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

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Plenary Oral Presentations

PL01

Timed up and go in elderly emergency department patients following minor trauma

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Introduction: Impaired mobility is associated with increased fall risk, functional decline and diminished quality of life, yet there is no standardized test for assessing mobility in the emergency department (ED). We wished to evaluate the Timed Up and Go (TUG) as a measure of mobility and its relationship with frailty, functional decline, fear of falling and falls in community dwelling elders that present to the ED following minor trauma. **Methods:** This was a substudy of a prospective cohort study conducted at 8 Canadian teaching EDs from May 2011 - July 2013, which enrolled patients ≥65 years presenting to the ED following minor trauma. Patient evaluations: 1) mobility using TUG scores categorized into <10 seconds, 10-19.9 seconds, 20-29.9 seconds and >30 seconds; 2) frailty using Study of Osteoporotic Fractures Frailty Index categorized as robust or intermediate/frail; 3) functional decline, defined as a decrease of 2 points in the Older American Resources and Service Functional Scale; 4) fear of falling using Short Falls Efficacy Scale with cut-off <9.8; and 5) self-report falls. Telephone or in-person follow-up at 3 and 6 months was conducted. Generalized linear model with log-binomial distribution was utilized to evaluate association between the measures. Relative risks (RR) and 95% CI were calculated. **Results:** 504/1,477 patients, with mean age 76.8 (SD 7.9) and 60.2% female, completed the TUG at initial ED visit. There was a significant association between TUG scores and frailty ($p < 0.05$), functional decline at 3 ($p < 0.05$) and 6 ($p < 0.05$) months, fear of falling ($p < 0.05$) at 0, 3, 6 months and self-reported falls at 0 ($p < 0.05$) but not at 3 ($p = 0.58$) or 6 ($p = 0.93$) months. For TUG scores 10-19.9 seconds, 20-29.9 seconds and >30 seconds, respectively: 1) frailty RR (CI): 2.0 (1.4-2.8), 3.2 (2.2-4.7) and 4.0 (2.8-5.8); 2) functional decline RR (CI): 2.8 (0.9-8.5), 6.0 (1.8-19.5) and 9.6 (2.9-32.6); 3) fear of falling RR (CI): 1.5 (1.1-2.1), 2.2 (1.6-3.0) and 2.6 (1.9-3.7); and 4) falls RR (CI): 2.1 (1.1-3.9), 4.0 (2.0-7.8) and 2.2 (0.8-6.3). **Conclusion:** In community dwelling elders presenting to the ED following minor trauma, TUG scores are associated with frailty, functional decline and fear of falling. TUG scores were associated with falls at initial ED visit but not predictive of falls at 3 or 6 months. Use of the TUG in the ED will help identify frail patients at risk of functional decline.

Keywords: geriatrics, trauma, timed up and go

PL02

Sonography in cardiac arrest: Real-time Assessment and Evaluation with Sonography - Outcomes Network (REASON)

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Introduction: Previous small single center retrospective studies have suggested that absence of cardiac activity visualized by ultrasound (US) during cardiopulmonary resuscitation (ACLS) predicts death. We performed a large multi-centre international prospective cohort study to examine whether cardiac activity on US during ACLS is associated with improved outcomes for cardiac arrest. **Methods:** Eighteen sites across North America collected prospective cardiac US data on patients with pulseless electrical activity (PEA) or asystole during resuscitation following ACLS protocols. An initial US was performed as the resuscitation was started and again at the conclusion of the resuscitation efforts. US images were interpreted un-blinded as demonstrating cardiac activity or not. The primary outcome was survival to hospital admission. The secondary outcome was return of spontaneous circulation (ROSC). All data were uploaded into a central electronic database (REDCap). Based on prior studies, our initial power calculation determined 761 patients were required assuming 20% ROSC and a misclassification rate of 1%. Comparisons were performed using Mann-Whitney U test and Fischer Exact. **Results:** A total of 1,103 patients presenting from May 2011 to November 2014 were included. Of these, 288 were excluded due to missing data or breach in protocol, leaving 815 patients. The initial presenting cardiac rhythm was PEA (49%) and asystole (48%). We recorded a timeline of median times (IQR) of resuscitation events in all patients. Patients without cardiac activity at initial ED US had longer downtimes in the field prior to EMS arrival (7 min vs. 4 min, $p < 0.0001$). Patients with cardiac activity on the initial US had longer resuscitation time in the ED (22 vs 16min, $p < 0.001$). Overall, the presence of cardiac activity on initial US was associated with a higher rate of ROSC (49.4 v.14.0%, $p < 0.001$) and survival (30.3 v. 8.8%, $p < 0.001$). There was an increased rate of ROSC with cardiac activity on US in patients presenting with PEA (53.3 v. 21.2%, $p < 0.001$), but not in patients with electrocardiographic asystole (18.4 v. 9.8%, $p = 0.15$). **Conclusion:** Patients in PEA and asystole with absent cardiac activity on initial US during CPR can survive to hospital admission, but the survival rate is more than three times greater in patients with detectable cardiac activity on initial US.

Keywords: cardiac arrest, point-of-care ultrasound, resuscitation

PL03

Push-alert notifications of troponin results to physician smartphones: impact on emergency department patient flow

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Introduction: Improving Emergency Department (ED) lengths of stay (LOS) is a universal challenge. Turnaround time for lab tests contributes to ED LOS. Smartphones can provide push-alert notifications to clinicians as soon as results are available, and could potentially reduce ED LOS. In patients with chest pain, discharge decisions often hinge on the final troponin test results. Our primary objective was to determine if push-alert notifications of troponin-T (TnT) results to physician smartphones leads to faster time to disposition for patients with chest pain who are discharged from the ED. **Methods:** We conducted a prospective cluster trial, randomized by physician. Of 34 ED physicians,

26 (76%) participated. All physicians had access to smartphones. Half the physicians were randomized to the intervention group, and received TnT notifications on their smartphones. The other half comprised the control group, and did not receive TnT notifications on their smartphones. We included all patients who were seen by participating ED physicians, and were ultimately discharged from the ED with chest pain, without being seen by a specialist. Our primary outcome measure was the time interval from the lab posting the final TnT result to patient discharge. **Results:** During the study period, 1125 patients met the inclusion criteria; 562 in the control group and 563 in the intervention group. The overall median time interval from posting of the TnT result by the lab to discharge was 1.48 hours, and was highly skewed (kurtosis = 3.98). The median time to discharge was 1.66 hours in the control group and 1.26 hours in the intervention group. Mixed linear model comparing the log transformed time to discharge showed that this was a statistically significant difference, accounting for clustering by physicians ($p = 0.031$). **Conclusion:** Physicians who received TnT results on their smartphones discharged their patients with chest pain 24 minutes faster than physicians without TnT notifications. Previous simulation studies have shown a 5 minute reduction in processing time can significantly improve ED crowding. Push-alert notifications could have significant impact on overall ED LOS.

Keywords: computers, handheld, hospital information systems, cellular phone

PL04

Factors associated with choosing the emergency department as a primary access point to health care in a population without a primary care physician: a Canadian cross sectional study

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Introduction: Approximately 4.3 million Canadians are without a primary care physician, of which 13% choose the emergency department (ED) as their regular access point to health care. We sought to identify factors that were associated with preferential ED use over other health services. We hypothesized that similar socioeconomic barriers to primary care would also prevent access to emergency department alternatives. **Methods:** Data regarding individuals' ≥12 years of age from the Canadian Community Health Survey, 2007 to 2008 were analyzed (n = 13,4073, response rate 93%). Our study population comprised 14091 individuals identified without a primary care physician. Socioeconomic variables included employment, mobility, and education. Covariates included chronic health condition, immigrant status, gender, age, and mental health. Prevalence estimates and confidence intervals for each variable were calculated. Weighted logistic regression models were constructed to evaluate the importance of individual risk factors and their interactions after adjustment for relevant covariates. Model parameters were estimated by the method of maximum likelihood. The Wald statistic was employed to test the significance of individual variables or interaction terms in relation to ED choice. **Results:** The sample comprised of 57% men and 43% women from across Canada. Employment (OR 0.733(95%CI 0.593-0.906)), good health (0.733(95%CI 0.566-0.878)), and post-secondary education (0.684(95%CI 0.533-0.878)) reduced respondents use of the ED. Adjusted for chronic conditions, mental health, gender, poor mobility, province, and age. Those with difficulty attending medical appointments (1.801(95%CI 1.184-2.739)) were significantly more likely to choose the ED as their primary access to health care. **Conclusion:** In a Canadian population without a family physician, barriers that prevent access to primary care also lead to a preferential use in the ED over alternative resources. An absence of these barriers allows for reduced use of the ED. Low socioeconomic status and not necessarily availability of resources dictate preferential ED use in those without a primary care physician. Specific policy and system development targeting this at risk population are required to change ED use patterns.

Keywords: emergency department, frequent users

Oral Presentations

OP01

Innovative use of AED by RNs and RTs during in-hospital cardiac arrest: phase II

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Introduction: In-hospital cardiac arrest most commonly occurs in non-monitored areas, where we previously observed a long delay (11 min) before defibrillation (Phase I). Nurses (RNs) and respiratory therapists (RTs) cannot legally use Automated External Defibrillators (AEDs) during in-hospital cardiac arrests without a medical directive. We sought to evaluate the benefits of a rapid defibrillation program allowing RNs and RTs to use AEDs during in-hospital cardiac arrests (Phase II). **Methods:** We performed a health record review examining in-hospital cardiac arrests before (January 2012 - August 2013) and after (September 2013 - March 2014) implementation of The Ottawa Hospital's AED medical directive. We used ICD-10 codes to identify potentially eligible cases, and included in-hospital cardiac arrests for which resuscitation was attempted, including those re-arresting following prehospital return of spontaneous circulation (ROSC). We developed a standardized and piloted data collection tool based on the Utstein reporting guidelines for in-hospital cardiac arrest. We obtained consensus on all data definitions before initiation of data extraction by a trained investigator. We report descriptive and t-test statistics. **Results:** There were 270 in-hospital cardiac arrests for which resuscitation was attempted with the following characteristics (before n = 195 v. after n = 75): mean age (68 v. 69 years), gender distribution (62.1% v. 64.0% male), witnessed (70.3% v. 72.0%), initial rhythm PEA (39.0% v. 27.3%) or VF/VT (26.7% v. 26.7%), ROSC (65.1% v. 61.3%), and survival to hospital discharge (24.6% v. 22.7%). Our primary outcome, mean time to first shock, showed a decreasing trend from 10:54 min in the before group to 8:13 min in the after group (mean difference 2:41 min; $p = 0.30$). An AED was used in four of the 15 VF/VT cases occurring in non-critical areas (3 times on a medicine ward, and once in dialysis). When an AED was used, the observed time interval between recognition of cardiac arrest and first shock delivery (median 3:30 min) approached the recommended resuscitation guidelines of less than 3 min. **Conclusion:** We successfully implemented a program allowing RNs and RTs to use AEDs during in-hospital cardiac arrests. We anticipate the adoption of such a program in a much larger cohort of hospitals could have a significant impact on survival to hospital discharge for in-hospital cardiac arrest patients.

Keywords: cardiac arrest, automated external defibrillator

OP02

Prognostic value of cardiac biomarkers in the risk-stratification of ED syncope - a systematic review

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Introduction: The role of cardiac biomarkers in risk-stratification of syncope is unclear. The objective of this study was to systematically review the literature to assess the predictive value of cardiac biomarkers during acute management of syncope to identify those at risk for short-term major adverse cardiovascular events (MACE). **Methods:** We conducted a systematic review of MEDLINE, EMBASE, DARE and Cochrane databases from inception to July 2014. We included studies involving adult syncope patients that evaluated cardiac biomarkers and excluded case reports, reviews and studies involving children. Our primary outcome (MACE) included death, CPR, AMI, structural heart disease, pulmonary embolism, aortic dissection, significant hemorrhage or cardiac procedural interventions. Secondary outcome analysis assessed the biomarker prediction of AMI, cardiac syncope and death. Two reviewers extracted patient level data based on the cut-off reported. Pooled sensitivities and specificities were calculated using patient-level data and presented as summary ROC curves. **Results:** A total of 1,862 articles were identified and 11 studies with 4,246 patients were included. Studies evaluated 3 cardiac biomarkers: contemporary troponin (2,693 patients), natriuretic peptides (1,353 patients) and high-sensitive troponin (819 patients). The pooled sensitivities and specificities for MACE were: contemporary troponin 0.29 (95% CI 0.24, 0.34) and 0.88 (95% CI 0.86, 0.89); natriuretic peptides 0.77 (95% CI 0.69, 0.85) and 0.73 (95% CI 0.70, 0.76); high-sensitive troponin 0.74 (95% CI 0.65, 0.83) and 0.65 (95% CI 0.62, 0.69) respectively. Natriuretic peptides and high-sensitive troponin showed good diagnostic characteristics for both primary and secondary outcomes. **Conclusion:** Natriuretic peptides and high-sensitive troponin might be useful in risk-stratification. Future studies are needed to assess their role in identification of syncope patients at-risk for MACE after initial evaluation.
Keywords: biological markers, risk stratification, syncope

OP03

Safety and efficiency of outpatient coronary CT angiography for the evaluation of potential ischemic chest pain in emergency department patients

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Introduction: Coronary computed tomography angiography (CCTA) may assist in diagnosing acute coronary syndrome in emergency department (ED) patients with chest pain. In previous studies CCTA has been performed during the index visit, resulting in 18 to 24-hour lengths of stay (LOS). We investigated the safety and feasibility of discharging low-risk ED chest pain patients for outpatient CCTAs, in comparison to those in whom it was performed during the ED visit. **Methods:** This prospective cohort was enrolled at two urban Canadian EDs. Patients up to 65 years of age with potential ischemic chest pain, but without ischemic EKG changes or elevated initial serum troponin values, were evaluated with CCTA at the physician's discretion. Patients arriving during weekday daytime hours had CCTA performed prior to discharge (the ED-based group). Patients presenting outside these hours underwent serial troponin testing and six hours of observation, with outpatient CCTA's performed within 72 hours (the outpatient group). Outpatient CCTA's were immediately interpreted and patients with abnormal tests were re-referred to the ED (using a pre-defined algorithm). Patients were contacted at 30 days to ascertain outcomes. The primary outcome was the proportion of patients in the outpatient CCTA group who experienced a predefined major adverse cardiac event (MACE) between the ED visit and outpatient CCTA. Secondary outcomes (examined in both groups) were: (1) the proportion of patients who had invasive coronary angiography within 30 days; and (2) ED LOS. **Results:** Between July 1, 2012 and December 1, 2014 we enrolled 629 patients; 423 and 206 in the outpatient and ED-based groups respectively. Age, gender, and risk factors were similar in both cohorts. No outpatients had a MACE prior to CCTA (0.0%, 95% CI 0 to 0.8%), and no study patients had a myocardial infarction or died within 30 days. Seventeen outpatients (4.5%) and 9 ED-based patients (4.4%) had invasive coronary angiograms within 30 days (difference 0.1%, 95% CI -3.9 to 3.3%). Median ED LOS was 6.9 hours for the outpatient group and 6.4 hours for the ED based group (difference 0.4 hours; 95% CI -0.1 to 1.0 hours). **Conclusion:** In ED patients with potential ischemic chest pain, CCTA may be safe and acceptable as an outpatient investigation within 72 hours. Emergency department LOS for ED-based and outpatient groups were similar.
Keywords: myocardial infarction, chest pain, computed tomography

OP04

A simple clinical decision tool for diagnosing acute heart failure in the undifferentiated dyspneic patient using a Bayesian approach

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Introduction: Diagnosing acute heart failure (AHF) in the undifferentiated dyspneic emergency department (ED) patient can be challenging, even with natriuretic peptide binary testing. Structured on a Bayesian approach, we had retrospectively derived and validated a promising mathematical diagnostic model (SoB-HF) for potential AHF cases based simply on initial clinical impression, patient age and absolute NT-proBNP value. We sought to prospectively compare the diagnostic accuracy of SoB-HF with that of NT-proBNP and emergency physician (EP) final diagnosis (EPDx). **Methods:** Undifferentiated dyspneic ED patients with an EP assessed initial indeterminate (21-79%) pretest probability for AHF were enrolled across 4 sites. At time of ED disposition, the EP recorded EPDx as "AHF" or "noAHF". Receiver-operator characteristic (ROC) curves were constructed and area under the curve (AUC) calculated to illustrate both pretest AHF and SoB-HF posttest value agreement with gold standard adjudicated diagnosis by two blinded cardiology experts. For model agreement, optimal cut-points using sensitivity, specificity and likelihood ratios (LR) were calculated. **Results:** Two hundred patients were enrolled (43% male, mean age 64 years, 53% with a history AHF, 49% with a history COPD), EP pretest AHF had a ROC AUC of 0.76 v. 0.93 for SoB-HF ($p = 0.000001$). EPDx accuracy was 75%. NT-proBNP testing with standard cut-points had 88% (95% CI 79, 94) sensitivity and 78% (95% CI 70, 84) specificity. SoB-HF posttest optimal single cutpoint of 0.515 had 90% (95% CI 82, 96) sensitivity and 88% (95% CI 82, 93) specificity. SoB-HF posttest values >0.65 had a +LR > 10 and posttest values <0.47 had a -LR of <0.1; together redirecting 84% of uncertain cases with 92% accuracy. **Conclusion:** This simple clinical decision tool demonstrates superior diagnostic accuracy in a prospective cohort of dyspneic ED patients with an indeterminate pretest probability for AHF. With clinical implementation, further studies of its sensitivity and impact analyses are warranted.
Keywords: clinical decision tool, acute heart failure, gestalt

OP05

The Canadian syncope risk score to identify patients at risk for serious adverse events after emergency department disposition

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Introduction: Considerable variations in ED management of syncope exist with patients suffering serious adverse events (SAE) outside the hospital. We sought to develop a risk scoring system to identify ED syncope patients at risk for SAE after ED disposition. **Methods:** This was a prospective cohort study at 6 large Canadian EDs that enrolled adult syncope patients. We collected standardized variables from history, clinical examination, results of investigations including ECG, and patients' disposition at index presentation. Adjudicated SAEs included death, MI, arrhythmia, structural heart disease, pulmonary embolism, significant or subarachnoid hemorrhage, other syncope-related serious conditions or procedures within 30-days of ED disposition. Multiple imputation for missing data, multivariable logistic regression and bootstrap internal validation were performed. **Results:** Of the 4,611 patients enrolled (mean age 53.7 years, 55.0% females, and 13.0% hospitalized), 285 (6.2%) suffered SAE during the index visit and 292 (6.3%) were lost to follow-up, leaving 4,034 patients with 147 (3.6%) suffering SAE after ED disposition. Nine variables were independently associated with SAE after ED disposition: precipitating factors for vasovagal syncope, history of heart disease, troponin (>99 percentile), ED diagnosis of cardiac, or of vasovagal syncope, any ED systolic blood pressure <90 or >180 mmHg, QRS duration >130msec, abnormal QRS axis and QTc interval >480msec. We developed the Canadian Syncope Risk Score incorporating these variables with the risk ranging from 0.4% for a score of -3 to 41.7% for a score of ≥7. Threshold scores of -2 and -1 had a sensitivity of 99.2% and 97.7% and a specificity of 25.6% and 47% for SAE respectively. **Conclusion:** An important number of ED syncope patients suffer SAE after ED disposition. Once validated, the Canadian Syncope Risk Score has the potential to standardize ED management, and to improve risk-stratification and disposition decisions.

Keywords: clinical decision making, risk stratification, syncope

OP06

ED management of heart failure and COPD: a national survey of attitudes and practice

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Introduction: The Ottawa Heart Failure Risk Scale (OHFRS) and the Ottawa COPD Risk Scale (OCRS) were developed in order to estimate medical risk and to help guide disposition decisions for emergency department (ED) patients with acute heart failure (HF) and COPD. We sought to learn physician attitudes towards these two new risk scales and to identify potential barriers to ED implementation. **Methods:** We distributed 2 self-administered online surveys to members of the Canadian Association of Emergency Physician's (CAEP) using the modified Dillman's tailored design method and 4 email notifications. The surveys consisted of 16 questions relating to the OHFRS and OCRS scales respectively. Survey content was pre-tested on ED physicians. The primary outcome was the overall physician rating of the two risk scales and their component criteria on a 5-point Likert scale. Secondary outcomes included the likelihood of risk scale implementation into ED's as well as the perceived barriers to such implementation. Simple descriptive statistics were used to illustrate the survey results. **Results:** For the OHFRS survey, we had responses from 195 ED physicians (35.7%) with the following characteristics: male (67.9%), practicing in academic centre (47.9%), median years of practice (15 years). The overall OHFRS approval by physicians was 74.4%, and for components ranged from 51.3% to 96.9%. 66.7% believed that OHFRS would be implemented at their hospital. For the OCRS survey, we had responses from 208 ED physicians (38.1%) with the following characteristics: male (76.0%), practicing in academic centre (47.6%), median years of practice (15 years). The overall OCRS approval by physicians was 76.9%, and for components ranged from 45.7% to 99.5%. 70.2% believed that OCRS would be implemented at their hospital. In both surveys, the most frequently reported barriers to scale implementation were concerns about component criteria and point allocation (OHFRS 39; OCRS 26), memorization and scale complexity (OHFRS 34; OCRS 45), and uncertainty about scale superiority over physician gestalt (OHFRS 17; OCRS 13). **Conclusion:** Canadian ED physicians were very supportive of the new OHFRS and OCRS scales and their implementation. We expect that these new risk scales will assist physicians with making safe and efficient disposition decisions and significantly improve outcomes for patients suffering from HF and COPD.

Keywords: decision tool, COPD, heart failure

OP07

Determination of the pretibial soft tissue thickness in children: are intraosseous infusion needles long enough?

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Introduction: The EZ-IO® intraosseous (IO) needles are available in two sizes for pediatric populations: a 15mm for <39kg and 25mm for >39kg. Currently no published research validating the use of weight-based selection exists, which may be affected by increasing obesity. Correlational data may help guide the correct IO needle choice with greater accuracy. We hypothesized that pretibial subcutaneous tissue thickness (PSTT) does not correspond with patient weight but rather with age and body mass index. **Methods:** This prospective study began recruitment in October 2014. All children <39 kg presenting to the emergency department (ED) were included in a convenience sample. Two clinicians certified in point of care ultrasound measured the PSTT using the SonoSite M-Turbo® linear array transducer in one leg corresponding to the site of IO insertion. A subset of participants PSTT was measured in duplicate by each clinician in a blinded fashion to generate a measure of agreement. Pearson correlation analyses and univariate linear regressions were performed to determine the relationship between age, weight and BMI with PSTT. **Results:** To date, measurements have been obtained in 58 participants. Participants' age ranged from 10 days to 14 years (mean [SD] = 5.24 [3.52 years]). 55% of participants were male. Patient weight ranged from 3.50 to 39.3 kgs (mean [SD] = 21.73 [10.18 kgs]) and BMI ranged from 12.1 to 24.9 (mean [SD] = 16.99 [2.57]. Mean PSTT across all participants was 0.657 cms (SD = 0.192cms). Intraclass correlation coefficient for measuring agreement between the two ultrasound measurements showed moderate agreement of ICC = 0.602 (0.385-0.757). There were strong positive correlations between BMI and PSTT ($r = 0.639$, $p = < 0.001$) as well as weight and PSTT ($r = 0.490$, $p < 0.001$). There was a weak correlation between age and PSTT (0.244, $p = 0.065$). **Conclusion:** Pretibial subcutaneous tissue thickness strongly correlates with BMI and weight, but weakly with age. Overall, the PSTT is less than half of the recommended IO needle length in most patients. It would appear that the weight-based recommendation of the 15mm IO needle is appropriate in most cases. The strongest correlate was not with weight, but with BMI. This would suggest that clinicians need to be aware that young patients in particular with large BMI's may pose problems with current weight based needle length recommendations.

Keywords: resuscitation, intraosseous devices, pretibial subcutaneous tissue thickness

OP08

Randomized controlled trial of ketorolac in combination with metoclopramide for the treatment of children with migraine in the emergency department

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Introduction: Migraine headaches are a common presenting problem in pediatric emergency departments (ED) and practice variation exists. Inflammation is thought to play a role in migraines and there is conflicting evidence regarding the additive effectiveness of non-steroidal anti-inflammatories on mitigating acute pain and reducing early recurrences. We designed a randomized clinical trial to test this hypothesis. **Methods:** Consenting children (ages 5-17) presenting with acute migraine at two EDs were enrolled. In addition to standard intravenous (IV) abortive therapy with metoclopramide (0.2 mg/kg; maximum 10 mg) and normal saline (10 ml/kg), patients were randomized to receive similar appearing IV ketorolac (KET: 0.5 mg/kg; maximum 30 mg) or placebo (PLA) using concealed allocation and in a double-blind fashion. Follow-up telephone interviews were conducted 24 hours after ED discharge. Pain was rated pre and 2-hours post administration and relapse was defined a priori. Intention to treat was used for this final analysis. **Results:** Overall, 53 patients were randomized and the groups were similar at baseline. Mean age was 12.8 ± 2.7 years, 66% were female; most (85%) had already taken a headache prior to their ED presentation. Overall, 26 received KET and 27 received PLA. The mean difference in pain intensity between baseline and discharge (or <120 mins) was -42 mm (95% CI: 32 to 51) for the KET group and -38 mm (95% CI: 29 to 46) for placebo group (difference: $p = 3.97$; 95% CI: -16.5 to 8.5). Only 11% (95% CI: 3 to 20%) of patients were pain free at discharge (difference: $p = 0.36$). There was no difference in relapse or adverse effects between the groups. **Conclusion:** In pediatric patients presenting to the ED with migraine headache, the additional of KET to standard care with metoclopramide and fluid bolus failed to reduce acute pain scores or headache relapses after ED discharge. Monotherapy in acute headache in pediatrics should be encouraged and further comparative effectiveness research is needed in the pediatric age groups.

