of ED visits and acute hospitalizations. However, only about 15% of patients presenting to the ED with high-risk symptoms do, in fact, have an acute coronary syndrome. The objective of this study is to derive a 2-hour high-sensitivity Troponin T (hsTnT) testing algorithm with outcome based-cutoffs to rapidly rule out acute myocardial infarction (AMI) in a large proportion of ED chest pain patients. **Methods:** Patients included consecutive ED patients with a chief complaint of cardiac chest pain who had an hsTnT assay performed at ED arrival and 2 hours after ED arrival. Administrative databases were queried to identify troponin results and major adverse cardiac outcomes (MACE) including death, MI, and revascularization. Test characteristics of iterative combinations of initial troponin level and absolute change in troponin level were quantified in order to identify the testing algorithm that identified the greatest proportion of patients eligible for early discharge while maintaining a target sensitivity of 98.5% for the primary outcome of 7-day AMI. **Results:** 755 eligible patients had hsTnT assays performed at ED arrival and at 2 hours. 91 patients (12.1%) had a 7-day AMI while 108 (14.0%) had 7-day MACE. An initial hsTnT level of less than 14 ng/L, in combination with a 2-hour absolute change of less than 10ng/L had a sensitivity of 98.9% (95% CI 94.0,99.8) and an NPV of 99.8% (95% CI 98.7, 100.0) for 7-day AMI. This identified 58.5% of all patients as being suitable for early discharge. Sensitivity and NPV for 7-day MACE were 90.0% (95% CI 83.3, 94.2) and 97.3% (95% CI 95.3,98.4) respectively. Sex-specific differences in test characteristics were not clinically important. Rule-in hsTnT cutoffs were also evaluated, with specificities ranging from 85-95%, although cutoffs with higher specificity had less ability to rapidly rule-in AMI, leaving more patients with indeterminate results after 2 hours. **Conclusion:** A hsTnT algorithm can safely and accurately rule out AMI in 58.5% of ED chest pain patients within 2 hours of ED arrival. The lower sensitivity of this algorithm for MACE compared to AMI speaks to the importance of clinical assessment and ECG findings in identifying patients at risk for acute coronary syndromes.

Keywords: troponin, acute coronary syndromes, acute myocardial infarction

PL002

A randomized controlled trial on oral analgesic utilization for children presenting with a musculoskeletal trauma in the emergency department

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Introduction: Background: A single-agent approach to children's moderate to severe pain is often inadequate. To date, no studies have evaluated the combined use of oral morphine and ibuprofen for optimal pain management of children presenting to an Emergency Department (ED) for musculoskeletal (MSK) trauma. Objective: To assess the efficacy of a combination of oral morphine and ibuprofen for pain management in children with MSK trauma in the ED. **Methods:** A double-blind, placebo-controlled, multi-centered, three-arm, randomized clinical trial of 500 patients was conducted at three pediatric tertiary care EDs. Patients 6 to 17 years of age, who presented to the ED with a MSK trauma, and a score > 30 mm on the 100 mm Visual Analogue Scale were eligible to participate. Patients were randomized (in a 2:1:1 ratio) to receive (orally): (a) morphine (0.2mg/kg) + ibuprofen (10mg/kg) (Group MOR + IBU) or (b) morphine (0.2 mg/kg) + placebo (Group MOR) or (c) ibuprofen (10mg/kg) + placebo (Group IBU). Primary outcome was pain intensity score under 30 mm (mild pain) at 60-minutes (T-60) after treatment administration. **Results:** A total of 456 patients were included in analyses: 177 (MOR + IBU), 188 (MOR), 91 (IBU). Mean age was 11.9 + 2.7 years, with a majority of boys (55.3%) and soft tissue injuries (62%). There were no differences in baseline characteristics in the three groups. Baseline mean pain score was 60.9 + 16.2 mm. Only 30% (MOR + IBU), 29% (MOR) and 30% (IBU) of patients reached a pain score under 30 mm at T-60 ($p = 0.83$). Mean pain scores at T-60 were 42.3 + 23.2 mm (MOR + IBU), 43.8 + 23.1 mm (MOR) and 42.3 + 23.3 mm (IBU) ($p = 0.83$). No severe adverse events were observed in any of the groups, at any of the study measurement points. **Conclusion:** Combination of morphine with ibuprofen did not provide any additional pain relief for children with MSK injuries, in the ED. None of the study medication provided optimal pain management, as the majority of children did not reach the WHO definition of mild pain. Alternative analgesic combinations should be investigated to optimize pain relief of children who present to the ED with MSK injuries.

Keywords: pain, pediatric, clinical trial

PL003

Impact of process improvements on measures of emergency department efficiency

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Introduction: The objective was to study the operational impact of an intervention comprised of simultaneous process improvements to triage, patient inflow, and physician scheduling patterns on emergency department (ED) patient flow. The intervention did not require any increase in ED resources or expenditures. **Methods:** A 36-month pre-/post-intervention retrospective chart review at an urban community emergency department from January 2010 to December 2012. The ED process improvements started on June 6, 2011 and involved streamlining triage, parallel processing, flexible nurse-patient ratios, flexible exam spaces, and flexible physician scheduling. The main outcomes were ED length-of-stay (LOS). Secondary outcomes included time to physician-initial-assessment (PIA), left-without-being-seen (LWBS) rates, and left-against-medical-advice (LAMA) rates. Segmented regression of interrupted time series analysis was performed on Canadian Triage and Acuity Scale (CTAS) 2 to 5 patients to quantify