Keywords: migraine, pediatrics, clinical trial

OP10

Effectiveness of interventions to decrease emergency department visits by adult frequent users: a systematic review

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Introduction: Frequent emergency department (ED) users are a group of interest from a health services perspective, partly due to their presumed contribution to ED overcrowding. Existing literature suggests that frequent ED users are a high-risk group in whom interventions may improve outcomes. This systematic review evaluates the effectiveness of interventions targeting frequent ED users in reducing visit frequency and improving patient-oriented outcomes. **Methods:** An *a priori* study protocol was published in PROSPERO (CRD42014015058). A comprehensive search of seven electronic databases and the grey literature was conducted. Comparative studies examining interventions targeted at adult frequent ED users that assessed ED visits and other patient-oriented outcomes were included. Two independent reviewers screened, selected, assessed quality and extracted data. Third party adjudication resolved disagreements. High heterogeneity and incomplete outcomes reporting precluded a meta-analysis as planned. Results are reported via median change scores with interquartile range (IQR). **Results:** The search strategy identified 4,898 citations; full texts of 407 were screened and 29 studies were included. The studies were primarily before-and-after studies ($n = 22$) and controlled trials ($n = 7$). The risk of bias of the included studies was judged as moderate to high. The definition of frequent ED user varied considerably across studies. The interventions implemented were case management ($n = 19$), care plans ($n = 6$), diversion strategies to non-urgent care ($n = 3$), printout case notes ($n = 1$), and social work home visits ($n = 1$). Among the 12 studies reporting average ED visits per patient, there was a decrease from 8.45 (IQR: 6.98, 13.6) to 4.58 (IQR: 3.09, 7.15) visits after exposure to the intervention. In seven studies assessing total ED visits before and after exposure to case management, the median number of aggregate ED visits decreased by 70 (IQR: 33, 441) after the case management program. **Conclusion:** Interventions targeting frequent ED users are likely to effectively decrease ED visits; however, poor outcomes reporting precluded traditional meta-analysis of the effectiveness of these interventions. Standardized definitions to facilitate comparable research are urgently needed.

Keywords: frequent emergency department users, ED crowding, access

OP11

Validation of ICMED - the International Crowding Measure in Emergency Departments

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Introduction: The consequences of emergency department crowding are well described and understood. There is uncertainty about the best way to measure emergency department crowding. We have previously derived the International Crowding Measure in Emergency Departments (ICMED). We aimed to validate a short form of this measure in an international sample of emergency departments. **Methods:** In this study we used a seven point version of the ICMED known as the sICMED. We compared performance of the sICMED at predicting senior Emergency Physician's concerns about the crowding and danger of their emergency department by collecting their perceptions on two 10cm visual analogue scales. The data was collected in seven different centres in five different countries between April and October 2014; Ireland, England, Chile, Canada and the USA. Each centre contributed a minimum of 40 observations. **Results:** 398 sets of observations were submitted, data completeness was 99%. Overall, the sICMED was moderately correlated with the perceptions of crowding and danger, $r = 0.46$ and 0.47. There was substantial variability in the performance of the sICMED in different countries and different centres.The sICMED was better than individual component variables at predicting clinician's concerns about crowding or danger. In particular, the sICMED was better at predicting clinician's perceptions than was occupancy alone. **Conclusion:** This study provides some face validity for the sICMED as a measurement tool of emergency department crowding in some, but not all settings. Future work should validate the sICMED against harder outcomes such as cancelled elective surgery and mortality.

Keywords: crowding, emergency department, trigger tools

OP13

The utilization of a public wait times website by ED patients

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Introduction: The implementation of a regional electronic public wait times website has the potential to improve patient satisfaction and increase functional regional capacity by allowing patients to choose less busy EDs. These websites are impugned as a potential cause of increasing ED volumes by serving as advertising for would be patients. We sought to survey ED patients to understand whether they are using this website tool to make ED destination decisions. **Methods:** A prospective cross-sectional survey was done between May - August 2014 in the urban Vancouver Coastal Health - Providence Health Care (VCH-PHC) Health Region at the five EDs and the single Urgent Care Centre (UCC). VCH-PHC implemented the www.edwaittimes.ca website in April 2013. A focus group of 4 ED experts created a 20-question survey instrument. This was piloted to minimize bias and confusing verbiage. Research assistants approached a convenience sample of self-referred patients of any age from the province of British Columbia with a Canadian Triage and Acuity Scale level 2-5. We excluded patients transported via ambulance, directed to the ED by Nursing Services (8-1-1) or a referring physician, and out of jurisdiction patients. Questions included use of Internet access, use of the website prior to the ED visit, and use of the website in hypothetical low-risk (ankle injury) and high-risk (chest pain) scenarios. **Results:** 606 patients were approached. Of the 512 eligible patients, 447 (87%) agreed to participate. Median age was 44 years (IQR 28 - 57) and 47% were male. Only 4 patients were less than 10 years of age. Average CTAS for the entire cohort was 3.3 (95% CI [2,4]). 256/447 (57%) travelled <5 km to the ED. 406/447 (91%) of participants had Internet access and 89% (362/406) use the Internet daily. 93/447 (21%) were aware of the wait times website, while 27/447 (6%) used the website prior to their ED visit. Even the ED with the lowest annual median time to physician in the region had only 9% of patients use the wait times website prior to coming to the ED. Given a hypothetical low acuity and high acuity case, 60% and 28% respectively stated they would consider using the website in the future. **Conclusion:** Only a very small percentage of patients currently use the public ED wait times web site. Low acuity conditions are more likely to drive website usage. Increased use of the website to improve regional ED smoothing may require a significant public awareness campaign.
Keywords: ED wait times, internet, capacity planning

OP14

Slow or swift, your patients' experience won't drift: absence of correlation between ED MD productivity and the patient experience

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Introduction: EDs are pressured to meet the demands of increasing input. As emergency physicians (EPs) strive to see more patients per hour, it is important to ensure that productivity improvements are not eroding the patient experience. Numerous studies have evaluated factors affecting patient satisfaction with ED care, yet, there is limited data quantifying the relationship between patients' interpersonal experiences and EP productivity. The objective of this study was to evaluate whether patients' satisfaction with EP-relevant dimensions of care are correlated with average productivity, among patients presenting to 3 EDs in a single urban centre. **Methods:** This retrospective observational study linked administrative and patient experience databases to measure correlation between patient satisfaction and EP productivity. The study was performed across three Calgary EDs (from June 2010 to July 2013). Patients >16 years old, who also completed a Health Quality Council of Alberta (HQCA) ED patient experience survey were included. The HQCA, an organization independent from the provincial health authority has a legislated mandate to measure, monitor and assess patient safety and healthcare quality. EP productivity was measured at the individual physician level and defined as the average number of patients seen per hour. Patient satisfaction scores from 5 composite domains of the HQCA's ED patient experience survey were correlated with average annual EP productivity information using a Pearson correlation and univariate general linear model. **Results:** We correlated 3,794 completed patient satisfaction surveys with productivity data for 130 EPs. The survey response rate was 45%. Very weak non-significant negative correlations existed between productivity and "Staff Care and Communication" ($r = -0.057$, $p = 0.521$), "Discharge Communication" ($r = -0.144$, $p = 0.102$), and "Respect" ($r = -0.027$, $p = 0.760$) composites; very weak, non-significant positive correlations existed between productivity and "Medication Communication" ($r = 0.003$, $p = 0.974$) and "Pain management" ($r = 0.020$, $p = 0.824$) composite domains. A univariate general linear model also yielded no statistically significant correlations between EP productivity and patient satisfaction. **Conclusion:** There is no association between EP productivity and the patient experience.
Keywords: patient satisfaction, productivity

OP15

Peer teaching: an effective method for simulation-based instruction

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Introduction: A resident's first lumbar puncture (LP) often occurs in a high-stakes environment where patient management depends on success. Unfortunately most junior residents do not achieve competence for this important skill. The objectives of this study were 1) to determine if students taught LP skills by peers perform as well on a simulated LP task trainer as students taught by experts; 2) to determine if teaching peers results in improved performance; and 3) to determine if there were differences in self-efficacy between groups. **Methods:** We conducted a block randomized study using 3rd year medical students' LP skill acquisition at the Montreal Children's Hospital. Students ($n = 62$) were given two 30 minute sessions with the LP task trainer. Group 1 (control group, $n = 21$) was initially taught via deliberate practice by an *expert* and then had 30 minutes of self-guided practice. Group 2 (student teachers, $n = 21$) were similarly taught by an *expert* and then had 30 minutes to teach a peer. Group 3 (peer taught, $n = 20$) was taught by group 2 and then given an additional 30 minutes of self-guided practice. All students had an equal amount of time with the task trainer. Assessments of students were conducted 4-6 weeks after training, with a previously validated 15-point checklist by a single blinded assessor. The main outcome measure was the mean score on the 15-point checklist compared using independent sample t-tests. Self-efficacy was measured on a 5-point scale. **Results:** The mean score of students taught by an expert (i.e. group 1) was 11.9 (SD 2.2) and those taught by their peers (i.e. group 3) was 11.7 (SD 2.0); the difference between groups was not statistically significant ($p = 0.83$). Moreover, the mean score of students who taught their peers (i.e. group 2) was 12.9 (SD 1.9); there was no statistically significant difference when compared to group 1 ($p = 0.13$). The students self-efficacy was 3.8 for group 1, 3.8 for group 2 ($p = 0.58$) 3.5 for group 3 ($p = 0.31$ when compared to group 1). **Conclusion:** The students taught by their peers achieved the same degree of competency as students taught by experts. This could potentially provide medical schools with valuable new resources for teaching. We did not observe a benefit to the learner from 'teaching the skill' to their peers, as compared to practicing on their own, though the study may have been underpowered to detect a small difference. Self-efficacy was no different between groups.
Keywords: lumbar puncture, simulation

OP16

Podcasting can improve clinical clerks' ability to generate differential diagnosis for an ED patient presentation

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Introduction: Podcasting for Continuing Medical Education is well established in emergency medicine (EM), however its effectiveness for Undergraduate Medical Education has not been explored. We felt there was an opportunity to use podcasting to orient clinical clerks to the EM approach for common presentations. The purpose of this study was to determine if listening to a related podcast improved clinical clerks' ability to formulate a differential diagnosis for an ED patient presenting with chest pain. **Methods:** Phase 1 of this study determined podcast content by reviewing clinical clerks' differential diagnosis formulation from paper-based cases completed in the previous academic year. In Phase 2, a 20-minute podcast was created considering the learning needs identified in Phase 1. Phase 3 was a prospective study involving all clinical clerks at a single Canadian medical school during the 2013-14 academic year. The intervention group was required to listen to the podcast prior to starting their EM rotation. The control group did not have access to the podcast. Both groups were shown a videotaped, standardized-patient encounter at the start of their rotation and asked to complete a written clinical assessment including a differential diagnosis for this chest pain presentation. Two blinded physicians using a modified, previously validated, nine-point scoring rubric independently scored these lists. Differential diagnoses scores between the intervention and control groups were compared using an independent-samples t test. Their Inter-Rater Reliability was analyzed using Inter Class Correlation (ICC) and Cohen's Kappa. **Results:** Phase 1 identified two major knowledge gaps in the differential diagnosis: failure to consider life-threatening conditions and failure to consider multiple systems. In Phase 3, students who were exposed to the podcasts ($N = 61$, $M = 6.73$, $SD = 1.53$) had a statistically significant higher average score $t(124) = 1.97$, $p = 0.05$ than those who were not exposed to the podcasts ($N = 65$, $M = 6.14$, $SD = 1.86$). The two raters were highly consistent (ICC = 0.97, Kappa = 0.64). **Conclusion:** Exposure to podcasts was an effective way for clinical clerks to learn an EM approach to a differential diagnosis for chest pain. This research suggests that podcasting holds promise for a range of EM undergraduate topics.

Keywords: innovations in EM education, medical education

OP17

Patterns and predictors of early mortality in the Tikur Anbessa Hospital Emergency Department in Addis Ababa, Ethiopia: a prospective study

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Introduction: Ethiopian emergency department (ED) patients have a high burden of illness and injury for which mortality rates have not been previously published. This study sought to characterize the burden of and to identify predictors for early ED mortality among patients presenting to the Tikur Anbessa Specialized Hospital ED (TASH-ED) in Ethiopia. **Methods:** Data was prospectively collected from the records of all adult (≥15 yrs.) patients who died within 72 hours of ED admission to the Tikur Anbessa Specialized Hospital in Addis Ababa, Ethiopia. Pearson's chi-square and Fisher's exact tests were used to investigate associations between time to death and cause of death in addition to demographic and clinical factors. Time from ED admission to death was dichotomized as 0-6 hours and 6+ hours and logistic regression was used to assess the adjusted impact of these variables on the probability of dying within 0-6 hours of ED admission. This study was approved by the Research Ethics Boards at Tikur Anbessa Hospital, Ethiopia and the University Health Network in Toronto, Canada. **Results:** Between October 2012 and May 2013, 16,056 patients visited the ED and 220 patients died within 72 hours of admission. After excluding patients dead on arrival ($n = 34$), the average age of death was 43.1 years and the overall mortality rate was 1.2%. Head injury (21.5%) and sepsis (18.8%) were the most common causes of death. Relative to medical patients, trauma patients were younger ($p = 0.009$), comprised more males ($p = 0.001$), died faster (≤6 hours; $p = 0.030$), and were less likely to present during the day ($p = 0.048$). The sole significant predictor of death within 6 hours was symptom duration less than 4 hours (4-48 hours v. <4 hours: OR = 0.20, 95% CI = 0.07-0.53, $p = 0.001$; >48 hours v. <4 hours (OR = 0.27, 95% CI = 0.09-0.81, $p = 0.020$). **Conclusion:** The mortality burden of trauma and sepsis in the TASH-ED is high, and mortality patterns differ between these groups. This study provides the first-ever prospectively established baseline all-cause ED mortality data in Ethiopia and will serve as a benchmark for ongoing improvements in ED care. As emergency medicine develops as a specialty in Ethiopia, reduced mortality among these otherwise young, previously healthy patients could occur through targeted trauma prevention advocacy and the development of context-specific ED clinical care protocols.

Keywords: all-cause mortality, Ethiopia, emergency medicine

OP18

An emergency medicine residency program as emergency medical services medical advisor: an evaluation of curriculum effectiveness

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Introduction / Innovation Concept: Emergency medicine (EM) residency programs require residents to cover certain emergency medical services (EMS) and pre-hospital care (PHC) curriculum objectives of training. Much variability exists with respect to EMS and PHC curriculum format among Canadian EM residency programs and limited research has been done to assess whether the proposed objectives are covered. The purpose of this study was: 1) to present an innovative EMS and PHC curriculum and 2) to assess whether this curriculum covers the proposed EMS objectives of training. **Methods:** In 2012, our Canadian Royal College EM residency program assumed the role of EMS medical advisor for our health region under the leadership of our program director. A rota was developed to distribute the workload equally among residents. Once monthly, the team met to discuss completed, current and upcoming duties including—but not limited to: 1) meetings (quality improvement, protocol development & fire committee), 2) continuing education (conference presentations, education module review & training days), 3) monitoring & quality assurance (chart audits and case reviews), and 4) Ask the Doc blog. The program director reviewed all tasks prior to completion and was available at any time for questions and concerns. **Curriculum, Tool, or Material:** Following the 2013-2014 academic year, residents were asked to complete a survey exploring which of the proposed EMS and PHC objectives of training—outlined by MacDonald et al. (2008)—were met. The survey generated an 89% response rate and determined that 72% of mandatory and 39% of optional objectives were covered. Additionally, a third-party moderated focus group was conducted with the surveyed

residents. This focus group revealed the greatest advantage of the program to be realistic exposure to the medical advisor role allowing residents to make an informed decision regarding future careers in EMS, while the major disadvantage was the time commitment required for activities covering optional objectives. **Conclusion:** A medical advisor-based EMS curriculum provides an innovative approach to EMS and PHC education in the residency setting. The majority of mandatory competencies are covered through this approach, while simultaneously providing residents with realistic insight into what a future career in EMS would entail. For other residency programs considering this approach, we would recommend reviewing the job deliverables, and creating additional learning opportunities for EMS and PHC objectives not covered through job deliverables.

Keywords: innovations in EM education, residency education, emergency medical services

OP19

Development and implementation of a near-peer simulation curriculum for emergency medicine residents

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Introduction / Innovation Concept: Medical simulation is widely used to teach resuscitation and crisis resource management (CRM) skills in emergency medicine (EM) residencies. However, implementation requires a significant time investment from teaching faculty. To address these issues we developed and initiated a longitudinal, near-peer simulation curriculum for junior EM (PGY 1 & 2) residents led by senior EM (PGY 3 & 4) residents. **Methods:** Local faculty and current EM residents at the University of Alberta identified a need for (1) standardized longitudinal resuscitation and CRM training for junior EM residents and (2) further teaching opportunities for senior EM residents. Utilizing a near-peer teaching approach, we used low-tech simulation to address these needs. We created overall goals and objectives for the program based on the CanMEDS competencies, and implemented the curriculum in the fall of the 2014 academic year. **Curriculum, Tool, or Material:** Twelve core resuscitation topics were chosen by consensus between the authors (chest pain, dyspnea, shock, altered level of consciousness, seizure, acidosis, hyperthermia, hypothermia, trauma, bradycardia, tachycardia, and wide QRS). For each simulation session, a senior resident created two original cases based on two of the core topics. The twelve topics were repeated four times, allowing 48 separate clinical cases over 24 sessions throughout the academic year. All junior residents attended every session. Simulations were run using a Resusci Anne® CPR manikin and an iPad monitor app (SimMon©). A designated junior resident led each case, with the additional residents assigned to other roles. Feedback was given to the learners directly after the case, and focused on differential diagnosis generation, initial resuscitation steps and CRM. Junior residents assessed senior residents' teaching skills using anonymous surveys based on the Debriefing Assessment in Healthcare Simulation (DASH) forms from the Center of Medical Simulation (Harvard). **Conclusion:** To address local needs, we created a longitudinal near-peer simulation curriculum that exposed junior EM residents to common resuscitation topics and provided senior EM residents with structured teaching opportunities in simulation debriefing. Future work will examine 1) which resuscitative and CRM topics are best suited to the near-peer simulation environment and 2) which teaching skills senior residents most develop while instructing this curriculum.

Keywords: innovations in EM education, near-peer teaching, medical simulation

OP20

Development and implementation of an emergency medicine residency training curriculum: The Toronto Addis Ababa Academic Collaboration in Emergency Medicine (TAAAC-EM)

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Introduction / Innovation Concept: Ethiopians experience a high burden of illness in a health system that has lacked trained emergency medicine (EM) physicians. To meet this pressing education and health system need, an EM residency training program was developed and implemented at the Addis Ababa University School of Medicine (AAU SM). **Methods:** A faculty taskforce from AAU SM and the University of Wisconsin designed a three-year residency curriculum intended to provide cost-effective, evidence-based training in Ethiopia's low resource context. Faculty from the University of Toronto (UT) partnered to develop and deliver content for the EM rotations within the residency program using an adapted EthioMEDS framework. **Curriculum, Tool, or Material:** The curriculum comprises three streams of structured teaching sessions: clinical (didactic and practical), administration and clinical epidemiology. Curriculum content is delivered by visiting UT EM faculty during regular in-country teaching trips. To date, 16 one-month teaching trips have taken place since 2010. Eighteen residents (PGY1-3) are in active training. Ethiopia's first board-certified EM physicians graduated in 2013 and 2014 (n = 10). A faculty-trainee mentorship program and regular videoconferencing sessions bridge gaps between teaching trips. **Conclusion:** This multi-faceted curriculum and collaborative institutional partnership has successfully graduated Ethiopia's first-ever EM faculty. We believe that the TAAAC-EM model will prove successful in both addressing the emergency healthcare needs of Ethiopians and in bolstering the expertise of trained Ethiopian physicians, and will be instrumental in helping develop future EM residency training programs throughout Africa.

Keywords: curriculum development, global health, emergency medicine

OP21

Short-term risk of arrhythmias among emergency department syncope patients with non-sinus rhythm

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Introduction: Short-term risk of arrhythmia or death among ED syncope patients with non-sinus rhythm is not known. The primary objective was to compare the 30-day incidence of arrhythmia or death between ED syncope patients with sinus and non-sinus rhythm; and to assess the independent risk of non-sinus rhythm for outcomes after ED disposition. **Methods:** We conducted a prospective study at 6 academic EDs to include adults with syncope. We collected demographic, clinical and ECG characteristics. Patients with prior or ED evidence of ventricular or atrial arrhythmias, or device implantation were designated as non-sinus. Primary outcome included arrhythmia or death within 30-days after ED disposition. Secondary outcomes included non-arrhythmic cardiac and non-cardiac serious outcomes. Outcomes were assessed by medical records review and telephone follow-up. We performed descriptive analysis and logistic regression. We also conducted

atrial fibrillation/flutter (AFF) sub-group analyses. **Results:** We enrolled 4,355 patients: mean age 53.7 years, 55.2% females, and 10.4% with non-sinus rhythm. After excluding patients with outcomes in the ED and those lost to follow-up, 3,417 patients in the sinus and 349 patients in the non-sinus groups were analyzed. The incidence of primary outcome was significantly different: 1.4% (95% CI 1.0-1.8%) in sinus; 9.2% (95% CI 6.1-12.2%) in non-sinus and 7.1% (95% CI 4.1-10.2%) in the AFF groups. There was no difference in the incidence of secondary outcomes among the groups. Clinically important risk factors: age, male sex, non-sinus rhythm/AFF; history of CAD, valvular heart disease, CHF, diabetes, and hypertension; and cQT were selected for multivariable analysis. The adjusted odds ratios for primary outcome were: non-sinus rhythm 2.0 (95% CI 1.2-3.4), and AFF 1.5 (95% CI 0.8-2.7). **Conclusion:** Non-sinus rhythm is an independent risk factor for arrhythmia or death among syncope patients within 30-days of ED disposition.
Keywords: arrhythmia, risk stratification, syncope

OP22

Prospective validation of a clinical decision rule to identify which chest pain patients can safely be removed from cardiac monitoring in the emergency department

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Introduction: Chest pain is a common emergency department (ED) presenting complaint. The majority of chest pain patients are kept on cardiac monitors for several hours, blocking access for patients who may be in greater need of a monitored bed. We sought to validate a previously derived clinical decision rule for safe removal of a subset of patients from cardiac monitoring. **Methods:** This prospective study enrolled adult patients presenting with chest pain to the two academic ED's of The Ottawa Hospital during a 5-month period from April to August 2014. We included patients who were monitored in the ED and had an ECG performed, and excluded those with a pre-hospital cardiac arrest and ST Elevation Myocardial Infarction (STEMI) on ECG. We collected baseline characteristics, outcomes and variables for the clinical decision rule (1. Is the patient chest pain free during physician assessment? 2. Is the initial ECG normal or have non-specific changes?). The ECG's were analyzed at a later date by a blinded physician, and were coded in accordance with internationally accepted diagnostic definitions for ECGs. The outcome was any arrhythmia requiring intervention occurring within eight hours of presentation. Descriptive statistics, sensitivity and specificity were calculated. **Results:** We included 518 patients: mean age of 63.7 years, 54.6% male and 8.5% admitted. Seven had an arrhythmia requiring intervention within eight hours of presentation (1.4%). Of these, one patient had ventricular tachycardia and the remaining six patients had atrial fibrillation requiring treatment. The diagnostic characteristics of the rule in predicting clinically important arrhythmias yielded a sensitivity of 100% (95% CI 59.0-100%), specificity of 36.0% (95% CI 31.8-40.3%) and NPV of 100% (95% CI 98.0-100%). The decision rule would have allowed us to safely remove 184 out of 518 patients (35.5%) from cardiac monitoring, with no adverse outcomes. **Conclusion:** We have successfully validated our previous decision rule that allows for safe removal of a large subset of chest pain patients from cardiac monitoring during their evaluation in the ED. This validation study shows that this simple rule is highly sensitive in predicting clinically important arrhythmias and its implementation will allow for improved use of health care resources.
Keywords: decision rule, cardiac monitoring, arrhythmia

OP23

An observational analysis of termination of resuscitation in the out-of-hospital setting

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Introduction: Despite advancements in care, survival rates remain low after out-of-hospital cardiac arrests (OHCA). The Universal Termination of Resuscitation (TOR) Guideline (terminate if no shock delivered AND unwitnessed by EMS providers AND no return of spontaneous circulation (ROSC)) has been validated to accurately determine patients who can have resuscitation terminated in the prehospital setting. There remains, however, considerable variation in transportation practices among EMS providers including solely using absence of ROSC as evidence for futility. The objective of this study was to re-evaluate the survival rate of patients transported to hospital who met the Universal TOR Guideline for termination in the field and compare survival rates with the single criterion of no prehospital ROSC. Second to determine patient characteristics, prehospital and in-hospital factors associated with survival for patients who were transported without a prehospital ROSC. **Methods:** This was a retrospective, observational cohort study using data from the ROC Epistry-Cardiac Arrest and ROC PRIMED databases between 2006 and 2011. All non-traumatic, adult (≥18 years) OHCA patients of presumed cardiac etiology were included. The primary outcome was survival to hospital discharge and the secondary outcome was functional survival (MRS ≤ 3 or CPC ≤ 2). We used multivariable regression analysis to evaluate factors associated with survival in patients transported without a ROSC. **Results:** A total of 55,204 patients were analyzed in this study of which 32,324 (59%) were transported to hospital. Of those transported, the Universal TOR Guideline recommended termination of resuscitation in 7,129 (22%). Survival for these patients was 1.3% (95% CI 1.2-1.4%) and survival with good functional outcome was 0.4% (95% CI 0.1-0.6%). Patients that were transported but did not obtain a prehospital ROSC had a survival rate of 2.5%. Survival in these patients was associated with shockable rhythm (OR 3.47; 95% CI 2.40-5.02), EMS witnessed (OR 3.24; 95% CI 2.28-4.62), public location (OR 1.69; 95% CI 1.31-2.18) and bystander witnessed (OR 1.61; 95% CI 1.20-2.17). **Conclusion:** Employing only ROSC as a predictor of futility is unfounded. The Universal TOR Guideline remains a strong predictor of survival.
Keywords: cardiopulmonary resuscitation, prehospital care, out-of-hospital cardiac arrest

OP24

Morbidity of administration of epinephrine in the treatment of anaphylaxis

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Introduction: Epinephrine is still under-prescribed for anaphylaxis. One possible explanation is the fear of its adverse effects on patients. The aim of this study, as part of the multicenter C-CARE project (Cross Canadian Anaphylaxis Registry), is to describe whether adverse effects occurred following the administration of epinephrine treatment for anaphylaxis episodes seen in the emergency department. **Methods:** A prospective cohort study was conducted in the emergency department of Sacré-Cœur Hospital, a university-affiliated, urban tertiary-care hospital,

caring mostly for an adult population. Records of epinephrine treated patients were retrospectively reviewed in search of the following serious adverse effects: acute coronary syndrome, intracranial hemorrhage, acute heart failure, arrhythmia requiring cardioversion or administration of negative chronotropic medication, and hypertensive crisis requiring administration of antihypertensive medication. Other reported side effects were recorded if present in the charts. **Results:** In the period between May 2012 to April 2014, 91 cases were reviewed. The patients ranged from 6 months to 76 years of age with 88% (95%CI: 81.3-94.7) of the cases reviewed being 18 years or older. The majority of patients received epinephrine intramuscularly 96% (95%CI: 80.1-93.3) and the remainder subcutaneously 4% (95%CI:0-8.0%). Epinephrine was either self-administered by the patient 21% (95%CI: 10.9-27.1), by emergency medical services 15% (95%CI:6.9-21.1), or prescribed in the emergency department 75% (95%CI:56.6-75.7). Administration of more than one dose of epinephrine was required in 9% (95%CI 2.4-13.6) of patients. No serious adverse effects occurred. Thirteen mild adverse events were recorded amongst 12% (95%CI: 5.3-18.7) of patients. These were tremors (4), palpitations (2), tension headaches (2), non-ischemic chest pain (2), anxiety (1), asymptomatic hypertension (1) and asymptomatic hypokalemia (1). Of the patients with reported side effects, only two received more than one dose of epinephrine. **Conclusion:** This study supports the absence of significant adverse effects with administration of epinephrine as a treatment for anaphylaxis. Clinicians should not refrain from treating patients with anaphylaxis for fear of serious adverse effects.
Keywords: anaphylaxis, epinephrine, side effects

OP25

Antiarrhythmics for out-of-hospital cardiac arrest resuscitation: a systematic review and meta-analysis

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Introduction: The evidence for the use of antiarrhythmics in out-of-hospital cardiac arrest (OHCA) resuscitation is inconclusive. We systematically reviewed the existing literature to assess the efficacy and effectiveness of antiarrhythmics for adult OHCA. **Methods:** We searched in MEDLINE, EMBASE, and the Cochrane Library from inception to June 2013 for randomised controlled trials (RCTs) and observational studies evaluating amiodarone, lidocaine, and magnesium sulfate in adult OHCA patients. Meta-analyses were performed using random effects modeling on RCTs and observational studies. Sensitivity analyses were performed stratifying by study design. The primary outcome was survival to discharge and the secondary outcomes were return of spontaneous circulation (ROSC), survival to admission, and neurological outcome. **Results:** Nine studies (n = 2904) met our inclusion criteria, of which five were RCTs (n = 1132) and four were observational studies (n = 1772): one RCT compared amiodarone to placebo (n = 504), one RCT compared amiodarone to lidocaine (n = 347), three RCTs (n = 281) compared magnesium to placebo, two observational studies (n = 1366) compared amiodarone to no/other antiarrhythmic, and two observational studies (n = 406) compared lidocaine to no/other antiarrhythmic. There were no differences in survival to discharge or neurological outcome in any comparison group, including sensitivity analyses. Amiodarone was associated with improved survival to admission compared to placebo (one RCT; RR 1.27, 95% CI 1.02-1.59; RD 0.09, 95% CI 0.01-0.18; NNT 11, 95% CI 6-113) and lidocaine (one RCT, RR 1.90, 95% CI 1.16-3.11; RD 0.11, 95% CI 0.03-0.19, NNT 9, 95% CI 5-36). There were no differences in outcomes between magnesium vs. placebo in three RCTs, and amiodarone vs. no/other antiarrhythmic and lidocaine vs. no/other antiarrhythmic in observational studies. **Conclusion:** There was no benefit of antiarrhythmics in survival to discharge or neurological outcomes among adults with OHCA. Amiodarone was associated with improved rates of survival to admission compared to lidocaine and placebo; however, data comes from only one RCT each. Future placebo-controlled trials are needed to evaluate the efficacy of antiarrhythmics in OHCA.
Keywords: out-of-hospital cardiac arrest, cardiopulmonary resuscitation, antiarrhythmics

OP26

The association between manual mode defibrillation, pre-shock pause duration and appropriate shock delivery when employed by basic life support paramedics during out-of-hospital cardiac arrest

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Introduction: Pre-shock pause duration of <20 seconds is associated with improved survival after cardiac arrest. Manual mode defibrillation has been associated with the shortest duration of pre-shock pause but is largely practiced by advanced care paramedics (ACP) whereas basic life support paramedics (BLS) routinely use the defibrillator in automatic mode. We sought to explore the relationship between manual mode defibrillation, pre-shock pause duration and shock appropriateness when defibrillation is provided by ACP vs. BLS level of providers. **Methods:** We performed a retrospective review of all treated non-traumatic adult OHCA presenting in a shockable rhythm over a one year period beginning January 1, 2012. Our primary outcome measure was the proportion of manual mode shocks delivered by BLS with pre- shock pause duration of <20 secs when compared to ACP. Our secondary outcome measures were the duration of pre-, post- and peri-shock pause and the proportion of appropriate shocks (defined as correct identification and shock delivery to patients in a shockable rhythm) delivered by either level of provider. This study had a power of 90% to detect an absolute difference of 15% between provider levels in proportion of shocks delivered with pre-shock pause duration <20 secs. **Results:** Among 2019 treated OHCA, 335(20%) presented in a shockable rhythm. Manual defibrillation was performed in 155 (46%) of these cases (196 shocks by ACP, 143 shocks by BLS). There were no differences in the proportion of shocks delivered with pre-shock pause duration <20 secs (ACP 82.8% v. BLS 84.8%, p = .65) nor pre-shock pause duration (sec) (median, Q1, Q3); ACP: 12.0 (7.0, 17.0) v. BLS: 11.0 (5.0, 17.0), p = .13 while BLS had shorter peri-shock pause duration (sec) (median, Q1, Q3); ACP: 17.0 (12.0, 23.0) v. BLS: 15.0 (9.0, 22.0), p = .03. There were no differences in the rate of inappropriate shocks (ACP 1.0% v. BLS 0.7%), p = 1.0 between levels of providers. **Conclusion:** Manual mode defibrillation by basic life support paramedics produced similar measures of pre-shock pause when compared to advanced care paramedics without increasing the rate of inappropriate shocks. More widespread use of BLS manual mode defibrillation may have the potential to decrease shock pause duration and improve survival.
Keywords: cardiopulmonary resuscitation, heart arrest, survival

OP27

The impact of chest compression fraction on clinical outcomes from shockable out-of-hospital cardiac arrest during the Resuscitation Outcomes Consortium (ROC) PRIMED trial

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Introduction: The role of chest compression fraction (CCF) in resuscitation of shockable out-of-hospital cardiac arrest (OHCA) is uncertain. We evaluated the relationship between CCF and clinical outcomes in a secondary analysis of the Resuscitation Outcomes Consortium (ROC) PRIMED trial. **Methods:** We performed a secondary analysis of OHCA patients from the ROC PRIMED trial who suffered cardiac arrest prior to EMS arrival, presented with a shockable rhythm, and had cardiopulmonary resuscitation (CPR) process data for at least one shock. We used multivariable logistic regression adjusting for Utstein variables, CPR metrics of compression rate and perishock pause, and ROC site to determine the relationship between CCF and survival to hospital discharge, return of spontaneous circulation (ROSC), and neurologically intact survival defined with Modified Rankin Score (MRS) $\leq$3. Due to potential confounding between CCF and cases that achieved early ROSC, we also performed an analysis restricted to patients *without* ROSC in the first 10 minutes of EMS resuscitation. **Results:** Among the 2,558 eligible patients, median (IQR) age was 65 (54, 76) years, 76.9% were male, and mean (SD) CCF was 0.70 (0.15). Compared to the reference group (CCF < 0.60), the odds ratio (OR) for survival was 0.57 (95%CI: 0.42, 0.78) for CCF 0.60-0.79 and 0.32 (95%CI: 0.22, 0.48) for CCF $\geq$0.80. Results were similar for outcomes of ROSC and neurologically intact survival. Conversely, when restricted to the cohort who did not achieve ROSC during the first 10 minutes (n = 1,660), the relationship between CCF and survival was no longer significant. Compared to the reference group (CCF < 0.60), the OR for survival was 0.85 (95 %CI: 0.58, 1.26) for CCF 0.60-0.79 and OR 0.87 (95%CI: 0.58, 1.36) for CCF $\geq$0.80. **Conclusion:** In this observational cohort study of OHCA patients presenting in a shockable rhythm, CCF when adjusted for Utstein predictors, CPR metrics and ROC site was paradoxically associated with lower odds of survival. The relationship between CCF and clinical outcomes was null in a sensitivity analysis restricted to patients without ROSC in the first 10 minutes. CCF is a complex measure and taken by itself may not be a consistent predictor of clinical outcome.

Keywords: emergency medicine, cardiopulmonary resuscitation, heart arrest

OP28

Potential impact of an early extracorporeal cardiopulmonary resuscitation strategy in adult cardiac arrest

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Introduction: Despite advancements in cardiac resuscitation, survival after cardiac arrest remains low. Extracorporeal membrane oxygenation (ECMO) during cardiac arrest (extracorporeal cardiopulmonary resuscitation [ECPR]) has emerged as an alternative to conventional CPR with promising survival rates reported in observational studies. The objective of this study was to explore the potential impact of ECLS in a medium-sized Canadian academic hospital and identify the number of patients eligible for treatment. **Methods:** We undertook a retrospective chart review of all out-of-hospital and emergency department cardiac arrests between January 1, 2008 and December 31, 2012. We identified patients who might benefit from ECPR, and estimated the potential lives saved by extrapolating survival figures from the literature. We considered a patient eligible if they were age 16-65, suffered a witnessed cardiac arrest, had CPR started within 10 minutes of the arrest, had a prehospital transport time <20 minutes, and an arrest to ED arrival time <45 minutes. Exclusion criteria included asystole as the presenting rhythm, cardiac arrest due to trauma, exsanguination, sepsis, or toxins that impair cellular metabolism; or DNR status. Further exclusion criteria, were subjected to arbitration by 3 independent emergency physicians and included the presence of significant pre-existing comorbidities; pre-existing cognitive impairment; contraindication to anticoagulation; and ethical objections to therapy. **Results:** There were 1,382 cardiac arrests that occurred during the study period. Of these, 43 were considered eligible for ECLS. After arbitration, 28 would have been offered ECLS therapy. Interrater reliability for the three emergency physician arbitrations was very good. Pairwise kappa was: EB-SB 0.81, EB-MF 0.71, and SB-MF 0.89. **Conclusion:** Using highly selective inclusion criteria, ECPR would be offered to approximately 28 people over 5 years in our institution. Assuming a 40% survival among this group based on published data, this therapy could result in 11 additional individuals alive and neurologically intact over this time period.

Keywords: extracorporeal cardiopulmonary resuscitation, extracorporeal membrane oxygenation, adult cardiac arrest

OP29

Magnetic resonance imaging provides useful diagnostic information following equivocal ultrasound in children with suspected appendicitis

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Introduction: While ultrasonography (US) is the first-line imaging modality in children with suspected appendicitis (SA) across Canada, equivocal studies are not uncommon. Fast Magnetic Resonance Imaging (MRI) may be beneficial as an adjunct imaging strategy without exposing children to harmful ionizing radiation. The objective of this study was to quantify the magnitude of additional diagnostic information provided by fast MRI in children with SA and equivocal US. **Methods:** A prospective cohort study of children aged 5 to 17 years presenting to a tertiary pediatric Emergency Department (ED) with SA. All eligible children underwent initial diagnostic and management strategies according to our local SA pathway, followed by fast MRI using a Siemens Avanto 1.5 Tesla scanner. Images were reported by sub-specialty pediatric radiologists. The primary outcome was the proportion of children with equivocal US studies in which a diagnosis was determined by MRI. Secondary outcomes included the proportion of children with common MRI findings of appendicitis in those with equivocal US and the agreement between MRI results and pathology. **Results:** Fast MRI was performed in 96 children with SA; 55 (57.3%) were female. The mean age was 11.9 years (SD 3.4) and the median Pediatric Appendicitis Score was 6 (IQR 4). US was completed in 93/96 (96.9%). 36/96 (37.5%) underwent appendectomy; the negative appendectomy rate was 5.6%. Of the 53/93 (57.0%) equivocal US, MRI provided further diagnostic information in 40 (75.5%; 11 positive, 29 negative; 13 remained equivocal). MRI findings of appendicitis in children with equivocal US included abdominal free fluid (23, 43.4%), peri-appendiceal fluid (13, 24.5%), intraluminal fluid (10, 18.9%), fat stranding (9, 17.0%), appendicolith (3, 5.7%), abscess (1, 1.9%). None of the children with equivocal US and negative MRI had pathology proven appendicitis. Overall agreement between MRI result and pathology was 75.0% (kappa = 0.57). **Conclusion:** In children with SA and equivocal US, fast MRI can provide emergency and surgical clinicians substantial additional diagnostic information without the risk of ionizing radiation. ED and surgical administration should consider incorporating the use of fast MRI in clinical pathways/guidelines for the evaluation of children with SA. Further economic, feasibility and generalizability studies are warranted.

Keywords: magnetic resonance imaging, appendicitis, child

OP30

The role of universal helmet legislation on bicycle helmet use in adult cyclists

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Introduction: While bicycle helmets are an effective form of protection during bicycle crashes, their use by adult cyclists in Canada is generally low. Despite the apparent benefits of universal (all ages) helmet legislation, most Canadian provinces still have age-specific (child and adolescent) helmet legislation or none at all. This study evaluated bicycle helmet use in adult bicyclists before and after the introduction of provincial legislation in 2002 for ages <18 years and universal municipal legislation in 2006 in St. Albert (SA). **Methods:** Cyclists were observed by trained observers at selected sites in Edmonton (E) and SA during five summer observation periods between 2000 and 2014. Cyclist's age (adult or >65), sex, helmet use, helmet compliance, and companions were recorded during fair weather days on commuter routes, bike paths, schools/campuses, in residential areas, and in parks. Proportions of helmet use by year (pre [2000] and post [2006, 2010, 2013, 2014] legislation) for both SA and E are reported. Adjusted prevalence ratios (PR) are reported with 95% confidence intervals (CI). **Results:** Overall, 8,827 E and 992 SA adult cyclists were observed; more women (38% v. 29%) and adults aged >65 (20% v. 11%) were observed in SA. Prior to legislation, proportions of adults wearing a helmet were low in both E and SA (48%, 58%, respectively). Increased and persistent helmet use was observed in both adult groups after provincial age-specific legislation was introduced (2014 levels: 72% and 87%, respectively). Helmet use for all adults remained higher in SA than E (PR = 1.42; 95% CI: 1.32-1.52). **Conclusion:** From 2000 to 2014, cycling helmet use for adults increased in both communities. Helmet use increased more dramatically in SA after a universal municipal helmet law was implemented four years the provincial children-only law. These results confirm the important role of helmet legislation for adults and the ceiling effect that may limit educational efforts.

Keywords: bicycles, helmets, legislation

OP31

Are patients presenting with hip fracture to LHSC ED treated in accordance with Health Care Ontario's recommended quality-based procedures for hip fracture?

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Introduction: Health Care Ontario released a Clinical Handbook in May 2013 outlining recommended practices and time related goals for the management of patients presenting with hip fracture. Those specific to the emergency department (ED) are that 90% of patients should 1) be seen by a physician within 1 hour, 2) receive an orthopedic consultation within 2 hours, and 3) be admitted within 4 hours spent in the ED. The purpose of this study was to determine if patients presenting with hip fracture to the London Health Sciences Centre (LHSC) EDs are treated in accordance with Health Care Ontario's recommended quality-based procedures for hip fracture. **Methods:** A retrospective medical record review was conducted for all patients with a discharge diagnosis of hip fracture from April 2012 to March 2013. Patients who were transferred from another hospital were excluded. Charts were evaluated for the following date/time points: registration, physician initial assessment (PIA), X-ray ordered, X-ray completed, consult requested, consult arrived, and time left ED. **Results:** 366 patients were included over the one-year study period. The average (SD) age was 79 years (12.1) and 35.5% were male. 44.6% of patients were seen by a physician within 1 hour. The median (IQR) time to X-ray ordered was 46 minutes (20, 115 minutes) and the median (IQR) time to X-ray completed was 97 minutes (65, 175 minutes). 17.9% of patients received an orthopedic consultation within 2 hours. 356 (97.3%) patients were admitted with 8.7% being admitted within 4 hours. **Conclusion:** Patients presenting to LHSC EDs are not being treated in accordance with Health Care Ontario's recommended quality-based procedures for hip fracture. Less than half (44.6%) of patients met the recommended PIA time of 60 minutes, even fewer (17.9%) met the recommended time to consult arrival of 120 minutes, and only a fraction (8.7%) of patients leave the department within the recommended 240 minutes.

Keywords: hip fracture

OP32

Relevance of the national guideline clearinghouse repository for emergency medicine practice

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Introduction: Information relevant to the practice of emergency medicine (EM) is published and stored in various online repositories for clinician access and use. The Cochrane Library is a valuable resource for EM-relevant systematic reviews and meta-analyses (Emond et al., 2002). It is not clear if large international clinical practice guideline (CPG) repositories have similar content relevant to EM practice. The National Guideline Clearinghouse (NGC) is one of the world's largest free-access repositories for medical CPGs worldwide. The goal of this project was to determine the relevance of this repository to EM clinicians. **Methods:** The NGC master list (accessed May 2013, n = 2,509 titles) was screened by 5 reviewers. Relevance of CPGs to EM practice was ranked as follows: "0" = not relevant, "1" = indirectly relevant, "2" = directly relevant, and "3" = essential to EM practice. Evaluators met and reviewed the first half of the list in a consensus Delphi process. Raters then evaluated the second half of the list independently. Simple agreement and kappa weighted statistics were determined on the second half ratings. Results were collated into "essential" and "relevant" lists. **Results:** Of the 2,509 titles screened, 258 CPGs were deemed "essential" and 490 were deemed "relevant" (233 indirectly, 257 directly). Simple agreement was calculated at 67%, and kappa at 0.71. It was qualitatively apparent that the relevance of listed CPGs was differentially important based on regional ED resources and patient population demographics. Emergency medicine specialty associations having CPGs listed in NGC repository included the American College of Emergency Physicians and the Emergency Nurses Association. There were no CPGs listed in the repository from non-North American EM associations, nor any pediatric EM organizations. **Conclusion:** The NGC repository has a substantial number of diverse CPGs important to EM practice. The relevance of CPGs is variable based on geographical issues and patient populations served. This repository can be an initial starting point for EM clinicians looking for practice improvement information, and EM academicians for research opportunities. The database is not fully represented with submissions from global EM associations (e.g., CAEP, Australasia, etc.), nor from any pediatric EM assocations. These organizations should consider submitting CPG products for inclusion in the repository.

Keywords: clinical practice guidelines

OP33

Exploring patients' perspectives on outcomes of emergency department care: a qualitative study

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Introduction: There is recognition of the need for more patient-centred measures of care quality in emergency department (ED) care. In ED care, patient satisfaction questionnaires have been implemented broadly, but they focus on processes of care rather than outcomes. We sought to better characterize patients' perspectives on the outcomes they value and perceive to be most important when seeking ED care. **Methods:** Patients were approached during their ED visit and asked for consent to be contacted by phone. We selected interviewees based on purposeful sampling to maximize diversity of respondents until thematic saturation was reached. We performed semi-structured qualitative interviews of adult patients who were discharged after their ED visit. Questions focused on reasons and goals for seeking ED care, experience and communication with healthcare providers during ED visit, physical and emotional state, and social and physical function since ED visit. Transcripts were analyzed for themes using standard descriptive content analysis techniques and a modified version of the constant comparative method. **Results:** Over two months, 38 phone interviews were completed. Interviewees were diverse in age (Range 20-86 years), income, triage acuity (CTAS 2-5) and reason for ED presentation. Most patients reported being satisfied with their ED visit. However, at ED discharge many reported significant anxiety with regard to the significance of their symptoms or the next steps in investigations, which in many cases impacted their function in the days following the ED visit. Interviewees consistently said that their main outcome expectations included gaining a better understanding of the significance of their symptoms, a plan for follow up, and symptom relief. **Conclusion:** ED care is often focused on excluding dangerous diagnoses, yet patients tended to emphasize the value of understanding the significance of their symptoms, obtaining adequate guidance about how to improve their symptoms and obtaining a management plan. Improving on these patient-centred outcomes for ED patients requires work at the level of both ED clinicians and integration with outpatient care.

Keywords: quality of care, patient-centered research, quality improvement

OP34

The synergistic influence of universal helmet legislation on bicycle helmet use in children and adolescents

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Introduction: Legislating bicycle helmet use is an injury prevention strategy used by many jurisdictions to increase helmet use and prevent head/brain injuries among cyclists. Controversy exists regarding the effectiveness of universal (all age) compared to age-specific legislation applied to cyclists. This study evaluates the changes in bicycle helmet use before and after provincial legislation was introduced in 2002 for ages <18 years and universal municipal legislation in St. Albert (SA) in 2006. **Methods:** Cyclists were observed by trained observers at selected sites in Edmonton (E) and SA during five summer observation periods between 2000 and 2014. Cyclist age (<13, 13-17), sex, helmet use, helmet compliance, and companions were recorded during fair weather days on commuter routes, bike paths, schools/campuses, in residential areas, and in parks. Proportions of helmet use by year (pre [2000] and post [2006, 2010, 2013, 2014] legislation) for both SA and E are reported. Adjusted provenance ratios (PR) are reported with 95% confidence intervals (CI). **Results:** Overall, 4,243 E and 1,152 SA cyclists <18 were observed; a similar proportion of males (71% v. 70%) were observed. More cyclists aged 13-17 (48% v. 39%) were observed in E. Pre-legislation helmet use proportions were low for <13 (57%, 63%) and 13-17 (22%, 10%) year olds in both E and SA, respectively. Over time, helmet use has increased in both cities for both age groups. Adjusted PRs demonstrated helmet use increased and persisted after legislation was introduced for both age groups; however, helmet use remained higher in SA than E for both <13 (PR = 1.14; 95% CI: 1.08-1.20) and 13-17 (1.21; 95% CI: 1.06, 1.38) year olds. **Conclusion:** From 2000 to 2014, cycling helmet use for children and adolescents increased in both communities. Helmet use increased more dramatically in children and adolescents in SA, where a universal helmet bylaw was implemented municipally after a provincial children-only law. These results confirm the important role of universal helmet legislation in increasing helmet use among cyclists.

Keywords: bicycles, helmets, pediatrics

OP35

Effectiveness of asthma action plans for adults with acute asthma discharged from the emergency department: a systematic review

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Introduction: Self-management for patients with asthma is an essential part of achieving and maintaining asthma control and has been shown to improve long-term outcomes. Asthma Action Plans (AAP) are a set of instructions provided to patients to manage their asthma by adjusting medications based on symptoms or peak flows monitoring. While numerous guidelines recommend every patient with asthma be prescribed an AAP, studies indicate few emergency department (ED) patients have written AAPs. The objective of this review is to examine the effectiveness of AAPs provided to adults in the ED to prevent relapses following acute asthma presentations. **Methods:** A comprehensive search of the literature was conducted including nine different databases (e.g., MEDLINE, EMBASE and CINAHL). Randomized controlled trials (RCTs) or controlled clinical trials (CCTs) conducted in the ED in which the intervention involved the provision of an AAP for asthma exacerbations were eligible. Two independent reviewers using standardized inclusion and exclusion criteria assessed the articles for inclusion as well as conducted quality assessment using the Cochrane risk of bias (RoB) tool. Pooled odds ratios (OR) with 95% confidence intervals (CI) under a random effects model; tests of heterogeneity (I^2) were calculated. Fidelity of the different components of the studies' interventions was assessed using the Treatment Fidelity Assessment Grid. **Results:** From the 518 citations, three studies were included (two published and one unpublished). Studies reported outcome data within six months of ED discharge. The RoB was "low" for two studies and "high" for one study. There was considerable diversity in terms of design, fidelity and outcomes in the included studies. The provision of an AAP in the ED was statistically significant in reducing relapse rates within six months (OR = 0.52; 95% CI: 0.28, 0.95); heterogeneity was low (I^2 = 6). **Conclusion:** Although only a small number of studies were identified and intervention variability was identified, the existing literature supports the provision of AAPs to adults discharged from the ED with acute asthma to reduce relapse within six months. EDs should explore ways to adopt this strategy.