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the immediate impact of the intervention on the outcome levels, and whether there were changes in the trend between pre-intervention and post-intervention segments. **Results:** 251,899 patients attended the ED during the study period. Daily patient volumes increased 17.3% during the post-intervention period. Post-intervention, for CTAS 2-5 patients, there was a reduction in average LOS by 0.64 hours ($p < 0.001$), and 90th-percentile LOS by 0.81 hours ($p = 0.024$). When separated by acuity and disposition, there were reductions in LOS for non-admitted CTAS 2 (-0.58 hours, $p < 0.001$), 3 (-0.75 hours, $p < 0.001$), 4 (-0.32 hours, $p = 0.002$), and 5 (-0.28 hours, $p = 0.008$) patients. For secondary outcomes, there was a decrease in overall average PIA by 43.81 minutes ($p < 0.001$), and 90th-percentile PIA by 91.39 minutes ($p < 0.001$). LWBS and LAMA rates decreased by 35.2% ($p < 0.001$) and 61.9% ($p < 0.001$), respectively. **Conclusion:** A series of process improvements meant to optimize flow in the ED without the addition of resources was associated with clinically significant reductions in LOS, PIA, LWBS and LAMA rates for non-resuscitative patients.

Keywords: efficiency, patient flow, length of stay

PL004

A population-based analysis of outcomes in patients with a primary diagnosis of hypertension in the emergency department, using linked datasets

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Introduction: Patients seen primarily for hypertension are common in the emergency department. The outcomes of these patients have not been described at a population level. In this study we describe the characteristics and outcomes of the patients making these visits, as well as changes over time. **Methods:** This retrospective cohort study used linked health databases from the province of Ontario, Canada, to assess emergency department visits made between April 1, 2002 and March 31, 2012 with a primary diagnosis of hypertension. We determined the annual number of visits as well as the age and sex standardized rates. We examined visit disposition and assessed mortality outcomes and potential hypertensive complications at 7, 30, 90, 365 days and 2 years subsequent to the ED visit. **Results:** There were 206,147 qualifying ED visits from 180 sites. Visits increased by 64% between 2002 and 2012, from 15793 to 25950 annual visits, respectively. The age- and sex-standardized rate increased from 170/100,000 persons to 228/100,000 persons over the same time period, a 34% increase. Eight percent of visits ended in hospitalization, but this proportion decreased from 9.9% to 7.1% over the study period. Mortality was very low, at less than 1% within 90 days, 2.5% within 1 year, and 4.1% within 2 years. Among subsequent hospitalizations for potential hypertensive complications, stroke was the most frequent admitting diagnosis, but the frequency was still <1% within 1 year. Together hospitalizations for stroke, heart failure, acute myocardial infarction, atrial fibrillation, renal failure, hypertensive encephalopathy and dissection were <1% at 30 days. **Conclusion:** The number of visits made primarily for hypertension has increased dramatically over the last decade. While some of the increase is due to aging of the population, other forces are contributing to the increase. Subsequent mortality and complication rates are low and have declined. With current practice patterns, the feared complications of hypertension are extremely infrequent.

Keywords: hypertension, stroke, emergency department

Oral Presentations

LO001

The prevalence of low back pain in the emergency department: a systematic review and primary study in the Charles V. Keating Emergency and Trauma Centre, Halifax, Nova Scotia, Canada

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Introduction: Low back pain (LBP) may be having a significant impact on emergency departments (ED) around the world. Two analyses conducted in the USA and Australia suggest that LBP is one of the leading causes of emergency department visits. However, in the peer-reviewed literature, there has been limited focus on the prevalence and management of back pain in the ED setting. Furthermore, the applicability of the available research to our local ED setting is unclear. **Methods:** This project includes two studies to investigate the prevalence of LBP in the ED: 1. a comprehensive **systematic review** of the published literature to gather a comprehensive and global perspective about the prevalence of LBP in the ED setting, and 2. a **retrospective cross sectional analysis** using six years of data from our local ED, the Charles V. Keating Emergency and Trauma Centre, Halifax, Nova Scotia. **Results:** Searches from multiple databases including PubMed (392 citations), resulted in 3024 citations, of which 20 studies were found to have prevalence data for LBP. Studies were reported between 2001–2015 and used mixed methods of data collection, including electronic databases, surveys and patient charts. Ranges for prevalence estimates were 1.9% to 17% of patient visits. Results indicated there are many gaps in the literature, for example research in rural EDs and in Canada. In our primary study, we have identified a sample of 10 000 patients presenting with LBP to our local ED. Analysis of this data will be completed prior to the CAEP conference. **Conclusion:** This project is the first systematic review; comprehensive search strategy to examine the prevalence of LBP in the ED. It is also the first project to assess the prevalence of LBP in a Canadian ED. Results from this study will inform healthcare providers, as well as administrative and policy decision-makers, of the global and local impact of LBP in the ED, and will identify opportunities for further research to enhance care pathways of patients suffering from LBP.

Keywords: low back pain, prevalence

LO002

Improving safety of patients in respiratory distress: identifying preventable adverse events related to care provided in the emergency department

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Introduction: Patients with acute exacerbations of heart failure (HF) or chronic obstructive pulmonary disease (COPD) may be at high risk for preventable adverse events (AEs). Preventable AEs are ED care-associated complications due to medical error. Our objective was to identify and characterize preventable AEs among ED patients over 50 presenting with dyspnea from an acute exacerbation of HF or COPD; who were subsequently admitted or discharged. **Methods:** We conducted a multicentre health records review from six academic centers in Ontario and Alberta. We analysed health records for all prospectively enrolled patients who experienced flagged outcomes: relapse to ED within 14 days requiring admission; admission to a monitored unit (AMU), cardiac care unit(CCU), or intensive care unit(ICU); intubation

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