Keywords: asthma, action plans, relapse

OP36

Prospective clinical validation of the Ottawa COPD risk scale

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Introduction: The Ottawa COPD Risk Scale (OCRS) was previously derived to identify ED COPD patients at high risk for serious adverse events (SAE) and consists of 10 criteria from history, examination, and bedside tests (CMAJ 2014). We sought to prospectively and explicitly validate the performance of OCRS when applied by ED physicians to a new patient population. **Methods:** We conducted a prospective cohort study and enrolled consecutive adults with acute exacerbation of COPD in 6 tertiary care hospital EDs. Patients were evaluated by physicians for the 10 OCRS criteria which were recorded on a data form: 1) History - a) Coronary bypass graft, b) Peripheral vascular disease intervention, c) Intubation for respiratory distress; 2) Examination - a) Heart rate on ED arrival > 110, b) Too ill to ambulate after ED treatment (SaO2 < 90% or HR > 120); 3) Investigations - a) ECG has acute ischemic changes, b) Chest x-ray has any pulmonary congestion, c) Hemoglobin < 100 g/L, d) Urea > 12 mmol/L, e) Serum CO2 > 35 mmol/L. Patients were followed for 30 days and the primary outcome, SAE, was defined as any of: death within 30 days, admission to monitored unit, intubation, non-invasive ventilation, myocardial infarction, or relapse back to the ED within 14 days followed by hospital admission. Data analyses included calculation of sensitivity, specificity, and potential impact on hospital admission. **Results:** We enrolled 1,415 patients with these characteristics: mean age 70.6 years, female 51.2%, arrival by EMS 56.8%, and admitted to hospital 45.0%. SAEs occurred in 153 (10.8%) cases (13.7% in those admitted and 8.5% in those discharged from the ED): death (28), NIV/intubation (62), MI 5, monitored unit (45), major procedure (3), relapse with admission (65). Comparing the potential performance of OCRS to that of actual practice, sensitivity for SAE was 77.1% v. 56.9%; specificity was 40.6% v. 56.6%; admission rate was 61.3% v. 45.0%. Physicians indicated discomfort with use of the scale for only 13.4% of cases. **Conclusion:** OCRS demonstrated much better sensitivity for SAE compared to current practice, excellent stratification of risk, and good acceptance by physicians. This risk scale has been validated and can now be used to estimate medical risk and help with patient disposition decisions. This should lead to a decrease both in unnecessary admissions and in unsafe discharge decisions for ED COPD patients.

Keywords: risk stratification, pulmonary, safety

OP37

Comfort with geriatric emergency medicine competencies: a survey of Canadian emergency medicine residents

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Introduction: The elderly patient population (>65 years) represents a large and complex sub-group seen in emergency departments (EDs), and emergency physicians (EPs) report a lack of focused education about their care. In 2010, Hogan et al. outlined geriatric emergency medicine (GEM) training competencies, a minimum set of behaviorally based performance standards for the care of older patients. The purpose of this survey is to establish the extent to which Canadian EM trainees feel comfortable with those competencies, and to determine how UME and PGME programs are supporting trainees in their development. **Methods:** First year (PGY-1) and fifth year (PGY-5) postgraduate residents at Canadian universities were invited to participate in an eight-item, online survey to determine resident comfort level regarding different GEM clinical scenarios. Each scenario was designed to illustrate one domain of GEM competence and residents were asked to rate their comfort with managing each scenario. Participants were also asked about the site of their UME or PGME, and the nature and extent of geriatric training they had received to date. **Results:** We achieved a 77% response rate to our survey (88% of PGY-1s and 64% of PGY-5s). None of the PGY-1s and 34% of PGY-5s described themselves as comfortable with all 8 GEM competency domains. The mean number of competency domains with which residents were comfortable was 1.26 for the PGY1s and 6.05 for the PGY5s. There was direct correlation between the variety of focused geriatric teaching and self-reported comfort with GEM. **Conclusion:** This first investigation of comfort with GEM by future EPs provides evidence of a concerning lack of comfort with a population that will likely represent the bulk of patients seen over their careers. It seems unlikely that an EM program would be satisfied if only one-third of its graduates reported comfort with all the principle domains of trauma or resuscitation, yet our results suggest that only one-third of Canadian PGY5s enter the work force fully comfortable with GEM. Comfort with this population increases during the residency years, however, even after completing 3 or 4 years of UME, no entering EM resident reported stage-appropriate comfort. Our findings suggest that comfort level increases directly with exposure to focused geriatric teaching both in UME and PGME, and leads us to call for an increase of such teaching at both levels.

Keywords: geriatric emergency medicine, residency education, competency-based medical education

OP38

Prospective study to revise the Ottawa Heart Failure Risk Scale

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Introduction: We previously developed the Ottawa Heart Failure Risk Scale (OHFRS) to assist physicians in making disposition decisions for acute heart failure (AHF) patients in the emergency department (ED). Our objective was to prospectively and clinically evaluate OHFRS in a new patient population and to improve upon it by re-evaluating predictor variables and developing a more concise model. **Methods:** We conducted a prospective cohort study in 6 tertiary hospital EDs and enrolled adult patients presenting with shortness of breath due to AHF. Patients were evaluated for the 10 OHFRS clinical and laboratory criteria and then followed for 30 days. The primary outcome, serious adverse event (SAE) was defined as any of: death within 30 days, admission to monitored unit, intubation, non-invasive ventilation, myocardial infarction, or relapse back to the ED within 14 days resulting in hospital admission. We performed logistic regression analyses to create the revised model. **Results:** We enrolled 1,100 patients with mean age 77.7 years, male 53.1%, and initially admitted 57.2%. SAEs occurred in 170 (15.5%) cases (19.4% in those admitted and 10.2% in those discharged from the ED). With logistic regression analyses, we revised the OHFRS model to consist of 6 elements from history, examination, or investigations: 1) Troponin >5x Upper Reference Level, 2) pC02 >60mmHg OR Serum C02 >35 mmol/L, 3) IV nitrates given in 1st hour, 4) Urea >12 mmol/L, 5) On anti-arrhythmic (amiodarone, sotalol, propafenone), and 6) Fails re-assessment 2-6 hours after ED treatment. The incremental risk of SAE varied from 4.8% for a score of 1, to 76.0% for a score of 7. Discrimination between SAE and no SAE cases was good with an area under the ROC curve of 0.72 (95% CI 0.67-0.76). There was good calibration between the observed and expected probability of SAE and internal validation showed the risk scores to be very accurate across 1,000 replications using the bootstrap method. **Conclusion:** We have revised the OHFRS tool which now consists of 6 simple variables and

which estimates the short-term risk of SAEs in AHF patients. The revised OHFRS should help improve and standardize admission practices, diminishing both unnecessary admissions for low-risk patients and unsafe discharge decisions for high-risk patients. This will ultimately lead to better safety for patients and more efficient use of hospital resources.

Keywords: congestive heart failure, clinical decision making, safety

LO01

Treatment of post-intubation hemodynamic instability by Canadian emergency medicine and critical care medicine physicians

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Introduction: Post-intubation hemodynamic instability (PIHI) is a physiological phenomenon that is common in the emergency medicine (EM) and critical care medicine (CCM) patient populations, and may be associated with poor patient outcomes. Despite this, little is known about how physicians respond to PIHI in practice. We present the results of a nationwide survey of Canadian EM and CCM physicians. **Methods:** A survey exploring physician preferences of clinical thresholds to treat hemodynamic instability in three clinical scenarios was developed by the investigative team, and distributed nationally to Canadian physicians that specialize in emergency medicine and critical care. Respondents answered questions that ranged on a 5- or 6- point Likert scale. **Results:** A total of 1758 physicians were contacted, and 882 (50.2%) completed the survey (711 [80.6%] were EM physicians, 171 [19.4%] were CCM physicians). The most common thresholds for physicians to treat PIHI were a systolic blood pressure (SBP) of 90 mmHg (53.9% of respondents) and a mean arterial pressure (MAP) of 60 mmHg (56.7% of respondents). Overall, most physicians indicated that they would treat PIHI within 1-2 minutes (79.7%), with 57.1% choosing to treat "immediately". Of the 3 clinical scenarios assessed, clinicians indicated that they would accept a lower SBP in the congestive heart failure (CHF) scenario compared to either the trauma scenario (OR = 1.38; CI: 1.14, 1.15, $P < 0.001$) or the sepsis scenario (OR = 1.41; CI: 1.15, 1.74; $P < 0.001$), yet there was no difference in the MAP threshold. Clinicians were more likely to rapidly treat PIHI in both the sepsis (OR = 1.27; CI: 1.04, 1.53; $P < 0.001$) and the trauma scenarios (OR = 1.88; CI: 1.52, 2.32; $P < 0.001$) compared to the CHF scenario. When assessed by specialty, CCM physicians were more likely to treat PIHI immediately (OR = 1.35; CI: 1.10, 1.67; P = 0.005%) yet tolerate a lower SBP (SBP treatment threshold 80 mmHg, OR = 0.679; CI: 0.54, 0.85, P = 0.001) and MAP (MAP treatment threshold 60 mmHg, OR = 0.282; CI: 0.21, 0.37, $P < 0.001$). **Conclusion:** The results of this survey suggest that the PIHI thresholds for intervention in Canadian resuscitation practice are a SPB of 90 mmHg or a MAP of 60 mmHg, and that most physicians would treat PIHI immediately. However, both patient illness and physician specialty are important variables.

Keywords: post-intubation hemodynamic instability, endotracheal intubation, practice patterns

LO02

Improving severe sepsis care with a Collaborative Emergency - Critical Care Pathway

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Introduction: The 2012 Surviving Sepsis Guidelines introduced evidence based quality bundles to optimize early resuscitation. We developed and implemented a collaborative ED-Critical Care sepsis pathway to optimize the delivery of sepsis care. We then sought to assess performance in quality measures of emergency department (ED) sepsis care including ordering of appropriate antibiotics, lactates, and crystalloid, for the sepsis patients admitted to the ICU. **Methods:** A severe sepsis pathway at a single site was introduced in September 2013 to identify septic patients early and to initiate effective treatment in the ED with timely ICU consults. A retrospective chart review of all ED patients admitted to ICU with pneumonia, sepsis or urosepsis was conducted pre- and post-implementation. Patients from September 2012 to 2013 (pre) were compared to September 2013 to December 2014 (post). Outcomes were time-based from triage and mortality. **Results:** 180 cases met inclusion criteria (2012-2013, n = 86; 2013-2014, n = 94). Improvements were seen in (mean, SD): EPs ordering initial lactate (56% pre v. 85% post), time-to-first lactate (1:50 ± 1:40 v. 1:38 ± 1:58 hr) and serial if initial >4mmol (5:04 ± 2:53 v. 3:34 ± 1:51 hr); EPs ordering first antibiotics (65% v. 93%), time-to-antibiotics (2:51 ± 2:35 v. 2:33 ± 2:12 hr); time-first-fluids (1:33 ± 2:24 v. 1:28 ± 1:42 hr), receiving 3L fluids (35% v. 67%) and time-to-3L fluids (5:19 ± 4:10 v. 4:28 ± 3:21 hr); and ED LOS (10:20 ± 8:39 v. 9:39 ± 10:56 hr). Time-to-admit (5:07 ± 3:04 v. 5:10 ± 2:56 hr) was quite similar in the two cohorts, however mortality (20% v. 26%) regressed. **Conclusion:** Developing an interdepartmental severe sepsis pathway has led to numerous improvements in quality measures of ED sepsis care for patients admitted to the ICU. Mortality was not improved, which may reflect differences in disease severity. Ongoing quantitative feedback to ED physicians and administrators was a vital component of changing practice. Opportunities for further improvements may be attained through targeted interdepartmental processes with patient flow.

Keywords: sepsis, quality indicator, critical care

LO03

Carotid flow time as a predictor of volume responsiveness

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Introduction: Fluid resuscitation is one of the cornerstones of shock treatment. However, accurately determining fluid status and fluid responsiveness are difficult tasks without the use of invasive (pulmonary artery catheter [PAC]), expensive (arterial pulse contour analysis) or technically difficult methods (echocardiography for aortic volume time index). Measurement of carotid flow times (CFT) using point-of-care ultrasound (POCUS) has recently been proposed as a non-invasive method of determining fluid responsiveness. The purpose of this pilot study is to determine the accuracy of CFT in detecting changes in cardiac output (CO) as measured by a PAC. **Methods:** We recruited a convenience sample of post-operative cardiac surgery patients with routine PACs in place. We measured baseline CO in triplicate and changes in CO after a 60 second passive leg raise test (PLRT). At the same time, baseline CFT and changes after PLRT were recorded using POCUS. The ultrasonographer was blinded to all CO readings. Patients were deemed volume responsive if there was a 10% increase in the CO or CFT after the PLRT. **Results:** We enrolled 9 patients. We excluded one patient from the study due to inaccurate PAC measurements and analyzed data on 8 patients. Three patients were deemed volume responders with both the PAC and the CFT demonstrating a change of at least 10% between the pre and post PLRT. Five patients showed no evidence of volume responsiveness after PLRT. This yields a sensitivity and specificity of 100% and 100% (95% CI are 31.0-100 and 46.3-100, respectively). Of the three volume responders, the average change in the CO was 24.77% and CFT change was 20.33%. **Conclusion:** Data is

very preliminary, but in a small cohort of post cardiac surgery patients we were able to demonstrate that CFT accurately predicted volume responsiveness. Further patient recruitment is ongoing at this time.
Keywords: volume responsiveness, point-of-care ultrasound, shock

LO04

Practice makes perfect: defining the learning curve for emergency physicians undertaking point-of-care ultrasound for confirming endotracheal tube placement

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Introduction: Unrecognized esophageal intubations are associated with significant patient morbidity and mortality. No single confirmatory device has been shown to be 100% accurate at ruling out esophageal intubations in the emergency department. Recent studies have demonstrated that point-of-care ultrasound (POCUS) may be a useful adjunct for confirming endotracheal tube placement. The purpose of this study is to determine the amount of practice required by emergency physicians to become proficient at identifying endotracheal tube location using POCUS. **Methods:** All emergency physicians and residents from a single academic institution were invited to participate in the study. Participants completed a baseline POCUS interpretation exam followed by a 10 minute web-based tutorial. They were then required to interpret randomly selected POCUS clips of esophageal and endotracheal intubations. If an incorrect response was provided, the participant completed another practice attempt with feedback. This process continued until they correctly interpreted 10 consecutive clips. **Results:** Of the 87 eligible physicians, 66 (75.9%) completed the study. The majority of the participants (54/66, 81.8%) had no prior experience with POCUS for intubation. The mean score on the pretest was 42.9% (SD 32.7%). After the tutorial, 90.9% (60/66) achieved proficiency after one practice attempt and 100% achieved proficiency after two practice attempts. There were six misinterpretations made (6/684, 0.9%), and all six errors were due to tracheal intubations being misidentified as esophageal placements. Overall, participants' interpretations resulted in a sensitivity of 98.3% (95% CI 96.3-99.4%) and specificity of 100% (95% CI 98.9-100%). Scans were interpreted within an average of 4 seconds (SD 2.9 seconds) of the intubation. **Conclusion:** After a brief online tutorial and only two practice attempts, all emergency physicians were able to quickly and accurately interpret ultrasound intubation clips to determine endotracheal tube location. Future studies are needed to validate these findings during real-time intubations.
Keywords: ultrasound, intubation, learning curve

LO05

Do small grants make a difference in the careers of researchers?

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Introduction: CAEP research grants (valued up to $5000) are provided to foster research. However, little is known about the impact of these grants on research careers of recipients. We sought to determine if these grants were associated with future research career success, as well as the opinion of the recipients on the value of this program to junior researchers. **Methods:** In order to measure the career success of grant recipients, we developed a 27-question survey that characterized CAEP grant recipients at the time of award receipt and identified measures of research career success. The survey was distributed up to four times electronically over six weeks. Non-responders were contacted directly by the primary investigator to encourage participation. **Results:** 96 CAEP research award recipients were identified (8 multiple award recipients), with 56 completing the survey (response rate of 58%). At the time of grant receipt, 50% (n = 28) were residents, 26 (46% [n = 26]) were attending physicians (including fellows and staff), and 2 (4% [n = 2]) received awards as both a resident and post-residency. At survey completion, 84% of CAEP research grant recipients had academic appointments, and 47% indicated that they had research positions. Forty-seven (84%) had been senior or first author on a manuscript, with a mean of 16 ± 27 manuscripts published. The attending recipients were more advanced in their career based on years post-MD (residents graduated in 2004 ± 6 years and non-residents graduated in 1996 ± 8 years), and had published twice as many manuscripts as senior authors (22 ± 35 v. 9 ± 12). The most common journal for research publication was *CJEM* (63%), and 9 (17%) had published research in other top-tier journals, including *NEJM*, *Lancet*, and *JAMA*. The majority of CAEP research award recipients indicated that the CAEP funds had a moderate to high impact on the completion of their projects (87%). Overall 60% indicated that the grant had a moderate to high impact on their career, whereas 88% of attending physicians indicated that the impact was moderate to high. 87% of CAEP research award recipients indicated that they are currently active researchers and 96% of respondents would encourage others to apply to the program. **Conclusion:** Despite the relatively small size, CAEP grants have supported researchers on clinically relevant projects and have had a positive impact on their research career success.
Keywords: grant awards, research funding, survey

LO06

CRicothryoidotomy In-situ simulation Curriculum (CRIC) improves surgical airway performance in emergency medicine residents

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Introduction: Emergency medicine (EM) residents must acquire the skill to perform a cricothyroidotomy, yet few real-life training opportunities exist. In-situ simulation (ISS), a training technique that occurs in the actual emergency department (ED), is a promising method to promote environmental fidelity for rare procedures. The aim of this study was to evaluate cricothryoidotomy performance by EM residents after completion of a curriculum consisting of deliberate practice and ISS. **Methods:** Twenty residents were enrolled from a Canadian Royal College EM residency program. The curriculum consisted of 3 sessions designed to enhance cricothryoidotomy performance by percutaneous Seldinger technique. Session 1 established participant baseline technical skill during a high-fidelity simulation scenario. Session 2 consisted of didactic teaching followed by deliberate practice with focused expert feedback using a task-training manikin. Session 3 was an unannounced, high-fidelity ISS, during an ED shift, two weeks later. The primary outcome was the difference in skill performance time between session 1 and session 3. ISS feasibility was evaluated based on total ISS time, impact on patient care due to resident absence and post-course surveys. **Results:** Cricothyroidotomy performance times improved significantly from session 1 to 3 (mean difference 59 seconds, $p < 0.0001$). The proportion of residents who completed the procedure in <100 seconds increased from session 1 to session 3 (mean difference 52%, $p = 0.0016$). Performance times did not differ significantly between junior (PGY1-2) and senior (PGY3-5) residents ($p = 0.99$). Post course survey responses were favourable for both the overall curriculum experience and the unannounced ISS. The mean duration of Session 3

was 17 minutes. Absence from clinical duties during ISS participation resulted in no adverse patient events according to supervising staff physicians. Two ISS sessions were postponed due to critically ill patients in the ED and one ISS was cancelled due to resident illness. **Conclusion:** This novel curriculum, which integrated deliberate practice and ISS, resulted in a significant improvement in cricothyroidotomy performance time among EM residents. These improvements were observed across all PGY levels. ISS proved to be a feasible and effective technique for realistic and more frequent cricothyroidotomy training in an EM residency.

Keywords: in situ simulation, cricothyroidotomy, competency-based medical education

LO07

Assessment of emergency medicine residents: a systematic review

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Introduction: With the ACGME Milestones project and Competency By Design (CBD), we are moving towards competency-based medical education (CBME). The evolution of assessment methods in residency programs, including emergency medicine (EM), is already underway. To understand the degree of restructuring and investment of resources, we must first describe the current state assessment methods used in EM programs. Our goal was to systematically gather and summarize publications on assessment (and evaluation) methods used in EM residency programs, following the launch of CanMEDS. **Methods:** We searched MEDLINE, EMBASE, PsycInfo and ERIC from Jan 2004 thru June 2014, with MeSH terms such as "assessment", "residency" and "emergency medicine". Studies were limited to English language and geography (North America, Europe, Australia/New Zealand). We included studies on EM residents that reported a co-primary outcome (excluding summary/consensus reports). Two independent reviewers screened titles and abstracts for suitability and reviewed all full text studies for inclusion and data abstraction. Our co-primary outcomes were 1) type of assessment used and 2) number of assessments per resident. A secondary outcome was the cost of the assessment system. Demographic data and outcomes of interest were summarized using descriptive analyses. **Results:** The search returned 879 articles. After exclusion based on title and abstract, 137 articles went to full text review; 72 met our inclusion criteria. Thirty-four studies (47.2%) were pilot projects and 18 (25.0%) described fully implemented resident assessment methods or programs. In total, twenty-three categories of assessment methods were described, most commonly simulation-based assessments (27.8%), written exams (29.2%) and direct observation (22.2%). Thirty-nine studies described frequency of resident assessment, ranging from once in residency to daily. The most common frequency was once annually (n = 4) followed by twice per rotation (n = 3) and 4 times annually (n = 3). No studies reported cost estimates. **Conclusion:** EM resident assessment is most often uses simulation or direct observation, on an annual basis. Few reports of comprehensive programmatic assessments exist. Our findings highlight the need for program-level reports of existing assessment tools, curricula and cost, which, as we move towards CBME, will be essential to facilitating the spread of local innovations and improving resident assessment methods.

Keywords: emergency medicine, assessment, residency

LO08

A qualitative exploration of how to integrate point-of-care ultrasonography training into the emergency medicine clinical clerkship

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Introduction: Point-of-Care Ultrasonography (PoCUS) is a core competency of Canadian emergency medicine residency training programs. As more academic centres introduce medical students to PoCUS, we sought to explore the attitudes, perceptions, and beliefs of physicians and students regarding the incorporation of PoCUS into medical school teaching. **Methods:** We conducted in-person semi-structured qualitative interviews with emergency medicine (EM) staff physicians and third-year clerkship medical students at the University of Ottawa, where PoCUS is currently a component of the EM clerkship. We made multiple attempts to recruit participants. Questions were modeled after the Theory of Planned Behaviour to elicit participants' attitudes, perceptions, and beliefs surrounding learning and teaching PoCUS during clerkship. Transcripts of interviews were coded according to Conventional Content Analysis to identify themes. Two researchers independently coded all transcripts, and conflicts were resolved by consensus. **Results:** Eight EM staff physicians and six medical students were interviewed. Attitudinal advantages of incorporating PoCUS into the undergraduate clerkship included: 1) enhanced learning; 2) early exposure to PoCUS; and 3) engagement of both teacher and learner. Stakeholders perceived to approve of incorporating PoCUS into the clerkship curriculum included academic figureheads, ultrasonography leaders, and peers (for both teachers and learners). Those who were perceived to disapprove included stakeholders interested in departmental flow. Facilitators to better integration of PoCUS included: 1) setting appropriate objectives; 2) teaching a PoCUS application that is transferrable to multiple specialties; 3) high quality teaching methods; and 4) being conscientious of introducing PoCUS on shift. Barriers included: 1) a lack of confidence in one's skills (for both teacher and learner); 2) a feeling of time pressure on shift; and 3) a lack of equipment or preceptors. Students described a perceived lack of indications to perform PoCUS on shift, and physicians felt the skill may be overwhelming for students (although students disagreed). **Conclusion:** We interviewed EM staff physicians and third-year medical students, and identified actionable items to aid in the successful integration of PoCUS into the EM clinical clerkship.

Keywords: point-of-care ultrasound, medical students, education

LO09

Management of acute opioid withdrawal in the emergency department with buprenorphine/naloxone: an assessment of emergency physician knowledge and practice

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Introduction: Canadian emergency departments (ED) are on the front lines of a rising opioid epidemic. Current ED treatment of acute opioid withdrawal (AOW) is inadequate. Many patients leave the ED symptomatic and more apt to relapse to avoid withdrawal. Buprenorphine/naloxone, an opioid agonist-antagonist used in the maintenance treatment of opioid dependence, is a safe and effective treatment for AOW, yet is not widely accepted among emergency physicians (EP). We sought to assess EP knowledge and practice regarding AOW prior to the introduction of buprenorphine/naloxone into hospital formulary. **Methods:** An inter-professional ED team developed a 24-question survey encompassing multiple choice and Likert scale questions. All EPs in an academic inner city emergency department as of October 2014 were eligible. Paper copies were distributed at two staff meetings over one month. **Results:** 27 surveys were returned (84%). Most EPs (89%) have treated at least one case of AOW in the past 3 months. Management of AOW includes clonidine (81%), benzodiazepines (69%) and NSAIDs (42%), with referral to the hospital addictions team (85%) or

detox (52%). EPs believe AOW is not life threatening (70%) and are unfamiliar with standardized measurements of severity (78%). While 74% agreed buprenorphine/naloxone is effective, EPs are unaware of the requirement to be in moderate withdrawal prior to initiation (89%), ceiling effect for respiratory depression (89%) and risk of precipitated withdrawal (45%). Barriers to buprenorphine/naloxone use in the ED were uncertainty with indications for use and prescribing nuances (89%) and clinical volume and patient acuity (63%). **Conclusion:** Buprenorphine/naloxone is an effective medication to treat AOW, yet it is not standard of care; likely due to uncertainty around indications, dosing, and side effects. A knowledge translation strategy and tools are being developed to accompany the introduction of buprenorphine/naloxone into the ED and the hospital formulary to support high quality of care for our vulnerable patients.

Keywords: addiction medicine, opioid, survey

LO10

A traumatic tale of two cities: Does EMS level of care and transportation model affect survival in trauma patients transported to Level 1 trauma centres?

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Introduction: Emergency medical services (EMS) are the major contributor to trauma care in the prehospital setting. The methods of transport and levels of care provided to trauma patients before arriving in hospital varies across systems in different regions. Atlantic Canada provides a natural experiment between two provinces with similar demographics but different EMS systems. Nova Scotia (NS) operates an Advanced Emergency Medical System (AEMS) which includes advanced care paramedics and helicopter services. In contrast, during the study period, New Brunswick (NB) had a Standard Emergency Medical System (SEMS) which included primary care paramedics in a ground transport network of multi-level trauma centres. We sought to determine if there was a difference in overall patient survival rates between the two systems, as well as whether being treated in an AEMS improved survival in patients with more severe injuries (ISS > 24). **Methods:** This prospective observational cohort study examined trauma patients (age >15 years) who suffered a kinetic injury (Injury Severity Score > 12) for whom EMS was called and who were transported directly to a level 1 trauma centre in NB or NS between April 1, 2011 and March 31, 2013. Survival to hospital and survival to discharge or thirty days were the primary endpoints. 101 cases met inclusion criteria in NB and were compared to 251 cases in NS. Hypothesis testing was conducted using Fisher's exact test to compare the results data extracted from the two registries. **Results:** Baseline demographics were similar between groups. Overall, there was no difference in survival to hospital when patients were treated by an AEMS (92%, n = 232) compared to patients treated by a BEMS (95%, n = 96) respectively (p = 0.49). Furthermore, when comparing patients with more severe injuries (ISS > 24) there was no significant difference in survival. When treated in an AEMS 55% (n = 44) of severely injured patients survived to hospital compared to 55% (n = 18) of severely injured patients treated in a SEMS (P = 1.00). **Conclusion:** Overall survival to hospital was the same between advanced and standard Canadian EMS systems. As numbers included are low, individual case benefit cannot be excluded. These results support the need for case level data sharing between provinces to permit analysis of potential confounding variables.

Keywords: trauma, emergency medical services, systems

LO11

Characteristics, management, outcomes and short-term adverse events of hypoglycemic patients treated by paramedics

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Introduction: In Ontario, paramedics are required to transport all patients to hospital. There currently is no prehospital treat-and-release protocol for hypoglycemia, and the safety of this practice remains unclear. The objectives of this study were to describe the characteristics, management and outcomes of hypoglycemic patients treated by paramedics, and determine the predictors of repeat 911 or emergency department (ED) access within 3 days of initial prehospital event. **Methods:** We performed a health record review of ambulance call reports (ACR) and ED records over a 12-month period. We queried prehospital databases to identify cases which included all adult patients (≥18 yrs) with a prehospital glucose reading of <4.0mmol/L and excluded palliative care and cardiac arrest patients. We developed and piloted a standardized data collection tool and obtained consensus on all data definitions before initiation of data extraction by a trained investigator. Data analyses include descriptive statistics, χ^2, t-tests, and logistic regression with adjusted odds ratios (AdjOR). **Results:** There were 997 patients with the following characteristics: mean age 55.7, male 52.2%, type1 diabetes 12.6%, on insulin 46.1%, initial glucose 2.7, from home 56.3%. They were treated by an Advanced Care Paramedic 80.0%, received IV D50 38.0%, IM glucagon 18.3%, PO complex carbs/protein 26.6%, and accepted transport to hospital 69.4%. Of those transported, 150 (23.2%) were admitted and 9 (1.4%) died in the ED. Overall, 71 patients (7.2%) had repeat access to 911/ED, and of those 19 (26.7%) were related to hypoglycemia. Patients from nursing homes were most likely to be transported (AdjOR 4.6; 95%CI 2.1-10.0), in comparison to those taking insulin or tolerating PO complex carbs/protein (AdjOR 0.21; 95%CI 0.14-0.31 and 0.19; 95%CI 0.13-0.27). Patients on insulin were also less likely to have repeat access to 911/ED (AdjOR 0.5; 95%CI 0.3-0.9). This was not impacted by initial (or refusal of) transport (AdjOR 1.4; 95%CI 0.7-2.8). **Conclusion:** It appears those taking insulin and able to tolerate PO complex carbs/protein in the field are more likely to refuse transport to hospital, and that such initial refusal of transport is not associated with later activation of 911 or an ED visit. These findings suggest there may be a place for a treat-and-release strategy which could greatly influence paramedic practice.

Keywords: emergency medical services, hypoglycemia, patient safety

LO12

Morbidity and mortality associated with pre-hospital "lift assist" calls

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Introduction: When an individual requires assistance with mobilization, emergency medical services (EMS) may be called. If a patient does not receive treatment on scene and is not transported to hospital for medical attention, these are referred to as "Lift Assist" (LA) calls. It is possible this need for assistance represents a subtle-onset of a disease process or decline in function. Without recognition or treatment, the patient may be at risk for recurrent falls, repeat EMS visits or worsening illness. The objective of this study was to determine the 14 day morbidity and mortality associated with LA calls. **Methods:** All LA calls

from a single EMS agency were collected over a one-year study period (January - December 2013). These calls were linked with hospital records to determine if LA patients had a subsequent visit to the emergency department (ED), admission, or death within 14 days. **Results:** There were 42,055 EMS calls in the study period; 808 (1.9%) were LA calls. These calls were for 428 individuals; 313 (73.1%) patients had 1 LA, and 115 (26.9%) patients had >1 LA call. The number of LA calls per patient ranged from 1 to 34. There were 169 (20.9%) ED visits, 93 (11.5%) hospital admissions and 9 (1.1%) deaths within 14 days of a LA call. Of those patients admitted to hospital, 71 (76.3%) were admitted under general medicine and median (IQR) hospital length of stay was 7 (4, 15.5) days. **Conclusion:** LA calls are associated with short-term morbidity, mortality and considerable use of EMS and hospital resources. These calls may be early indicators of problems requiring comprehensive medical evaluation. Further research is required to identify predictors associated with higher risk of morbidity and mortality in LA patients.

Keywords: lift assist

LO13

'False leads': derivation and validation of a rule to minimize false-positive prehospital cath lab activations for STEMI

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Introduction: Prehospital ECGs (phECGs) serve as the main screening tool for identifying STEMIs. In the absence of telemetry or personnel trained in ECG interpretation, computerized phECG interpretation leads to excessive false-positives. This impedes reliable early activation of reperfusion centers by EMS. Objective: Derive and validate a rule to reduce the number of false-positive STEMI activations. **Methods:** This was a retrospective analysis of cases from a phECG STEMI database that included all cases of phECG with a computer interpretation of '***ACUTE MI***'. For the derivation cohort, consecutive cases were collected over two 6-month periods. Trained data reviewers abstracted data from the electronic charts. All phECGs were reviewed separately using standardized definitions by two physicians for determination of false-positive status, and disagreements were resolved by consensus. Logistic regression analysis was used to identify the independent variables for derivation of the rule, with a predefined goal of minimizing the number of false-positives. Once derived, we tested the rule on a separate cohort of consecutive phECGs. **Results:** Among the 654 cases in the derivation cohort, 47% were false-positive STEMIs. After logistic regression analyses, selection of the following elements minimized false-positives: HR < 120, presence of chest pain of suspected cardiac origin, presence of interpretable ST segments in all leads, and absence of significant baseline wander or pacemaker spikes. Application of this rule in the derivation cohort led to a decrease in false-positives to 17% of the total cohort, at the expense of labelling 14% of STEMI cases as false-negatives. In the validation cohort, we evaluated 386 phECGs, with 42% false-positive STEMIs. Application of the rule brought the false-positives down to 8%, while 26% were false-negative. **Conclusion:** Application of this prediction rule in cases of phECGs with computer-interpretation of STEMI allows for prehospital activation of reperfusion centers with a much lower number of false-positives. However, this comes at the expense of a higher false-negative rate. Therefore even if prehospital activation is not indicated as per this rule, all patients with '***ACUTE MI***' should be transported urgently to centers capable of offering reperfusion.

Keywords: STEMI, prehospital care

LO14

The relationship between frequent emergency department visits and mental health: a retrospective study for the burden of mental illness among emergency department super users

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Introduction: While emergency departments (ED) generally see patients with urgent and emergent complaints, some patients seek ED several times every year. Our purpose was to define frequent users of ED into categories, and to correlate the number of visits and mental and behavioral health diagnoses (MBHD). Our hypothesis was that there is a higher prevalence of mental health disorders among patients who visit ED more frequently. **Methods:** This retrospective study used de-identified electronic administrative data from Sunrise Emergency Care System and Clinibase. Data from all adult ED sites in Calgary (FMC, PLC, RGH, and SHC), and dating from August 2013 to July 2014 were included. We analyzed the data using descriptive statistics and means. Based on the number of annual visits at any site, patients were categorized as infrequent users (≤1 visit), frequent users (FRU) (2-4), highly-frequent users (HFRU) (5-9), and super-users (SU) (≥10). We used ICD-10 codes for each visit to determine the top 10 diagnoses for each category. MBHD codes included diagnoses related to psychiatric illness and substance abuse. **Results:** A total of 304,737 visits for 223,632 patients (18.6% of Calgary's population) occurred during the study period. Of all ED users, more than half used the ED more than once (52.6%), comprised of 40.8%, 8.5%, and 3.3% for FRU, HFRU, and SU respectively. Unspecified abdominal pain was the top diagnosis overall (21%), as well as in the FRU (21%) and HFRU (22%). However, MBHD was the top diagnosis in the SU (28%). The ranking of MBHD rose from 10^{th}, to 5^{th}, to 1^{st} from FRU to HFRU to SU, accounting for 4%, 9%, and 28% of diagnoses respectively. We observed a positive correlation between the absolute number of patient visits per year and the number of patient's visits with MBHD (Pearson $r = 0.496$; $p < 0.001$). **Conclusion:** Over half of the ED users visit ED more than once per year, and majority of them visit ED 2-4 times per year. MBHD is more commonly seen in patients who visit ED more frequently. Abdominal pain is the most common reason for visiting ED overall, and in the FRU and HFRU. However, MBHD is the most common diagnosis in the SU. This indicates that interventions to impact super-users require a focus on mental health, whereas other high frequency users might benefit from teaching and better follow up of GI complaints.

Keywords: emergency department, frequent users, mental health

LO15

Prevalence and survival impact of bystander cardiopulmonary resuscitation in sudden cardiac arrest victims treated by a large, urban emergency medical services system in North America

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Introduction: Bystander cardiopulmonary resuscitation (CPR) is oft cited as a contributor to neurologically intact survival from out of hospital sudden cardiac arrest (OOH SCA). Ardent efforts continue in hopes of training more laypersons in CPR, producing higher prevalence of bystander CPR in OOH SCA events, and realizing greater success in neurologically intact survival from cardiac arrest. This study's purpose is to analyze demographics, prevalence and survival impact of bystander CPR in two large, urban metropolitan areas of North America. **Methods:** Database query and descriptive analysis utilizing a multiple-variable database

designed for use by medical oversight in a large, urban emergency medical services (EMS) system in North America. The database contains demographic, clinical resuscitation, and outcomes variables on all OOH SCA victims with resuscitation initiated by the study EMS system from January 1, 1993 onward. This study's cohort included all such OOH SCA victims from January 1, 1993 through December 31, 2013. **Results:** In the 21 year period, 20,567 resuscitations occurred. A bystander witnessed the arrest in 8,334 (40.5%) instances. Whether witnessed or not, bystander CPR was started in 7,028 (34.2%) of arrests. There was a downward trend of resuscitations being witnessed by bystanders from a high of 444/827 (53.7%) in 1995 to a low of 394/1232 (32.0%) in 2012. Despite this lower witnessing trend, there was an upward trend of bystander CPR being provided, from a low of 198/788 (25.1%) in 1994 to 472/1187 (39.8%) in 2012, with a high of 455/1028 (44.3%) in 2005. For 12,409 victims in which final outcomes were captured (mid-2000 and forward), bystander CPR was associated with an overall discharge from hospital rate of 694/4475 (15.5%). When compared to those surviving to hospital discharge without bystander CPR of 983/7934 (12.4%), p = 0.000. Using bivariate logistic regression, OR = 1.30 with 95% CI 1.17 - 1.44. Survival with a cerebral performance category score of 1 or 2 was enhanced by bystander CPR as well, bivariate logistic regression yielding OR = 1.65 with 95% CI 1.40 - 1.94. **Conclusion:** In a particularly large cohort of OOH SCA victims, treated by the study EMS system in the over twenty years included, bystander CPR promotes neurologically intact survival with statistically significant results.

Keywords: out-of-hospital cardiac arrest, bystander cardiopulmonary resuscitation, survival

LO16

Can prehospital activation of a "stroke code" decrease time to thrombolysis?

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Introduction: Treatment for ischemic stroke with tissue plasminogen activator (tPA) is effective but time sensitive, and many centres expedite this process with a 'stroke code' protocol. We compared "prehospital" vs. "in-hospital" activation of stroke code to determine if this affected time from emergency department (ED) arrival to tPA administration (door-to-needle time). **Methods:** We conducted a 12-month, prospective cohort study involving Eastern Ontario paramedics and two urban tertiary care stroke centres using similar stroke code protocols. Paramedics used a prompt card to identify a possible acute ischemic stroke, then patched to the closest stroke centre. With paramedic notification, one hospital activated a stroke code immediately. The other deferred until ED physician assessment. We compared continuous variables using Mann-Whitney U Test, and dichotomous variables using univariate logistic regression and chi-square statistics. **Results:** We enrolled a total of 555 patients, with mean age 72.3, male 51.9%, 70.4% stroke code called, and 51.1% with stroke as final diagnosis. At the prehospital activation centre, a total of 130 patients were seen with stroke code called in 94.6%, diagnosis of stroke in 47.7%, administration of tPA in 23.9%, and post tPA life-threatening bleed in 3.2%. At the in-hospital activation centre, a total of 425 patients were seen with stroke code called in 63.1%, diagnosis of stroke in 52.1%, administration of tPA in 24.0%, and post tPA life-threatening bleed in 5.9%. Median door-to-needle time was 41.0 minutes at the prehospital centre and 46.0 minutes at the in-hospital centre (Absolute difference 4.0 minutes; p = 0.1546). Of the 123 prehospital stroke code activations, 62 (50.4%) were diagnosed with stroke compared to 221 (82.5%) of the 268 with in-hospital stroke code activations (Absolute difference 32.1%, p = 0.0001; OR 4.6, 95% CI 2.9 - 7.4). **Conclusion:** Door-to-needle time was slightly faster with prehospital activation. However, it was not statistically significant, and did not reduce rate of tPA administration, post tPA bleed, or survival to discharge. In-hospital physician stroke code activation was less likely to activate a stroke code when a stroke was not present, but the impact of prehospital stroke code activation on hospital resources and personnel needs further study.

Keywords: medical emergencies, emergency medical services, stroke

LO17

A retrospective evaluation of the implementation of a rule for termination of resuscitation in out-of-hospital cardiac arrest

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Introduction: Previous research has created and validated a rule for termination of resuscitation (TOR) in non-traumatic out-of-hospital cardiac arrest (OHCA). This rule identifies patients where ongoing resuscitation would be futile. Little translational research exists regarding the application of TOR, particularly in an environment with both primary and advanced care paramedics. The objective of this study was to determine how often the TOR rule was applied for patients meeting TOR criteria. When TOR criteria were fulfilled but the rule was not applied, we attempted to determine barriers to compliance. **Methods:** This was a retrospective review of patients ≥18 years coded as having a non-traumatic OHCA from Jan - Dec 2013. Data was gathered from 3 EMS agencies in a Regional Base Hospital Program after the implementation of a TOR rule for primary care paramedics in 2012. Patients who had an EMS witnessed arrest, cardiac arrest secondary to trauma, return of spontaneous circulation (ROSC), defibrillation, or a valid do-not-resuscitate form were excluded. Patients who received exclusive care from advanced care paramedics (ACPs) and cases where ACPs arrived prior to the third rhythm analysis were also excluded. When PCPs patched to a base hospital physician for a TOR, and TOR was not granted, the patch recording was obtained to identify the barrier. **Results:** Our search for respiratory and cardiac arrests identified 548 patients. 91 met TOR criteria. Paramedics requested TOR in 82 (90.1%) cases; 66 (80.5%) were granted. Documented reasons for physician TOR refusal included ACPs nearby, the patient had not received epinephrine or the telephone connection was poor. The TOR rule reduced high priority transports by 15.2% during the study period. **Conclusion:** The recently implemented TOR rule has been successfully applied in our local EMS region with few barriers. Appropriate application of TOR for PCPs prevented the futile use of health care resources and unnecessary risk of motor vehicle collision by decreasing the number of high priority transports in a mixed PCP/ACP environment.

Keywords: termination of resuscitation

LO18

Does prehospital online medical oversight impact patient care in a Canadian EMS system?

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Introduction: In Ontario, paramedics access online medical oversight via telephone patches for cases where mandatory patch points are included in standard provincial medical directive(s). Paramedics may also patch for further orders based on a patient's condition. Little is known regarding the impact of online medical oversight on paramedic care. We sought to

estimate the proportion of cases in which online medical oversight results in a change in patient management versus the proportion of cases where the physician simply affirms paramedic requests. **Methods:** We retrospectively reviewed all recorded online patches in a single Canadian EMS system for a 1-year period ending December 31, 2013. Each patch was assessed for concordance between the physician's order/advice and documentation on the ambulance call report (ACR). Each call was categorized as to medical directive, whether mandatory or discretionary, and whether the physician agreed with the paramedic request, denied the paramedic request, offered another mode of management, or aided the paramedic with advice on a call. **Results:** We reviewed 479 patch recordings pertaining to 462 patient encounters. Seven recordings were not available due to technical issues. In 334 cases, physicians were contacted for patient conditions other than cardiac arrest. Of these, 267/334 (79.9%) were mandatory. The physician agreed with the paramedic request in 257/334 cases (76.9%). Of the remaining 77/334 (23.1%), the physician denied the paramedic request (24 cases), offered another mode of management (22 cases), and aided the paramedic with advice (31 cases). Physician agreement with a paramedic request varied by medical directive, with 92.7% agreement with paramedic requests for pain medication but only 51% agreement with requests concerning arrhythmia management. **Conclusion:** Online medical oversight impacted patient care in almost one quarter of calls studied in a single EMS system. Medical oversight remains an essential component of a paramedic's treatment plan to ensure optimal patient care. Further study is required to assess medical directives with low rates of paramedic/physician agreement as well as the applicability of our findings to other EMS systems.
Keywords: emergency medical services, medical oversight, education

LO19

Variability of CTAS scoring in two tertiary care centres in Calgary

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Introduction: The Canadian Triage and Acuity Scale (CTAS) is a tool, utilized by triage nurses in all emergency departments (EDs) throughout Canada, which allows a team of health care providers to more accurately determine the order and priority of each patient's treatment. In 2011, it was identified that all Calgary area EDs have approximately the same average CTAS score. We would expect that Foothills Medical Centre (FMC), our regional trauma, stroke and coronary intervention centre, would have a lower average CTAS than one of our community hospitals, the Peter Lougheed Centre (PLC). The objective of this study is to investigate variability in CTAS score utilization by validating them against other measures of acuity at two sites. **Methods:** We conducted a retrospective cohort study in Calgary, Alberta. Data was drawn from administrative and electronic health record-derived sources from FMC and PLC. Inclusion criteria included presentation to the ED at either FMC or PLC in 2012. Two-tailed t-test was used to test significant difference. **Results:** In 2012, FMC and PLC saw 80,313 and 80,744 patients in their EDs, respectively. The average CTAS score was lower for FMC than for PLC (2.83 v. 3.03, $P < 0.01$). An increased admission rate was seen at FMC (24.7% v. 14.9%) for CTAS level 1 (75.4% v. 53.9%), 2 (38.4% v. 28.1%), and 3 (20.3% v. 14.5%), with no difference between FMC and PLC admission rates at CTAS level 4 or 5. A higher proportion of patients at FMC presented with stroke (2.1% v. 0.4%), myocardial infarction (0.7% v. 0.4%) or required blood transfusion (2.6% v. 1.4%). FMC patients were more likely to arrive via EMS (31.2% v. 17.4%), and had a higher 30-day mortality rate (2.0% v. 0.9%) than PLC. **Conclusion:** Assuming similar thresholds to hospitalization we have shown differential application of CTAS between two sites in Calgary. CTAS score alone may not appropriately depict this difference in acuity between hospitals and should not be the sole driver of administrative decisions, such as staffing and funding. Efforts to standardize the application of CTAS are warranted.
Keywords: CTAS, acuity, triage

LO20

Prehospital application of the Canadian Triage and Acuity Scale (CTAS) by emergency medical service (EMS): a prospective cohort study

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Introduction: Emergency triage is a fundamental component of pre- and in-hospital patient assessment. Effective triage systems prioritize critical patients and predict the scope of services required. The CTAS is a validated five-level triage score widely implemented by triage nurses in emergency departments (EDs). Clinical evidence suggests the CTAS can be reliably implemented by EMS in the prehospital setting. This is the first system-wide, prospective assessment of the interrater reliability of the CTAS between EMS and ED triage nurses in routine clinical practice. **Methods:** This prospective, observational cohort study assessed CTAS interrater reliability between blinded ED triage nurses and EMS providers for patients ≥17 years old. CTAS scores and baseline characteristics were extracted from hospital and EMS databases. EMS providers determined CTAS on-scene, CTAS transport and CTAS arrival at hospital for each patient. The hospital arrival EMS CTAS ($CTAS_{arrival}$) score was compared to the initial ED triage CTAS score ($CTAS_{initial}$) and the final ED triage CTAS score ($CTAS_{final}$), including nursing overrides. The primary outcome, interrater reliability between ED $CTAS_{initial}$ and EMS $CTAS_{arrival}$ scores, was assessed by a quadratic weighted kappa statistic. Secondary outcomes interrater reliability between ED $CTAS_{final}$ and EMS $CTAS_{arrival}$ scores as well as proportion of patient encounters with perfect or near-perfect agreement were evaluated. **Results:** From July-December 2014, 14,380 consecutive patient encounters in the Winnipeg Region were evaluated. Patients were 17-105 years old and 55% female. Case-mix was representative of the EMS population as the study captured all adult encounters. Our primary outcome, interrater reliability (kappa = 0.437 ($p < 0.001$, 95% CI 0.421-0.452)), indicated moderate agreement. EMS $CTAS_{arrival}$ and ED $CTAS_{initial}$ scores had an exact or within one point match 84.3% of the time. The secondary interrater reliability outcome also showed moderate agreement with kappa = 0.452 ($p < 0.001$, 95% CI 0.437-0.466). **Conclusion:** EMS providers can reliably utilize the CTAS in clinical practice. Interrater reliability between ED triage nurses and EMS providers was moderate for overall agreement in this region-wide study. A future study examining the effectiveness of EMS serial CTAS scores in predicting patient outcomes will be performed.
Keywords: CTAS, triage, emergency medical services

LO21

Improving emergency room efficiency through a new patient intake model

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Introduction: ER wait times throughout Saskatchewan have doubled since 2010. In 2012, the provincial government announced a goal of reducing emergency room (ER) wait times to zero by March of 2017. The purpose of this study is to assess potential changes in ER efficiency through the implementation of a new ER patient intake model (8-Man

PTA (Physician Treatment Area) model). By restructuring how patients are initially evaluated, a reduction in patient wait times is anticipated as well as an improvement in related outcomes. **Methods:** Data from every patient who presented to the ER of a large urban hospital in Regina, SK, from June 3 to August 11 for both 2013 (old triage model, n = 10687) and 2014 (8—Man PTA model, n = 11162) was collected using the SCM (Sunrise Clinical Manager) electronic database. Continuous data from both years were compared using Mann-Whitney tests to account for the largely skewed data. **Results:** The most notable improvement using the new triage model was the average decrease in time from registration to MD assessment. There was a reduction from 109 to 88 minutes on average per patient. Also, the Left-Without-Being-Seen (LWBS) rate decreased by an average of 2.6 patients per day and the percentage of patients seen within the Canadian Triage and Acuity Scale benchmark times increased by 2.2% (all comparisons showed a significant difference, $p < .001$). **Conclusion:** The 8-Man PTA model was found to generally decrease patient wait times and related outcomes. Especially registration-to-MD time decreased substantially. Other outcome variables also showed significant improvements, although in most cases the associated effect sizes were small.
Keywords: emergency, wait times, patient flow

LO22

Descriptive results of the OPTIC Program of Research

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Introduction: Changes in health status are common among long term care (LTC) facility residents and necessitate transitions between LTC and emergency departments (EDs). However, LTC to ED transitions have not yet been described or analyzed in detail in Canada. This presentation reports the characteristics of the residents, events and outcomes of 637 LTC to ED transitions in two cities in British Columbia and Alberta. It draws on results of the Older Persons' Transitions in Care (OPTIC) program of research, whose overall aim is to improve quality of care for frail older adults who reside in LTC. **Methods:** OPTIC is a mixed-methods observational study. Researchers engaged in real-time tracking of LTC to ED transitions over a one-year period. Researchers gathered data from multiple levels (facility, care unit, individual), and sources (healthcare providers, residents, residents' families, health records, and administrative databases). **Results:** Descriptive results include the complexity of LTC residents, events leading to transfer, pre-hospital events recorded by EMS, events in the ED, and events on return to the LTC. In our sample residents' average age is 84 years, 55% have a CPS score ≤ 3 (indicating late stage dementia), and residents have a mean of 8 diagnoses or conditions (STD = 3.48). Common LTC events leading to transfers were falls (29% of cases), shortness of breath (24%) and sudden change in condition (20%). The ED recorded final diagnoses of pneumonia (12%), followed by urinary related disease (9%), sepsis (7%), heart failure (6.6%), and hip/pelvis fracture (6.6%). 44% of residents had no procedure performed, and 40% were discharged back to their LTC. 26% of residents returned to the LTC with a change in cognitive status, 16% had a new skin injury and 66% were perceived by staff to have retained their pre-transfer level of function. **Conclusion:** The descriptive results of the OPTIC study provide the basis for future investigations into LTC to ED transitions. In particular, there is a need to develop guidelines to reduce incidences of "avoidable" transitions. The fact that 44% of residents had no procedure performed indicates that their transitions may have been avoidable. The need to reduce incidences of avoidable transitions is further bolstered by literature that suggests that during transitions, residents frequently experience care that is delayed, unnecessary, not evidence-based, potentially unsafe, and fragmented.
Keywords: patient transfer, long-term care, continuity of patient care

LO23

Frailty and the use of health services by older patients following a minor injury

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Introduction: Minor injuries leading to emergency department (ED) visits for functionally independent seniors in Canada are associated with functional decline during the subsequent six months. Frailty may be associated with increased likelihood of requiring increased medical services in this context. The objective of this study was to examine the association between frailty and use of medical services prior to and following an ED visit for minor injuries by previously functionally independent seniors. **Methods:** This prospective multicentre cohort study was part of the Canadian Emergency Team Initiative research program. Patients aged 65 and older presenting to EDs for a minor injury were eligible if they were independent in their basic daily activities prior to their injury and were discharged home. They were interviewed within three days of the ED visit, and three and six months post-visit. Frailty was measured during the ED visit by the CSHA-CFS scale. Use of hospital, ED, family physician, and home health services in the previous three months was recorded at all three time points. Generalized mix models were used to test for difference between frailty levels and outcomes accounting for age, sex, comorbidities, living situation, cognitive impairment, and fracture. **Results:** A total of 1537 patients were included. 43% were 65-74 y/o, 40% were 75-84 y/o, and 17% were 85 or older. At all three time points use of certain services was significantly higher in "frail" (CHSA-CFS ≥ 4) than in "well" (CHSA-CFS < 4) patients. For instance, at the initial ED visit use of hospital, family physician, and home health services in the previous three months were 27% v. 18% ($p = 0.0009$), 74% v. 61% ($p < 0.0001$), and 16% v. 3% ($p < 0.0001$) in frail and well patients respectively. At the three month time point these values were 23% v. 16% ($p = 0.0047$), 72% v. 63% ($p = 0.0114$), and 19% v. 8% ($p < 0.0001$). At the six month time point these values were 22% v. 15% ($p = 0.0065$), 67% v. 60% ($p = 0.0345$), and 15% v. 5% ($p < 0.0001$). **Conclusion:** Overall, "frail" patients (CSHA-CFS ≥ 4) required more hospital, family physician, and home health services three months before and up to six months after a visit to the emergency department for treatment of a minor injury. The CSHA-CFS is an easy to use tool which could help emergency department clinicians identify patients who need more attention in order to reduce their need for costly medical care in the future.
Keywords: frailty, geriatric emergency medicine, minor injuries

LO25

Effectiveness of educational interventions to increase follow-up with primary care providers for adults with acute asthma after discharge

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Introduction: Patients with asthma commonly present to the emergency department (ED) with exacerbations which are largely preventable through avoidance of triggers, medication adjustment, and follow-up

with primary care providers (PCPs). Asthma guidelines recommend PCP follow-up after an attack; however, evidence suggests this linkage is delayed or absent. The objective of this review is to determine if educational interventions administered in the ED improve follow-up with PCPs after an asthma exacerbation. **Methods:** A comprehensive literature search was conducted involving nine databases. Randomized control trials (RCTs) examining the effectiveness of an educational intervention to increase follow up with a PCP were included. Two independent reviewers assessed study relevance using standardized inclusion criteria and assessed study quality using the Cochrane Risk of Bias (RoB) tool. Individual and pooled statistics were calculated as odds ratios (OR) with a 95% confidence interval (CI) using a random effects model. Heterogeneity among studies was reported using the I-squared (I^2) statistic. **Results:** Electronic and grey literature searches identified 471 potentially relevant studies; four studies involving 568 patients were included. The RoB was "low" for one study and "unclear" for the other three studies. Educational interventions included access to asthma information cards and written instructions, scheduling follow-up appointments in the ED, and telephone follow-up. Included studies showed educational interventions targeting either patients or PCPs are more effective at increasing PCP follow-up than standard care (OR = 1.54; 95% CI: 1.07, 2.22); heterogeneity was low (I^2 = 3%). Other important reported outcomes included ED relapses, time to follow up, and utilization of provided transport vouchers. **Conclusion:** Evidence suggests that educational interventions, directed toward either patients or providers, increase follow-up with a PCP after an ED visit. Given the small sample size, methodological weaknesses, and variability of intervention characteristics across the studies, further comparative effectiveness research is required to determine the most effective approach to ensure post-ED follow-up with PCPs.
Keywords: asthma, primary care providers, relapse

LO26

Does implementation of local AECOPD treatment guidelines increase management adherence and improve antibiotic stewardship in the emergency department?

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Introduction: Published COPD guidelines highlight the importance of oxygen therapy, bronchodilators, corticosteroids and appropriate antibiotics in the treatment of acute exacerbations of COPD (AECOPD). We have previously reported that a local guideline implementation process increased awareness and claims of guideline usage by emergency physicians, respiratory therapists and nurses. We wished to see if this process led to an actual change in adherence to guidelines, and whether there was any effect on antibiotic stewardship, including fluroquinolone use. **Methods:** This study was conducted at a tertiary hospital emergency department. Local COPD guidelines were developed by a quality improvement group. Copies of the guidelines were circulated and were posted in the department. A series of educational sessions were provided for staff, and sign off was required. A retrospective chart review screened 1849 patient visits from December 2011 to February 2012 and December 2012 to February 2013. Inclusion criteria were: history of COPD, age >40, MD diagnosis of AECOPD, LRTI or bronchitis; as well as two or more of the following: increased dyspnea, cough, production or change in sputum character for at least 2 days. Data were collected using a standardized abstraction tool, and captured use of bronchodilators, systemic steroids and antibiotics. Standard statistical tests were used. **Results:** Overall, 130 visits were evaluated: 51 visits prior implementation, and 79 post-implementation. Prior to implementation, 29/51 patients (0.57; 95% CI 0.43-0.70) received bronchodilators, systemic steroids and antibiotics. Following guideline implementation, 45/79 patients (0.57; 0.46-0.67) received the respective treatments. There was no difference in guideline adherence between the two groups (p = 1.0). Following implementation, there was a significant decrease in fluroquinolone use, from 25/44 patients (0.57; 0.42-0.70) to 20/69 patients (0.29; 0.20-0.41; p = 0.006). **Conclusion:** Implementation of a local AECOPD guideline significantly decreased fluroquinolone use in the treatment of AECOPD. There was no change in the rate of guideline adherence for the combined use of bronchodilators, systemic steroids and antibiotics.
Keywords: COPD, guideline, knowledge translation

LO27

Legal consequences for alcohol-impaired drivers involved in motor vehicle collisions: a systematic review

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Introduction: Alcohol-related motor vehicle collisions (MVCs) are a leading cause of preventable trauma and mortality worldwide. The treatment of alcohol-impaired drivers injured in a MVC is a complex public health issue. Intoxicated drivers seen in the emergency department (ED) following injury in a MVC often evade legal consequences. Possible explanations include difficulty identifying intoxication, unavailability of a legally usable blood alcohol concentration (BAC) measurement, lack of resources by police, poor logistical coordination between police and the ED, sympathy for the injured driver, and sanctity of doctor-patient relationship. The objective of this study was to describe legal consequences for alcohol-impaired drivers involved in a MVC and taken to a hospital or trauma center. **Methods:** We conducted a systematic review in accordance with PRISMA guidelines. We searched MEDLINE, Embase, and CINAHL databases from inception until August 2014. We included studies that reported legal consequences including charges or convictions of drivers taken to a hospital or trauma center after a MVC with a BAC exceeding the legal limit. We defined overall DUI/DWI conviction rate as the ratio of drivers above the legal BAC limit and convicted of DUI and/or DWI to the total number of drivers above the legal BAC limit. **Results:** Twenty six studies met inclusion criteria; twenty studies were conducted in the USA, five in Canada, and one in Sweden. All were cohort studies (23 retrospective, 3 prospective) and included 11409 patients overall. A total of 5127 drivers had a BAC exceeding the legal limit, with legal consequences reported in 4937 cases. The median overall DUI/DWI conviction rate was 13% (range 0%-85%). The median percentage of drivers with a previous conviction on their record for driving under the influence (DUI) or driving while intoxicated (DWI) was 15.5% (range 6%-40%). The median percentage of drivers convicted again for DUI/DWI during the study period was 3.5% (range 2%-10%). Heterogeneity between study designs, legal jurisdictions, institutional procedures and policies for obtaining a legally admissible BAC measurement precluded a meta-analysis. **Conclusion:** The majority of intoxicated drivers involved in MVCs and seen in the ED are never charged or convicted. A national solution which allows identification and prosecution of intoxicated drivers is required.
Keywords: alcohol, motor vehicle collision, major trauma

LO28

In trauma, when used in the emergency department, do viscoelastic hemostatic tests decrease mortality: a systematic review

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Introduction: In recent years, we have seen introduction of viscoelastic hemostatic tests in various clinical settings, the aim of which to provide a better functional assessment of coagulation. We sought to see if the use of these tests had an impact on mortality of trauma patients initially seen and treated in the emergency department. **Methods:** This Systematic Review, done in March 2014 and updated in November 2014, has been conducted in accordance with the STARD, PRISMA, and STROBE recommendations. Retrospective and prospective studies with a comparison group published in English were kept. Two reviewers (JC and ÉN) and two librarians (MC and DR) independently identified abstracts. The following databases were searched: Cochrane CENTRAL, Medline, Embase, LILACS, Web of Science, Science.gov, SciFinder Scholar, WorldCat, the Transf Evid Lib Database, and proceedings of the congresses of the Int Soc of Thromb and Haemost and the Am Soc of Hematol. Data extraction was done by two authors (ÉN and ÉP). **Results:** We kept 2,870 abstracts. Afterwards, 37 papers were analyzed and three articles evaluating mortality in two groups of patients (using and not using a VHT) were identified. Amongst these three studies, only one had raw data available. We did not succeed in getting the raw data from the two other authors. We asked the main authors of the 37 selected papers, and renowned authors in the field, if they had studies with new data that could be included in our review. The answers were negative. **Studies kept:** 1) Johansson PI. Before and After Study. Total N: 832 cases. 121 traumas. Raw data unavailable. 2) Kashuk K. Prospective Study. 68 cases. Mortality: 59% control group. 28% VHT group. 3) Messenger BM. Prospective Study. 50 cases. Mortality similar. Raw data unavailable. **Conclusion:** With the studies available, it is impossible to conclude if the use of a VHT in the Emergency Department has an impact on mortality. More studies are needed. **References:** 1) Johansson PI, Stensballe J. Effect of haemostatic control resuscitation on mortality in massively bleeding patients: a before and after study. *Vox Sanginis* 2009;96(2):111-8. 2) Kashuk K, et al. Initial experiences with POC rapid TEG for management of life-threatening postinjuty coagulopathy. *Transfusion* 2012;52(1):23-33. 3) Messenger BM et al. TEG_guided massive transfusion in trauma patients. *Anesth-Analg* 2011;112:S-9.
Keywords: coagulopathy, trauma, thromboelastography

LO29

Factors affecting adherence to the Canadian Computed Tomography Head Rules in concussion patients presenting to the emergency department

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Introduction: There is increasing awareness within North America regarding the potential serious morbidity associated with concussions. As a result there has been an increased presentation of concussion patients to emergency departments (ED) in Canada. The Canadian Head Computed Tomography Rules (CHCTR) are a validated set of clinical criteria used to help determine the appropriateness for a computed tomography (CT) scan in the evaluation of head-injured patients. In this quality assurance retrospective study we reported ED physician adherence to the CHCTR and furthermore, assessed other potential factors influencing the decision to perform a CT scan for concussion patients. **Methods:** We performed chart reviews on all patients diagnosed with a concussion at the Kelowna General Hospital ED and who agreed to enrolment in the Canadian Hospital Injury Prevention Program between April 2012 - October 2014. Patients were classified into four groups based on CHCTR criteria and CT application (A-D below), and demographic and clinical factors were compared. Standard parametric and non-parametric two sided statistical tests were used with significance set at $p = 0.1$. **Results:** 212 patients were included in the study. 22 of the 53 (42%) patients that met the CHCTR criteria for a head CT and 21 of the 159 (13%) that did not meet CHCTR criteria received a CT. In patients that *met* the CHCTR criteria, the average age was significantly higher in those who received a CT (group A) vs. those who did not (B) ($p = 0.08$). In patients who did *not* meet CHCTR criteria, those who received a CT (C) were much more likely to be referred to the ED from an outside clinic ($p < 0.0001$), have a CTAS designation of 2 ($p = 0.06$), have a history of previous concussions ($p = 0.08$) and were older ($p = 0.01$) than those that did not receive a CT (D). **Conclusion:** These preliminary results highlight that the use of CT scans for concussion do not appear to consistently follow the CHCTR. Furthermore, it appears that other factors may influence a physician's decision when to order a CT for patients presenting to the ED with a concussion.
Keywords: concussion, Canadian CT Head Rules, emergency department

LO30

The effectiveness of early educational interventions in the emergency department to reduce incidence or severity of post-concussion syndrome following a concussion/mTBI: a systematic review

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Introduction: Concussions or mild traumatic brain injury (mTBI) are a major public health concern accounting for 85% of all brain injuries. Post-concussion syndrome (PCS) has been found to affect between 15-25% of mTBI patients one year after initial injury; however, management in the emergency department (ED) varies. The goal of this review was to assess the effectiveness of early educational interventions provided or initiated in the ED, on the onset and/or severity of PCS. **Methods:** A comprehensive search strategy involving seven electronic databases was developed. A grey literature search of Google Scholar, recent conference proceedings in Emergency Medicine, study bibliographies and clinical trial registries was also performed. Two reviewers reviewed the citation list independently; no restrictions on publication status or language of publication were applied. The Cochrane risk of bias (RoB) tool and the Newcastle-Ottawa scale (NOS) were used to assess quality. **Results:** From 1,419 citations, four RCTs and one observational cohort study were included in the review. Interventions included: educational information sheets, with or without follow up and one study on bed rest. One study offered more referrals and additional treatment which were rarely requested. None of the studies were deemed to be high quality. Heterogeneity among outcome reporting, follow up dates and interventions used precluded study pooling. Three studies on educational information with and without follow-up showed minor positive improvement in select post-concussion symptoms, one showed no significant differences between intervention and control and no significant difference was seen in the study on bed rest interventions. **Conclusion:** Limited evidence exists regarding the effectiveness of educational interventions for the early management of mTBI. Standardization of the interventions, self-report outcome measures, and follow-up periods would make quantitative comparisons and pooling of studies more feasible. Moreover, higher quality research in the field of early educational interventions for patients presenting to the ED shortly after their concussion injury is urgently required.
Keywords: concussion, systematic review, prevention

LO31

Characteristics associated with sexual assaults at mass gatherings

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Introduction: Sexual assault is disturbingly common yet little is known about those occurring at mass gatherings, defined as a group of people congregated for a common purpose. Our objectives were to examine patterns of variation in sexual assault associated with mass gatherings and to determine risk factors associated with these assaults. **Methods:** We conducted a health records review from January to December, 2013. We included all patients greater than 16 years presenting within 30 days of their sexual assault to the Ottawa Hospital Sexual Assault and Partner Abuse Care Program (SAPACP). We abstracted from the SAPACP records: patient and sexual assault characteristics, mass gathering attendance, alcohol or drug consumption, and medical and forensic care accepted. We performed descriptive analyses and multiple logistic regression. **Results:** We found 204 cases of sexual assault, of which 53 (26%) occurred at mass gatherings. Relative frequencies of mass gathering sexual assaults peaked during New Year's Eve, Canada Day, university frosh week and Halloween. We found the following factors were statistically significantly associated with sexual assault at mass gatherings: younger age (OR = 0.95, 95%CI: 0.91-0.99); voluntary consumption of drugs and alcohol (3.88, 95%CI: 1.34-11.23); assault occurring on a holiday (2.37, 95%CI: 1.00-5.64); and the assailant unknown to the victim (OR = 2.43, 95%CI: 1.15-5). **Conclusion:** This study is the first to describe patterns of variation in sexual assault incidents associated with occurrence of mass gatherings as well as the risk factors for such assaults. We will disseminate these results to key stakeholders in order to develop prevention-minded policies for future mass gatherings

Keywords: sexual assault, mass gatherings, prevention

LO32

First-responder accuracy using SALT during mass-casualty incident simulation

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Introduction: During mass-casualty incidents (MCIs), patient volume often overwhelms available emergency medical services (EMS) personnel. First responders are expected to triage, treat, and transport in a timely fashion. If other responders could learn to accurately triage, pre-hospital EMS resources could be focused more directly on patients that require immediate stabilization and transport. Furthermore, accurate MCI triage by other first responder groups may also allow for discussion of overlapping organizational responsibilities during a MCI. The objective of this study is to compare triage accuracy, error patterns, and time to triage completion for primary care paramedic (PCP) and fire students participating in a simulated MCI using the Sort, Assess, Life-saving interventions, Treatment/Transport (SALT) triage algorithm. **Methods:** All students in the second year PCP program and fire science program at two separate community colleges were invited to participate in this study. Immediately following a 30-minute didactic session on SALT, participants were given a standardized briefing and asked to triage an eight-victim mock MCI using SALT. The total number and acuity of victims were unknown to participants prior to arrival to the mock scenario. **Results:** 38 PCP and 29 fire students completed the simulation. Overall triage accuracy was 79.9% for PCP and 72.0% for Fire (Δ 8.0%; 95% CI: 1.2, 14.7). No significant difference was found between the groups regarding types of triage errors. Over-triage, under-triage, and critical errors occurred in 10.2%, 7.6%, and 2.3% of PCP triage assignments, respectively. Fire students had a similar pattern, with 15.2% over-triaged, 8.7% under-triaged, and 4.3% critical errors. The median time to triage completion for PCPs and fire were 147 s and 157 s, respectively (Δ 10 s; 95% CI: -10, 30). **Conclusion:** PCPs performed MCI triage more accurately than fire students after brief SALT training and no difference was found regarding types of error or time to triage completion. The clinical importance of this difference in triage accuracy is likely minimal, suggesting that fire could be considered for MCI triage depending on the availability of pre-hospital medical resources and appropriate training.

Keywords: disaster medicine, triage, emergency medical services

LO33

Comparison of the SACCO triage method versus START triage using a virtual reality scenario in advance care paramedic students

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Introduction: Many triage methods have been proposed with few being validated in an evidence based manner. The Sacco triage method (STM) has been reported as superior to the START method. Few studies have compared the two methods in triage order and time to triage in a simulated scenario. **Methods:** A prospective randomized controlled study was conducted using twenty-six students in their final year of advance care paramedic program at Holland College, Prince Edward Island. The volunteers were randomized into either STM triage or START triage group. The study scenario was based on a train accident database using ten victims. A 30 minute lecture on their respective method was given prior to the subject participating in the simulation. The two outcome measures, time to triage and triage order, were recorded. **Results:** The average time to triage all patients were 709'' (11'49'') SACCO and 609'' (10'9'') START, corresponding to a mean difference of 100'' (95% CI: (-11s, 211s) (P = 0.07) demonstrating no statistical difference. Statistical analysis by a nonparametric permutation test showed a significant (P = 0.008) difference between victim triage order in the two groups. The statistical significance was driven by one victim which disappeared when this victim was removed from the ordering. The difference between the two groups was not significantly linked to any of the victim physiologic characteristics. **Conclusion:** This study demonstrated that there is no difference in time to triage or triage order by advance care paramedic students using the SACCO or START triage methods in a simulated mass casualty incident.

Keywords: mass casualty incident, paramedics, virtual reality

LO34

Clinical prediction rule for treatment change based on echocardiogram findings in transient ischemic attack and non-disabling stroke

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Introduction: Echocardiogram use in Transient ischemic attack and non-disabling stroke patients is variable. Our goal is to derive a clinical prediction rule for patients with TIA and non-disabling stroke to predict an abnormal echocardiogram requiring a change in treatment. **Methods:** We prospectively collected data consisting of 27 potential predictor variables at 8 emergency departments (ED) for TIA and non-disabling strokes who had an echocardiogram. Sites were tertiary university affiliated EDs and data were collected from October 2006 to October 2011. Our outcome measure was treatment change (i.e. initiation of anticoagulation or surgical correction of abnormal cardiac structure) based on echocardiogram findings. Univariate analysis utilized Fisher's exact or Pearson χ^2 test and stepwise logistic regression for multi-variable analysis. **Results:** We found 87 (3.1%) of 2804 patients had a

treatment change based on their echocardiogram findings. The final model contained six predictors: age < 50 years old, coronary artery disease history, heart failure history, any language deficit, posterior circulation infarct, and middle cerebral artery infarct evident on brain imaging. Our model had a sensitivity = 94.3% with 95% CI (87.09 % to 98.09 %), specificity = 35.4 % with 95% CI (33.6 % to 37.3 %) and negative predictive value = 99.5% with 95% CI (98.8 % to 99.8 %). **Conclusion:** We developed a highly sensitive prediction rule to identify high-risk patients for a treatment change based on echocardiogram findings. TIA and non-disabling stroke patients with one or more of these high risk features should have an urgent echocardiogram performed.
Keywords: clinical decision making, echocardiogram, stroke

LO35
Prehospital blood pressure differentiates acute stroke from mimics
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Introduction: Elevated hospital admission blood pressure (BP) in acute stroke is common and associated with poor outcomes. The natural history of BP in suspected stroke patients in the prehospital setting is unknown. We tested the hypothesis that prehospital BP values are higher in acute stroke patients, relative to stroke mimics. **Methods:** We conducted a retrospective analysis of a prospectively-maintained centralized database of electronic patient health care reports (ePCR), including serial BP measurements, of all patients transported by Emergency Medical Services (EMS) to the emergency department (ED) of a single hospital with acute stroke symptoms during an 18-month period. All patients with an EMS dispatch code for suspected stroke were included. Hospital charts and neuroimaging review were utilized to determine final diagnosis of ischemic stroke, transient ischemic attack (TIA), intracerebral hemorrhage (ICH) or stroke mimic. BP data was analyzed by one-way ANOVA followed by Tukey's test for independent comparisons. **Results:** A total of 877 patients were transported by EMS to the ED with suspected stroke. Median (IQR) time from symptom onset to first BP measurement was 70.5 (204) minutes. The final diagnosis was stroke in 524 (59.7%) patients (41.0% ischemic stroke, 11.7% TIA, 7.0% ICH) and 354 (40.4%) were considered mimics. Mean prehospital SBP was higher in acute stroke patients (155 ± 31 mmHg) compared to stroke mimics (143 ± 32 mmHg), $p < 0.001$). Mean prehospital SBP was higher in ICH (171 ± 33 mmHg, $p = 0.001$) than both ischemic stroke (155 ± 27 mmHg) and TIA (153 ± 23 mmHg). SBP remained stable during EMS transport in all patients (median -3 (22) mmHg, $p = 0.16$). Mean prehospital SBP was correlated with ED SBP ($R = 0.85$, $p < 0.001$). Mean SBP at ED arrival was higher in acute stroke patients (ICH: 170 ± 34 mmHg, ischemic stroke: 154 ± 30 mmHg, TIA: 153 ± 26 mmHg) than stroke mimics (142 ± 28 mmHg, $p < 0.01$). **Conclusion:** Higher prehospital SBP differentiates acute stroke from stroke mimics. Blood pressures are highest in ICH patients. Prehospital BP remains stable until ED arrival. Elevated prehospital BP may help identify patients with acute stroke. Acute BP elevation may also represent an acute prehospital treatment target.
Keywords: prehospital, blood pressure, stroke

LO36
Intracranial bleeding time trends and the impact of the new oral anticoagulants
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Introduction: Dabigatran, rivaroxaban and apixaban were approved for stroke prevention in the past 4 years. The drugs are attractive alternatives to warfarin because of their fixed dosing, predictable effect and lack of monitoring. Phase 3 studies reported a lower risk of intracranial bleeding compared to warfarin however there is little real-life data to show this. We assessed time trends in atraumatic intracranial bleeding between 2009-2013, and compared this to provincial oral anticoagulant prescription trends. **Methods:** ICD-10 codes were used to identify all atraumatic intracerebral bleeds presenting to our neurosurgical centre (covering a population of 1.3 million). Trained researchers extracted data on administration of anticoagulant medication in the week prior to diagnosis of intracranial bleed. Data on antiplatelet drugs and renal function were extracted. Provincial prescription data for oral anticoagulants was obtained from IMS Brogan CompuScript Market Dynamics. The primary outcome was trend analysis of incident anticoagulant-associated intracranial bleeding events per year. The secondary outcomes were comparisons between rate of anticoagulant drug related bleeding and provincial prescription rates. **Results:** 2,050 patients presented with atraumatic intracranial bleeds. The median patient age was 72, 51.5% male. Subdural and intracerebral hemorrhages accounted for 73% of all bleeds. 371 (18%) patients were prescribed an anticoagulant. There was an increasing trend over time in the rate of anticoagulant associated bleeding ($p = 0.035$) and non-anticoagulant associated bleeding ($p = 0.04$). The new anticoagulants were associated with a total of 20 bleeds. By the end of 2013, dabigatran, rivaroxaban and apixaban accounted for 16%, 17% and 3% of all oral anticoagulant prescriptions respectively. Warfarin consistently accounted for a disproportionately large number of all anticoagulant associated bleeds compared to prescription prevalence. Dabigatran, rivaroxaban and apixaban each accounted for a non-significantly smaller proportion of bleeds when compared to prescription prevalence. There was no time trend in dual antiplatelet/anticoagulant prescription, and no association with renal impairment. **Conclusion:** We found an increasing number of patients treated for intracranial bleeding over time, however there was a trend towards fewer intracranial bleeds associated with the new oral anticoagulants.
Keywords: anticoagulant, intracranial bleed

Moderated Poster Presentations

MP01
Development of a Canadian emergency medicine open-access podcast: the *Emergency Medicine Cases* experience
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Introduction / Innovation Concept: Internet-based medical education resources such as podcasts have increased in popularity in recent years, and have considerably changed the landscape of continuing medical education (CME). One advance has been Free Open-Access Medical Education (FOAMed), which was borne out of a desire from health care professionals for free means to stay current with the wide scope of EM literature. The educational program Emergency Medicine Cases (EMC) was created in 2010, and underwent significant improvements in order to stay current and relevant in the world of online CME. **Methods:** Initially available as a paid subscription-only educational program, EMC was threatened to become less relevant in a sea of free resources. The authors therefore decided to switch to a model of FOAMed, which however created financial difficulties given the high ongoing costs of running an educational program. As a result, a partnership was sought and secured with the Schwartz/Reisman Emergency Medicine Institute (SREMI), a non-profit academic institution dedicated to advancing the care of patients requiring emergency services. **Curriculum, Tool, or**

Material: In a monthly podcast aimed at emergency department health care workers, the host (ADH) poses clinical questions to guest experts, discussing current controversies and describing evidence-based treatments. The 56 episodes to date cover broad-based and clinically relevant topics, have a written summary for subsequent reference, and most have a related clinical vignette named "Best Case Ever." Since adopting a free model, EMC's website traffic has increased two-fold to greater than 6,000 visitors per month, and its podcast dowloads have increased four-fold to 45,000 monthly. 135 listeners voluntarily filled out a survey on the EMC website, of which 90% felt that what they learned from an episode would change their practice, 90% felt they would be more confident the next time they saw a patient with the discussed condition, and 99% would recommend the episode to a colleague. **Conclusion:** To our knowledge, EMC is the only free-access EM podcast wholly funded and supported by a non-profit academic institution. We believe the transition to free access contributed to the increase in EMC's accessibility, universality and immediacy, and the academic partnership, to its accountability and overall quality. In the future, partnerships between medical education resources and academic institutions may become necessary for the production and sustainability of high-quality programs.

Keywords: medical education, podcasts, open access

MP02

A national, collaborative, peer-reviewed, free, online EM simulation case database

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Introduction / Innovation Concept: Simulation is an increasingly prevalent aspect of emergency medicine (EM) education. However, faculty availability and case development are major challenges for simulation programs. The use of case databases would alleviate the time investment required for case development. Currently available databases contain few cases, are published in inconsistent formats, and are not regularly updated. Only one database offers formal peer review; it has been completed for a small minority of cases. We describe the process of creating a national database of EM simulation cases that is open-access, free, and mapped to the Royal College EM Objectives of Training (OTR). **Methods:** All Royal College EM program directors were surveyed about their simulation curricula. Results indicated a heterogeneous mix of curricula from well-established to non-existent. All EM programs currently using simulation were asked to submit their three best cases. Reasons to select a case for submission included, but were not limited to: core topic for EM training; rare presentation that is a critical EM content area; or high quality resident feedback related to the case. All cases were submitted using a standardized template designed by the study authors. Submissions were reviewed, edited, and mapped to the Royal College EM OTR by an editorial board of medical education experts. Cases were (and continue to be) published regularly via an EM simulation case blog (EMSimCases.com). **Curriculum, Tool, or Material:** This collaborative effort is filling an identified need within the Canadian EM community by providing free, online, instructional resources. In particular, this education innovation incorporates peer-review and ensures clear learning objectives. Finally, it serves as a platform to connect simulation educators around the globe. **Conclusion:** EMSimCases.com provides educators, whether new to simulation or experienced, with high quality simulation cases that include clear learning objectives. Publishing in a free open access meducation (FOAM) format maximizes efficiency in case creation. The collaborative nature of the project engages the EM education community.

Keywords: innovations in EM education, simulation, FOAMed

MP03

Severe sepsis report cards for emergency physicians: how do you measure up?

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Introduction / Innovation Concept: In patients with severe sepsis and septic shock it has been demonstrated that there is a linear increase in mortality with delays in administration of appropriate antibiotic therapy. Despite this robust relationship, most emergency physicians are unaware of their personal performance in regards to this important marker of sepsis care. We sought to use our health system database to generate aggregate and individual physician-specific data reports to assess the time to antibiotics, and other markers of quality sepsis care, in patients with severe sepsis in our emergency departments. **Methods:** A data algorithm was used to identify patients who met criteria for severe sepsis in our emergency departments over a 3-year period from 2011 to 2013. Multiple time-points during the patient's ED stay were accurately captured using administrative databases. Our primary marker of quality sepsis care was the time from meeting criteria for severe sepsis to first antibiotic administration. Other indicators of quality sepsis care and compliance with published guidelines were evaluated on both an aggregate and individual level. Aggregate data was presented to all emergency physicians. Each physician was then invited to consent to see his or her individual report for self-assessment and reflection. Anonymous, confidential reports allowed comparison to their aggregate peer-group and published guidelines. **Curriculum, Tool, or Material:** The aggregate data consisted of 2197 severe sepsis patient visits seen by 146 emergency physicians. The median time from meeting criteria for severe sepsis to antibiotic administration was 41mins (IQR = 7 to 101mins). The number of patients receiving antibiotics within the first hour of recognition of severe sepsis was 60%. Median time from triage to ordering of a serum lactate was 72mins (IQR = 38 to 151mins) Serial lactate was assessed in 44% of cases and demonstrated clearance in 82% of those. Blood cultures were drawn 85% of the time. Of the 135 eligible emergency physicians, 78(58%) consented to participate and receive individual feedback reports. Upon seeing the anonymized scatter plot, physicians expressed enthusiasm to know whether *they* were outliers. **Conclusion:** Time to antibiotics, and other markers of severe sepsis care, can be determined using administrative datasets. ED Physicians are keen to receive this feedback for personal self-assessment.

Keywords: sepsis, professional development, innovations in EM education

MP04

Development of an in-situ, simulation based prehospital critical care curriculum: a novel approach

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Introduction / Innovation Concept: In 2011, the Auckland Rescue Helicopter Trust (ARHT) adopted a helicopter emergency medical services (HEMS) model and currently delivers prehospital emergency care via a Doctor / Paramedic / Crewman team. As a learning organization the ARHT and Auckland HEMS pride themselves on maintaining the highest standard of prehospital critical care. The ARHT educational team introduced a modular based curriculum with content delivered via social media and learning cemented through multi-disciplinary in situ simulation. To our knowledge, the use of a podcast, simulation,

re-podcast model is an innovative method of delivering learning in the prehospital environment. **Methods:** A needs assessment was conducted via a Google survey to identify the key clinical and non-technical skills essential to the development of a prehospital critical care curriculum. This assessment tool was distributed to all clinicians working with at the ARHT, Auckland HEMS and STARS. The results of this assessment were used to guide the development of the curriculum. **Curriculum, Tool, or Material:** The curriculum is composed of 6 modules. Pre-simulation material is taught using a "flipped classroom" approach. The curriculum is structured as follows: 1) Online Modules: The online modules contain the course objectives, a podcast lecture and an online resource library. The 35 - 45 min lectures feature a host of prehospital experts and will cover the core material relevant to each module. The Australian Civil Aviation Safety Authority: Safety Behaviors - Human Factors for Pilots course was used as a reference text. 2) In-situ Simulation: In-situ simulation provides active duty crews with the ability to apply the knowledge gained from completing the online modules. Successful completion of each SIM requires mastery of both technical and non-technical skills. Each simulation is followed by a structured debrief and feedback from the debrief is recorded. 3) Feedback Podcast: Feedback gathered during the simulations is recoded in a "podback" podcast. Combining the learning of each individual debrief allows common errors or positive skills to be identified and shared amongst all clinicians at the trust. **Conclusion:** While none of the tools used by the ARHT educational team are novel in themselves, we feel that the combination developed is ground breaking. The challenges of developing this curriculum included implementing in-situ simulation into daily operations and ensuring that the learning objectives of the various members of the air crew were met

Keywords: prehospital, simulation, innovations in EM education

MP05

Education and experience with shiftwork: Are residents prepared?

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Introduction: In response to limited duty-hours, many areas of medicine are transitioning away from 24-hour call in favor of shiftwork. There is a substantial body of literature documenting the adverse physical, mental and social health effects associated with shiftwork. This can compromise the learning experience for trainees. With more areas of medicine utilizing shiftwork schedules, this may have a significant impact on post-graduate education. Previous studies show that education and experience prior to an impending task have a major impact on its success. Therefore ensuring residents understand potential issues and effects of shiftwork should increase the success of trainees who participate in shiftwork. As emergency medicine is reliant on shiftwork, it provides an optimal setting in which to study trainee experience and education. Unfortunately, there is a paucity of data on resident experience, knowledge and shiftwork-specific teaching prior to exposure to shift work. In this study, we sought to address this knowledge gap by examining baseline resident experience and education about shift work prior to the start of a rotation in the pediatric emergency department (PED). **Methods:** This was a survey study carried out over one year at The Children's Hospital in London, Ontario. Residents rotating through the PED were asked to complete a novel six-item survey about their prior experience and education on shiftwork. **Results:** 127/134 (95%) residents completed the survey, the average age of participants was 30 years, 47% were female and level of training varied from year 1 to year 5 of residency. Prior to starting residency, 45% (71/127) of residents had experience doing shiftwork. During residency, trainees did both 24 hour call (120/127) and shiftwork (94/127). The majority of residents (124/127) considered themselves capable of doing shiftwork. Very few residents (25/127) had received shiftwork-specific education, and 43% (55/127) of residents believed they would benefit from further teaching on the effects of shiftwork. **Conclusion:** Despite the majority of residents feeling that they are capable of doing shiftwork, most have no experience with shiftwork and do not receive any anticipatory teaching or guidance prior to the start of a shiftwork rotation. This highlights the need for the implementation of education on shiftwork in order to maximize the learning experience and minimize the consequences associated with shiftwork.

Keywords: residency education, shiftwork, implications for teaching

MP06

Does a just-in-time mobile simulation module improve success at surgical cricothyroidotomy?

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Introduction: Surgical cricothyroidotomy is a life-saving procedure that is essential to the practice of emergency medicine (EM). Yet it is rarely performed, raising concerns about maintenance of competence. This is the first study to evaluate the utility of a mobile just-in-time instructional (JITI) video for improving procedural skill of surgical cricothyroidotomy. **Methods:** A randomized control trial was conducted from March to April of 2014. 20 medical students, 20 junior EM residents, 20 senior EM residents, and 20 EM attendings were block randomized, and run through simulation sessions in which they were asked to perform a surgical cricothyroidotomy on a porcine trachea. Control group participants read for 90 seconds a standard textbook chapter on surgical cricothyroidotomy, while the intervention group was shown a 90 second JITI video on a smart phone. The primary outcome measured was time to completion. Secondary endpoints included correct placement, checklist score and global rating score (GRS), where the former was correlated with a pathologist's opinion in a pilot session, and the latter two were independently scored by two reviewers from video recordings of each individual session. **Results:** Main analysis was done as a repeated measures ANOVA with two between subject factors; educational level and intervention versus control, and 2 repeated measures; Rater 1 vs Rater 2. Using a comparison of multi-variables via an F-test, there was no significant difference in time to completion or successful placement based on either assignment to intervention versus control group or level of training. Overall, there was a significant difference between checklist ($p < 0.0001$), and GRS ($p < 0.001$) scores in participants assigned to intervention versus control groups, with those in the intervention group scoring higher. Level of training was significant for the checklist ($p < 0.0001$) and GRS ($p < 0.001$) scores. There was good correlation between checklist and GRS scores (0.766). There was also good inter-rater reliability between the checklist (0.867) and GRS (0.723) scores. **Conclusion:** Viewing a just-in-time instructional video on a smart phone improves surgical cricothyroidotomy procedural scores when compared with reading a standard textbook chapter. This mobile learning tool may benefit the performance of a life-saving, but rarely performed, procedure.

Keywords: medical education, simulation, airway

MP07

Quality indicators for medical education blog posts and podcasts: a qualitative analysis of themes from published literature

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Introduction: Emergency medicine professionals are among the leading proponents of blogs and podcasts' frequent use for medical education and knowledge translation. However, concerns about the quality of these sources are preventing widespread utilization. Quality indicators and scores have been developed for patient health websites but not medical educational content. This study's aim was to determine appropriate quality indicators for these emerging knowledge translation and education methods. **Methods:** A literature search for quality indicators applicable to secondary sources was conducted using Medline, EMBASE, Web of Science, and ERIC. Articles likely to contain quality indicators were identified by two reviewers and an arbitrator. Three reviewers extracted article data and quality indicators. Quality indicators were excluded if they were deemed irrelevant by two reviewers. The remaining quality indicators were thematically analyzed to generate a list of themes and subthemes. The initial coding used a constant comparative technique to create a registry of codes until saturation was reached. Each categorization was done by two investigators with a third auditing their proceedings for credibility. Discussions were held frequently between all investigators. Disagreements were resolved by consensus. The complete data set was then coded by at least one investigator, with 30% of the items redundantly coded to calculate inter-rater agreement. **Results:** The literature review returned 4,530 articles. 164 articles were included by the reviewers and 154 articles were accessible. From the 1,817 extracted quality indicators, the qualitative analysis found three major themes and 132 subthemes. The major themes (most frequent subtheme) were credibility (transparency), content (academic rigour), and design (interaction). The concordance of the reviewers during the coding of the final themes was 90.0%. **Conclusion:** A qualitative analysis of the literature derived a list of quality indicators as a first step toward building consensus around quality indicators for blogs and podcasts. These indicators will inform learners, educators, academic leaders, and bloggers and podcasters.
Keywords: social media, medical education, quality indicator

MP08

ULTRASIM: ULtrasound in TRAuma SIMulation. Does the use of ultrasound during simulated trauma scenarios improve diagnostic abilities?

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Introduction: Point of care ultrasound (PoCUS) has become standard of care in many clinical settings; including the Extended Focused Assessment with Sonography in Trauma (E-FAST) in the management of trauma cases. Similarly, simulation is increasingly used in medical and trauma education. We wished to examine the diagnostic utility of the addition of low cost ultrasound simulation, using the edus^2 system, to standard trauma simulations performed by residents. **Methods:** Twelve residents with prior ultrasound training and orientation to our two simulators (SimMan 3G and edus^2 ultrasound simulator), were each assessed on six different trauma simulations. For each scenario the participant initially performed a standard clinical assessment utilizing the SimMan 3G mannequin simulator, compiling a differential diagnosis, including confidence scores. They then performed an E-FAST scan using the edus^2 ultrasound simulator and subsequently adjusted their list of diagnoses accordingly. A total of 72 scenarios were completed. We examined the effect of addition of simulated ultrasound on diagnostic accuracy, diagnostic confidence and diagnostic precision. Data was analyzed using standard techniques (Fisher's exact and student t-tests) with Prism (v6, GraphPad Software Inc.). **Results:** Diagnostic accuracy improved considerably with simulated PoCUS using edus^2. With the addition of PoCUS participants had 64 correct primary diagnoses (89% accuracy), as opposed to 32 correct primary diagnoses (44% accuracy) without PoCUS ($p < 0.0001$; paired t-test). Confidence in diagnosis improved from a mean of 47.6% (95% CI 39.9% - 55.3%) without the ultrasound simulator to a mean of 83.6% (95% CI 78.1% - 89.1%) with ultrasound use ($p < 0.0001$). **Conclusion:** The use of a simulator is a convenient way of supplementing training in both trauma and ultrasound. By incorporating PoCUS simulation into trauma simulations, participants are significantly more likely to arrive at the correct diagnosis, have more confidence in their conclusions and also have a narrowed differential diagnosis.
Keywords: Point of care ultrasound, simulation, trauma

MP09

Demographics of CAEP grant award winners

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Introduction: CAEP grants have provided a funding source for EM researchers since 1996 through an annual competition that awards up to $5000 per grant. We sought to describe the demographics of grant recipients at the time that they received funding. **Methods:** We designed a 27-question survey for distribution to successful CAEP grant recipients. The survey was distributed up to four times electronically over a six-week period. Non-responders were contacted directly by the primary investigator to encourage participation. **Results:** Since 1996, 102 grants were awarded to 96 recipients (eight recipients received the award multiple times [up to four awards], and there were co-award winners in the first three years). Our response rate was 58% (n = 56). 50% (n = 28) were residents at the time of receipt; 46% (n = 26) were attending physicians (including fellows [10], junior staff £ 5 years post-MD [10], and senior staff > 10 years post-MD [7]); and 4% (n = 2) received multiple awards. Overall, the mean number of years post-MD on grant receipt was 6.6 ± 4.5. The resident recipients had a mean of 3.7 ± 2.3 years of experience post-MD compared to attending recipients who had 9.7 ± 4.4 years. Overall, most grant recipients had completed or were enrolled in a RCPSC-EM (64%) program, with RCPSC-PEM (14%) or RCPSC-peds (5%), CFPC-EM (11%), FACEP (4%), and FAAEM (2%) accounting for the remainder. Recipients had (or were engaged in) formal research training in the form of fellowships (61%) and/or graduate degrees (78%). Most commonly, recipients had (or were pursuing) a MSc degree (57%) in epidemiology (22%), public health (11%), or an unspecified area (24%), followed by MEd (9%) and PhD (9%) degrees. The most common project was a prospective cohort (32% of all projects), followed by surveys (21%) and chart reviews (16%). When asked about publication of CAEP research grant projects, respondents reported a high rate of success (published: abstract 82%, manuscript 52%; and in progress: abstract 5%, manuscript 25%). **Conclusion:** Our survey results indicate that the CAEP research grants have provided support for resident and junior researchers. The majority of grants were awarded to physicians with a RCPSC background, and resulted in successful publication in the majority of cases.
Keywords: grant awards, research funding, survey

MP10

Characterization of point-of-care lung ultrasound in young children with viral-induced wheeze in a pediatric emergency department

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Introduction: Young children with viral-induced wheeze pose a diagnostic challenge as there are no diagnostic tests available to differentiate bronchiolitis from reactive airway disease. Point-of-care ultrasound is an increasingly available tool for emergency physicians and may serve a role in discriminating different lung pathologies. We describe lung ultrasound findings in children with viral upper respiratory tract infections (URTI) and wheeze presenting to a pediatric emergency department. **Methods:** A cross-sectional study was conducted in children < 2 years of age presenting with URTI symptoms and wheeze to a pediatric emergency department from October 2013 to July 2014. Prior to management, one investigator (TV) performed all point-of-care lung ultrasounds and saved 5-second video clips in each of the 6 lung zones. A physician (ASD) blinded to all clinical and ultrasound information reviewed the latter and provided the final interpretations used for the main outcome measure. Abnormal lung ultrasound was defined as the presence of any of the following findings: multiple B-lines, consolidations, pleural abnormalities, or absent lung slide. The treating physician remained blinded to the findings and prospectively documented discharge diagnoses. Proportion of children with abnormal lung ultrasounds were characterized and categorized abnormalities by discharge diagnoses (reactive airway disease versus other respiratory diagnoses). **Results:** In the 96 patients enrolled (median age 11.1 months [IQR 6.7-16.1], 65% male), ultrasound was abnormal in 37/96 (38.5%). When categorized per diagnosis, an abnormal lung ultrasound was found in 0/16 (0%) with reactive airway disease, which was significantly lower than with any other diagnosis: bronchiolitis 19/43 (44.2%, $p = 0.001$), viral illness 11/29 (37.9%, $p = 0.001$) and pneumonia 7/8 (87.5%, $p < 0.0001$). There was excellent inter-rater agreement (kappa 0.89) for an abnormal lung ultrasound. **Conclusion:** Over a third of young children with *undifferentiated* wheeze had an abnormal point-of-care lung ultrasound. Given that all children with a discharge diagnosis of reactive airway disease (compared to other respiratory diagnoses) had a normal ultrasound, the next step would be to prospectively determine if lung ultrasound might help guide clinicians with the management of children with undifferentiated viral-induced wheeze.

Keywords: point-of-care ultrasound, wheeze, pediatric emergency medicine

MP11

Injury control education in pediatrics and pediatric emergency medicine in Canada

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Introduction: Injury is the leading cause of death in Canadian children. Pediatricians and pediatric emergency medicine (PEM) physicians are strategically positioned to implement and promote injury control practices. However, little is known on injury prevention and control curriculums within Canadian Pediatric and PEM training programs. **Methods:** A novel survey, based on literature review and expert input, was developed and tested prior to implementation. The target audience included all Royal College Pediatric (n = 17) and PEM (n = 10) program directors (PDs). The web-based survey was distributed from May to June 2014, using a modified Dillman technique. Our objectives were to determine the proportion of (a) Canadian Pediatric and PEM training programs with an active injury control component in their curriculum, (b) PDs who ranked injury control training within their curriculum as high priority (i.e. >8/10), and (c) PDs who agreed/strongly agreed that injury control should be a high priority topic. **Results:** Of the 27 eligible participants, 24 responded to the survey, yielding an aggregate response rate of 88.9%; response rates were 16/17 (94.1%) and 8/10 (80.0%) for Pediatric and PEM PDs, respectively. The median number of trainees enrolled in each program was 37 [IQR 25-52] for Pediatrics and 6 [IQR 5.5-7] for PEM. 57.1% [95% CI 25.0%, 84.2%] of PEM programs and 43.8% [95% CI 23.1%, 66.8%] of Pediatric programs formally incorporated injury control into their curriculum. Among these programs, 78.6% had between 1 to 5 hours of total instruction time for injury prevention. Awareness of specific training tools and inclusion of information on Parachute occurred in one program (4.2%). All PEM PDs and 85.7% of Pediatric PDs agreed/strongly agreed that injury control should be mandatory in residency training; none of these PEM Pediatric PDs reported injury control as 'high priority' currently within their curriculum. Overall, 33.3% of PEM and 7.1% of Pediatric PDs felt injury control should be a high priority topic. **Conclusion:** Approximately half of surveyed PDs incorporate injury control within their Pediatrics or PEM curriculum. Despite its established importance in optimizing health for Canada's children, most PDs do not currently agree that injury control merits high priority within the curriculum. Further research is needed to understand this position, before any changes can be effectively implemented to curriculum content.

Keywords: injury, prevention, education

MP12

Validation study of the pediatric Appendicitis Score and Alvarado Score without laboratory investigations

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Introduction: Calculation of the Pediatric Appendicitis Score (PAS) and Alvarado Score (AS) requires the white blood cell count (WBC) and neutrophil count (NC), despite their individual sub-optimal test characteristics. From the patient perspective, bloodwork may cause anxiety and pain; children with abdominal pain often first present to a primary care provider where laboratory resources may not be available. Given the aforementioned limitations of the WBC and NC for the diagnosis of appendicitis, scores relying exclusively on clinical signs/symptoms have potential benefit. We have previously calculated the test characteristics of the PAS and AS without laboratory investigations (mPAS, mAS). The objective of this study was to validate the use of the mPAS and mAS in identifying children with suspected appendicitis who may be safely discharged with close follow-up. **Methods:** We enrolled a new cohort of children aged 5-17 years presenting to a tertiary pediatric emergency department (ED) with abdominal pain who underwent either ultrasound or surgical consult to rule out appendicitis. Clinical care of the patient was left to the discretion of the managing physician after completion of a case report form detailing clinical elements of the scores. Low risk for appendicitis was defined as a mPAS or mAS <4. Appendicitis was defined as acute inflammation, rupture or abscess of the appendix on pathologic evaluation. Unscheduled return visits were tracked. Test characteristics were calculated. **Results:** Of the 88 children enrolled, 40 (45.5%) were male. The average age was 11.4 years (SD 3.4). Appendectomy was performed in 30 (34.1%) children while 27 (30.7%) had pathology proven appendicitis. Only 1 child with appendicitis would have been discharged from the ED with a mPAS (3.7%) or mAS (3.9%) <4. The sensitivity and negative predictive value (NPV) were 96.2% and 94.7% for mPAS and 96.3% and 95.7% for mAS. **Conclusion:** Children scoring <4 on a PAS or AS without laboratory investigations have a low risk of appendicitis. Our results may be of great benefit in the ED where routine use of painful bloodwork may not be warranted in this population and discharge with close follow-up is feasible. Moreover, these results have potential impact in the primary care settings for identifying which children are unlikely to

require consultation in the ED. Future ED and primary care translational initiatives are required.
Keywords: appendicitis, child, clinical score

MP13
Pediatric chest pain in the emergency department
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Introduction: Chest pain is a frequent chief complaint of pediatric patients presenting to the emergency department (ED). Despite the low risk of a cardiac cause in the pediatric population, chest pain is a worrisome presentation for patients and their families, and sometimes serious underlying pathology can occur. There is no evidence based diagnostic approach, and this results in significant practice variation often with extensive investigations, both in the ED and in follow-up. **Methods:** After REB approval, a chart review was conducted of all patients presenting to an urban pediatric tertiary care ED with the chief complaint of chest pain over a three year period. Charts were analyzed for sex, age, associated symptoms, past cardiac history, investigations in the ED, discharge diagnosis, and outpatient echocardiogram and Holter monitor findings. **Results:** Of the 473 visits, 50 were repeat visits. The mean age at visit is 12.1 years. 16.9% (n = 80) of patients reported past cardiac-related medical history. 64.9% (n = 307) of patients received chest x-ray, but only 2.9% (n = 9) had an abnormal finding. Electrocardiogram was done in 75.7% (n = 358) of the patients, and 23.7% (n = 85) of the results were abnormal. Troponin was done in 9.5% (n = 45) of the cases, with only one abnormal result unrelated to cardiac etiology. 96.0% of patients (n = 454) were discharged, and 4% (n = 19) were admitted to hospital. Most causes were idiopathic (n = 282, 59.6%), followed by musculoskeletal causes (n = 145, 30.7%). Within six months following discharge, 75 (15.9%) patients received echocardiogram, 45 (60%) of whom had no reported cardiac history or previous investigations, and 25 had normal ECG in the ED. The echocardiograms yielded only 2 cases of newly diagnosed mitral valve prolapse, and one case of small patent ductus arteriosus. 50 patients (10.6%) received Holter monitoring within six months following discharge, 20 of whom had no previous cardiac history, and had normal ECGs in the ED, and the arrhythmias found on Holter monitor correlated poorly with the presenting symptoms. **Conclusion:** This is the largest pediatric review of chest pain in Canada in published literature. Chest pain in the pediatric population are rarely due to cardiac causes, but most patients still receive unnecessary investigations in the ED, and in their follow-up visits. An evidence based diagnostic algorithm would be useful to improve resource utilization in children presenting with chest pain.
Keywords: chest pain, pediatrics, emergency department

MP15
The utility of point-of-care ultrasound in detecting distal forearm buckle fractures in pediatric patients
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Introduction: Distal forearm buckle fractures are one of the most common pediatric injuries encountered in the ED. Point-of-care ultrasound (POCUS) is being used with increased frequency for clinical assessments in pediatric patients. While it has been shown to be an effective method for detecting non-angulated transverse fractures, its utility in buckle fractures has yet to be examined. Being able to use ultrasound at the bedside could lead to quicker assessment, less radiation exposure, and less pain perceived by patients. The objective of this study was to determine the diagnostic accuracy, pain scores, and parental satisfaction of POCUS in pediatric buckle fractures. **Methods:** We conducted a prospective single arm cohort study of children aged 4-17 years who presented to the ED following injury, with distal forearm pain and no physical deformity. A clinician with ultrasound certification, blinded to radiography results, performed a bedside ultrasound with interpretation of a buckle or no buckle fracture. Primary outcome was diagnostic accuracy. Secondary outcomes were time to complete the exam, self-reported pain score using the Revised FACES Pain Scale, and parental satisfaction using a 5-point Likert scale. **Results:** Fifty-six participants were enrolled, including 35 (63%) males. The mean (SD) age was 10.8 (3.4) years. After excluding 7 participants with other fracture types, ultrasound had a sensitivity of 95% and specificity of 93% for detecting buckle fractures. The mean ($\pm$ SD) time to complete the ultrasound was 70.7 $\pm$2.9 seconds. The mean ($\pm$ SD) pain score was significantly lower for ultrasound than radiography (2.1 $\pm$2.4 v. 3.2 $\pm$ 2.9, respectively, $p = 0.04$). There was no significant difference in parental satisfaction score between ultrasound and radiography (4.7 $\pm$ 0.8 v. 4.3 $\pm$ 1.0, respectively, $p = 0.05$). **Conclusion:** Bedside ultrasound demonstrates good sensitivity and specificity for detecting distal forearm buckle fractures in children and may be less painful than conventional radiography. Our findings suggest that POCUS may be an effective diagnostic modality in the assessment of children with suspected distal forearm injuries.
Keywords: point-of-care ultrasound, buckle fractures

MP16
Pre-hospital and emergency room management of pediatric anaphylaxis
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Introduction: Anaphylaxis is a severe, potentially fatal allergic reaction. Intramuscular epinephrine is known to be a highly effective treatment, and failure to delivery epinephrine promptly is associated with increased mortality. However, it is unknown if epinephrine is used when indicated. We sought to determine the pre-hospital and emergency room management of children who present to a Canadian pediatric emergency department (PED) with anaphylaxis. **Methods:** A retrospective, cross-sectional medical review was done in a Canadian PED. Children aged 0 - 17 with a diagnosis of anaphylaxis were included in the review. Presentations between December of 2008 and 2012 were assessed for inclusion. Data were collected on a standardized form. Descriptive statistics were computed. **Results:** A total of 128 charts were reviewed. The mean patient age was 7 years (range of 4 months - 16.75 years). Fifty-nine percent (76/128) of patients were triaged as "emergency" (Level II, Canadian Triage Acuity Scale). The allergic reaction was attributed to food exposure in 83.5% (106/127) of cases. Seventy-three percent (94/128) of patients received medication prior to arriving in the ED; 43.0% (55/128) of patients received epinephrine. Other pre-hospital medications included antihistamines (66.4%; 85/128), salbutamol (16.4%; 21/128), and corticosteroids (3.9%; 5/128). Eighty-three percent (107/128) of patients received pharmacologic treatment in the PED. Antihistamines were used most frequently (59.4%; 76/128), followed by corticosteroids (58.6%; 75/128) and salbutamol (48.4%; 62/128). Eighteen percent (23/128) of patients received epinephrine in the PED. Median length of stay in the PED was 240.5 minutes (range 0-1,034 minutes). Prior to discharge, 44.4% (48/108) of patients received a prescription for an epinephrine auto-injector. **Conclusion:** Antihistamines are the most common therapy provided for

anaphylaxis, both pre-hospital and in the PED. Epinephrine was rarely administered in the PED. Given the known efficacy and safety of epinephrine in anaphylaxis, administrators should seek to translate knowledge into practice to ensure optimal management of pediatric anaphylaxis.

Keywords: pediatrics, anaphylaxis, food allergy

MP17

Observation times in pediatric head injuries and the use of an evidence based approach

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Introduction: In Canada, pediatric head injuries are responsible for 20,000 emergency department (ED) visits per year and it is one of the leading causes of death and disability in children. In the US, 50% of children presenting to an ED with a head injury will undergo CT scanning. Not only do these CTs contribute to ionizing radiation, but there is also a low detection rate of clinically important traumatic brain injury. Multiple studies have assessed the use of CT scans for head injuries and clinical decision making rules (CDMR) such as PECARN and CATCH help stratify risk. However, not many studies have focused on whether the appropriate duration of observation for children with head injuries not requiring a CT scan is followed. This study aims to assess to which extent a documented approach to observation times in pediatric head injuries in Regina is used. **Methods:** A retrospective chart review was conducted of pediatric patients (0-2 years old) who presented between April 1, 2012 and March 31, 2013 with a head injury to a Regina hospital's ED. The primary outcome was the length of stay (LOS) in the ED for observation of children who did not undergo CT. Secondary outcomes included rate of CT, use of a CDMR, and documentation of head injury advice. **Results:** The charts of 104 patients (mean age = 14.4 ± 8.6 months; 62 males) were reviewed. Using the PECARN scoring system, 58 patients (56%) had a minor head injury, 40 patients (38%) a moderate injury, and six patients (6%) a severe injury. For non-CT patients with a minor injury, the average LOS was 1:46 (± 0:58) hours (n = 39) and 2:45 (± 1:52) hours for a moderate injury (n = 27; p = .02). No patients with a minor injury had a CT scan. In the moderate injury group, eight patients (20%) had a CT, while all six patients with severe injuries received one. Only two charts indicated the use of a CDMR, both pertaining to moderate severity and used PECARN to justify observation rather than CT. A total of 51 charts (49%) had documentation that head injury advice was given verbally or in a written form. **Conclusion:** Our results show that the average LOS in patients with moderate severity injuries is about 1.6 times as long as those with a minor injury. Our rates of CT use for patients with moderate and severe injury are reasonable, and well within accepted rates in the literature. Documentation of clinical decisions, discharge times, and head injury advice could be improved.

Keywords: head injury, observation time

MP19

Derivation of a clinical decision rule for Acute Cerebrovascular Syndrome (ACVS) diagnosis in the emergency department

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Introduction: Management of acute cerebrovascular syndrome (ACVS) in emergency departments (ED) requires early diagnosis to prevent recurrent stroke and guide appropriate referral. There are no published rules to aid in diagnosis, though prognostic rules can be used (e.g., ABCD). We derived a clinical decision rule (CDR) to identify likely ACVS among patients referred from ED. **Methods:** This was an analysis of a comprehensive clinical administrative database of the Stroke Rapid Assessment Unit (SRAU) in Victoria, B.C. Review of ED-referrals to this specialized outpatient stroke unit servicing most of Vancouver Island (pop. 759,366) from 2008-2013 yielded patient risk factors, clinical characteristics, symptom onset/duration and diagnosis (made at the stroke unit after full neurological work-up). Using our training data (2008-2011, n = 1908), we derived our CDR as a logistic regression model for definite/probable/possible ACVS cases vs. mimics; unknown or other diagnoses were excluded. We assessed performance in our hold-out dataset (2012-2013, n = 1174). **Results:** Overall, there were 3082 known ED-referrals in our study (2054 cases of ACVS, mean age 69 years, 52% male). Median time from ED referral to stroke unit was 3.84 days. Statistically significant predictors of ACVS included symptoms such as face droop, arm weakness, unilateral limb weakness, speech and language disturbances, and the headache:age interaction. Our CDR had an AUC = 0.81, with sensitivity/specificity = 0.90/0.49 (predicted probability cut-off of 0.5); in comparison, the ABCD score had an AUC = 0.67 with sens/spec = 0.58/0.18 (cut-off score of 4). **Conclusion:** Though promising, our CDR is less sensitive than the acceptable median sensitivity (0.97) desired for prognostic management of ACVS per an international survey of emergency physicians (Perry et al., 2011). Prospective validation of our CDR proceeds in three ED settings in a large Genome Canada funded study (SpecTRA Study). Future work will include refinement of the CDR, development of a proteomic biomarker panel to supplement the CDR, and implementation of an electronic decision support system incorporating both clinical and proteomic information.

Keywords: clinical decision rule, transient ischemic attack, stroke clinic referrals

MP20

Comparison of patient profiles and diagnostic accuracy of suspected ACVS cases by emergency room physicians and general practitioners.

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Introduction: Early diagnosis of mild acute cerebrovascular syndrome (ACVS) enables targeted intervention and reduces risk of recurrent stroke. Many conditions however mimic ACVS. Sending these mimic cases to specialized TIA units increases wait times, delays timely intervention for real ACVS and increases recurrent stroke rates. **Methods:** The Stroke Rapid Assessment Unit (SRAU) accepts referrals from all general practitioner (GP) offices and nine emergency departments (EDs) on Vancouver Island (pop 765,000). We examined all SRAU cases with known referral source and valid diagnoses (following neurological consultation) between 2007 and 2013 (n = 8387). **Results:** 56.8% (n = 4768) of SRAU referrals were from ED physicians and 43.2% (n = 3619) from GPs. TIA risk scores (ABCD score) for ED referrals were slightly higher (mean = 3.93, t = 20.16, p < 0.01) than GP referrals (mean = 3.32). A higher proportion of ED referrals were male and GP referrals were more commonly female (χ^2 = 21.64, df = 1, p < 0.01). GP referrals were slightly younger (mean = 68.4) than ED referrals (mean = 69.3, t = 2.74, p < 0.01). The frequency of ACVS diagnosis was higher among ED-referred patients (61.5%) compared to GP-referred patients (49.2%) (χ^2 = 126.1, df = 1, p < 0.01). The most common definitive mimic sub diagnoses were migraine (22%), vestibulopathy (8%), neuropathy (7%) and syncope (6%) for both ED and GP referrals. **Conclusion:** ED physicians referred higher-risk ACVS

patients to the specialized stroke unit and 13% fewer mimics than GPs over the six-year period of study. One in five mimics seen at the stroke unit were migraine, regardless of referral source. A strategy for reducing referral of mimic patients without increasing the rate of false negatives (missed ACVS referrals) is required. Diversion of acute GP referrals to the EDs is one possibility. Another option is the development of clinical decision support tools and ACVS biomarkers that could aid clinicians in making referral decision. The latter strategy is the target of the Genome Canada *Spectrometry in TIA Rapid Assessment* project (SpecTRA).
Keywords: acute cerebrovascular syndrome, stroke clinic referrals, diagnostic accuracy

MP21

Morbidity and mortality of various etiologies of TIA or non-disabling stroke

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Introduction: The mortality and morbidity among various causes of transient ischemic attack (TIA) is unknown in the Canadian population. We aimed to determine all-cause mortality and risk of subsequent stroke among various transient ischemic attack etiologies. **Methods:** We prospectively collected data at 8 emergency departments (ED) for TIA and non-disabling strokes. Sites were tertiary university affiliated EDs and data was collected from October 2006 to October 2011. Our outcome measure was to determine all-cause mortality and risk of subsequent stroke among various etiologies of TIA and non-disabling stroke. The relative risk (based on incidence risk estimates) with 95% confidence intervals, and a χ^2 test were used to quantify the comparison. **Results:** Our study results showed a significantly higher mortality among cardioembolic TIA/non-disabling stroke, in comparison with other types of etiologies. A cardioembolic TIA/non-disabling stroke has a 7 fold increase in death with a relative risk of 7.59 95% CI (3.91-14.77). We found no morbidity (i.e. subsequent risk of stroke) difference among various TIA etiologies. **Conclusion:** Cardioembolic TIA and non-disabling stroke carry the highest mortality rate among various TIA etiologies. There is no significant difference in risk of subsequent stroke among various TIA etiologies.
Keywords: cardioembolic, TIA, mortality

MP22

Focused transesophageal echocardiography by emergency physicians for critically ill patients

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Introduction: Emergency physicians (EPs) frequently employ transthoracic echocardiography (TTE) to assist in diagnosis, therapy and prognosis of critically ill patients with acute circulatory failure or shock. Transesophageal echocardiography (TEE) offers several advantages over TTE including reliable, continuous acquisition and superior image quality. Despite these advantages, uptake of TEE by EPs remains rare. The objective of this study was to describe patterns of use, clinical findings and safety profile from the first ever TEE program implemented in to an emergency department point of care ultrasound program. **Methods:** Emergency department TEE was implemented after a 4-view, focused TEE training workshop was provided to a group of 14 EPs. All EP-performed TEE examinations conducted between February 1, 2013 and November 30, 2014 were reviewed for relevant details including operator, indication, findings, and the utilization of additional ultrasound modalities. The electronic chart of each patient was subsequently reviewed for the presence of any complications related to the examination. **Results:** 52 consecutive TEE examinations were performed by 12 different emergency physicians. For patients receiving a TEE exam, the most common presentation to the ED was vital signs absent in 33 (63%) of the patients. Correspondingly, intra-cardiac arrest care in 22 (42%), post-arrest management in 13 (25%) and hypotension in 16 (40%) of the patients were the most common clinical indications for a TEE study. The findings of each TEE exam varied in scope according to the skill set of the operator. Intra-arrest CPR assessment (43%), normal studies study (29%), LV dysfunction (27%) and hypovolemia (20%) were the most common findings. Probe insertion was successful in call cases, and on first attempt in 85%. A follow-up chart review of all patients who survived to admission and/or autopsies of those who died prior to admission demonstrated no evidence of esophageal or aerodigestive tract injury. **Conclusion:** Emergency department TEE in critically ill patients is feasible and safe with important applications, including its use as an adjunct to cardiac arrest management, a tool in critically ill patients with difficult or indeterminate TTE, or as an advanced diagnostic tool yielding information not obtainable by TTE.
Keywords: transesophageal echocardiography

MP23

Ultrasound probe motion tracking as a novel tool for PoCUS competency assessment

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Introduction: Point of Care Ultrasound (PoCUS) has become the standard of care in emergency department patient assessment. Currently, competency in PoCUS is determined by the performance of a fixed number of supervised scans, an approach supported by guidelines published by the Canadian Association of Emergency Physicians. However, such an approach is incongruent with current trends for evaluation in competency-based medical education. Procedure-based studies have demonstrated a correlation between hand motion efficiency and development of expertise. We suggest that this principle may apply to PoCUS, thus providing a more objective assessment of competency. This study quantified and compared probe motion patterns of novice versus intermediate emergency resident sonographers during a validated PoCUS examination (Focused Abdominal Sonography in Trauma; FAST). **Methods:** Fourteen novices (no PoCUS experience) and 15 intermediates (50 scans completed) performed a complete FAST exam on a healthy volunteer. Probe motion was tracked and video-recorded using the PLUS software. For each anatomical region, an expert (PoCUS fellowship-trained) used tracked ultrasound images to define several key points of interest (POIs). These expert-derived POIs were used as benchmarks against which study scans were compared. All procedures were evaluated with PerkTutor software, using the following objective metrics: percentage of POIs scanned, time of procedure, and path length of the probe. Data were analyzed using the Wilcoxon rank sum test. **Results:** Compared to the intermediates, novices scanned significantly fewer POIs ($p < 0.001$), with a median (interquartile range) of 50% (10% - 86%) versus 100 % (83% - 100%). Further, novices took significantly longer to scan the POIs (62s, 47s - 89s, v. 43s, 27s - 69s, $p < .001$) and had significantly longer path lengths (2113mm, 1199mm - 2902mm, v. 892mm, 619 - 1804mm, $p < .001$). **Conclusion:** The observed differences in scanned POIs and probe motion efficiency between novices and intermediates show promise for the use of ultrasound probe motion tracking as a quantitative method to objectively assess PoCUS competency. This novel approach is consistent with

the Royal College of Physicians and Surgeons' mandate towards competency-based assessments for residency training programs.
Keywords: PoCUS, competency-based medical education, ultrasound

MP24

Direct contact ultrasound vs. the water bath technique for point of care ultrasound localization of small, superficial, soft-tissue foreign bodies

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Introduction: Emergency department point-of-care ultrasound can be a very useful tool for identifying and localizing small, subcutaneous foreign bodies; however, there still exists variation in the scanning technique. Some prefer to use the direct contact technique (DCT), where the transducer is placed directly on the patient's skin, whereas others advocate for the use of a water bath technique (WBT), where the transducer can be held further from the skin by immersing the area of interest in water. Our study aimed to compare the sensitivity and specificity of the WBT and the DCT using small, superficial, foreign bodies in a simulated tissue model. **Methods:** 30 participants (15 with ultrasound independent practitioner certification [IPC] and 15 novice users) were given a 30-minute seminar in foreign body localization using the DCT and the WBT. Small wood and glass fragments were randomly inserted into 8 human tissue analogues (chicken thighs) at a superficial depth of 2-3mm with 8 other analogues acting as controls. All participants were blinded to the foreign bodies and were given one minute to scan each analogue. Participants scanned all 16 analogues. **Results:** Using the WBT, the IPC group and the novice group located 39 and 40 of 60 foreign bodies, respectively. Overall sensitivity using the WBT was 65.8% (95% CI 56.6-74.2%), whereas specificity was 77.5% (95% CI 69.0%-84.6%). Using the DCT, IPC participants located only 22, and the novice group 32, of 60 foreign bodies. Sensitivity using the DCT was 42.5% (95% CI 35.91 % to 54.35 %), and specificity was 78.3% (95% CI 70.0-85.3%). 22 of 30 (73.3%) study participants stated the water bath provided superior image quality; additionally 20 of the 30 (66.7%) participants stated the WBT was easier to perform. **Conclusion:** The WBT appears to have a greater, statistically significant success rate, in comparison to the DCT, when attempting to locate small, superficial foreign bodies. Specificity was generally high for both techniques. These results further strengthen the notion that the WBT should be used over the DCT when dealing with suspected superficial foreign bodies in the emergency department. Low sensitivities with the DCT emphasize the inadequacy of assessing superficial structures with that technique.
Keywords: ultrasound, foreign body, water bath

MP25

Assessing future fetal viability following ED point of care ultrasound for vaginal bleeding in early pregnancy

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Introduction: Spontaneous abortion occurs in approximately 20% of all pregnancies, 80% of which happen in the first 12 weeks of gestation. For patients presenting to the emergency department (ED) with vaginal bleeding in early pregnancy, point of care ultrasound (POCUS) provides immediate information about their pregnancy, such as evidence of an intrauterine pregnancy (IUP) and fetal cardiac activity (FCA). The objective of this study was to determine the fetal viability at 40 weeks for patients with POCUS-confirmed IUP and FCA in the ED. **Methods:** This was a prospective, observational cohort study of consecutive pregnant patients < 20 weeks gestation presenting to a tertiary care center with vaginal bleeding from September 2013 to February 2014. CEUS-certified independent practitioners (22 emergency physicians and 1 nurse practitioner) performed focused, trans-abdominal POCUS in the ED and presence or absence of IUP and FCA was documented. The primary outcome was fetal viability at 40 weeks (or term), confirmed by telephone follow-up with the patient and/or electronic documentation. Positive predictive values (PPV) and negative predictive values (NPV) are reported with 95% confidence intervals (CIs). **Results:** 85 women were enrolled, 4 were lost to follow-up. Mean (SD) gestation was 9.7 (2.8) weeks. IUP was identified using POCUS in 50 (61.7%) patients and FCA was detected in 40 (49.4%) patients. Of those with identified IUP, 39 (78.0%) had viable pregnancies and 11 (22.0%) had miscarriages (PPV = 78.0%; 95% CI: 64.0, 88.5%; NPV = 93.6%; 95% CI: 78.5, 99.0%). Of the 31 patients without evidence of IUP at their index ED visit, 2 (6.4%) had live births. For patients with detected FCA, 38 (95.0%) had viable pregnancies and 2 (5.0%) did not (PPV = 95.0%; 95% CI: 83.1, 99.2%; NPV = 92.7%; 95% CI: 80.1, 98.4%). Of the 41 patients without evidence of FCA at their ED visit, 3 (7.3%) had live births. **Conclusion:** In this cohort of women presenting to the ED with bleeding in the first 20 weeks of pregnancy, detection of IUP and especially FCA on POCUS performed by a CEUS-certified providers was associated ongoing viable pregnancy. This acquired skill allows ED physicians to reassure patients and safely discharge them home from the ED with appropriate outpatient follow-up.
Keywords: vaginal bleeding, ultrasound, spontaneous abortion

MP26

International scope of emergency ultrasound: barriers to utilizing ultrasound to guide central venous catheter placement by providers in Kenya

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Introduction: While ultrasound (U/S) use for internal jugular central venous catheter (CVC) placement is standard of care in many institutions in North America, most developing countries have not adopted this practice. Previous surveys of American physicians who are not currently using U/S to place CVCs have identified lack of training and equipment availability as the most important barriers to the use of U/S. We sought to identify Kenyan physicians' perceived barriers to the use of U/S to guide CVC insertion in a resource-constrained environment. **Methods:** The study was conducted at the Aga Khan University Hospital in Nairobi, Kenya. Physicians participating in a one-hour course teaching U/S guided CVC placement were asked to complete a survey before beginning training, which was used to assess previous experience with U/S, and evaluate perceived barriers to U/S. Survey responses were analyzed using summary statistics and the Rank-Sum test to compare the difference between participants' responses based on different specialty, gender and previous history of using U/S. **Results:** There were 23 physicians who completed the course and the survey. They included 6 internal medicine, 5 critical care, 5 anesthesia, 2 emergency medicine and 5 physicians from other specialties. The mean length of practice was 5 years. 52% (95% CI: 0.30-0.73) had put in >20 CVCs. 21.7% (95% CI: 0.08-0.44) of participants had previous U/S training, but none have received any training on the use of U/S for CVC insertion. The respondents expressed agreement on the ease of the use, improved success rate, and decreased failure rate with U/S guidance. However, less agreement was found regarding the perceived superior convenience and cost effectiveness of U/S CVC placement. The lack of training or comfort with the U/S and the availability of U/S and equipment to

maintain sterility were reported as the main barriers for use. Neither previous U/S experience nor specialty of the respondent significantly affected responses. **Conclusion:** Barriers to the use of U/S guidance for the placement of CVCs in Nairobi, Kenya are similar to those found among American physicians. These include training and comfort level with U/S in placement of CVCs, as well as resources required for U/S equipment and to keep the field sterile.
Keywords: ultrasound, venous access, international EM

MP27

Emergency department point-of-care ultrasound in symptomatic early trimester patients: a description of practice management patterns

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Introduction: Point-of-care ultrasound (POCUS) has played an increasing role in the emergency department (ED) evaluation of symptomatic, pregnant women in their first-trimester. Although many studies highlight the benefits of POCUS when an intrauterine pregnancy (IUP) is confirmed, a significant number of patients have indeterminate studies. This study describes the current management of patients with determinate and indeterminate POCUS studies in two urban tertiary-care EDs. **Methods:** In this retrospective chart review, 100 patients of ages 18-52 were randomly selected from all ED visits in a one-year period (January to December 2013) with a documented positive βHCG during their ED visit. Patients who were not pregnant or over 20-weeks gestation, or those with chief complaints other than abdominal/pelvic pain, vaginal bleeding, and/or syncope/pre-syncope, were excluded. Charts were reviewed to determine whether POCUS was performed and the documented interpretation by the physician. Demographics, further diagnostic imaging, management plans, and diagnosis were also recorded. **Results:** 11 charts were excluded based on the exclusion criteria. Of the remaining patients, 73% (65) had a documented POCUS examination. 52% of patients who had POCUS scans were documented as IUP. Patients who had an IUP on POCUS scanning alone were more likely to be discharged home with family physician follow-up (70%) than non-determinate (NDIUP) patients (9.7%) or no-POCUS patients (29%). Immediate and outpatient specialist referral were both less frequent in patients with IUP (5.9%, 24%) than NDIUP (23%, 58%) and no-POCUS (25%, 29%), respectively. Formal radiology consultation was also reduced in IUP patients (12%) compared to NDIUP (32%) and no-POCUS (29%). **Conclusion:** In patients with determinate early trimester POCUS studies, there was a reduction in both comprehensive radiologic investigations requested and overall specialty service consultation. Despite this potential benefit, 27% of patients in our review did not have ED POCUS study. This may represent a lack of physician training or comfort with POCUS, or lapse in documentation. Management strategies in NDIUP and no-POCUS patients were heterogeneous with specialist service consultation. Further research will examine differences in practice management strategies after implementation of a multidisciplinary care pathway incorporating the use of POCUS.
Keywords: point-of-care ultrasound, first trimester vaginal bleeding, pregnancy

MP28

Test characteristics of a highly-sensitive troponin T assay performed at ED arrival in patients with suspected acute MI

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Introduction: Serum cardiac troponin (cTn) testing is the cornerstone of diagnostic testing for emergency department (ED) patients with suspected acute myocardial infarction (AMI). New generation "highly sensitive" assays can reliably detect circulating cTn levels below the 99th percentile of normal that defines an AMI. Highly sensitive assays may enable rapidly ruling-in or ruling-out AMI when performed at the time of patient arrival in the ED. The objective of this study was to quantify the sensitivity and specificity of various cutoff levels of a highly sensitive troponin T assay (hsTnT) for major adverse cardiac events (MACE) when performed at the time of ED arrival. **Methods:** Consecutive emergency department patients with a triage code of "Chest Pain-Cardiac Features" from four urban EDs over one year were included. Patients with ST-elevation MI were excluded. Serum hsTnT levels and outcomes were obtained from linked administrative databases, including the provincial vital statistics registry. The primary outcome was the incidence of MACE (all-cause mortality, AMI, revascularization, ventricular arrhythmia) within 7, 30 and 90 days of ED presentation. Sensitivity, specificity and 95% confidence intervals were calculated for selected cutoff values, including the 99th percentile of normal (14 ng/L). **Results:** 12,783 patients were included. The incidence of MACE at 7, 30, and 90 days was 15.8%, 15.9% and 16.1%. The sensitivity of an undetectable (<3ng/L) hsTnT level for 7, 30 and 90d MACE was 99.0, 99.0 and 99.1% with a specificity of 15.3, 15.5 and 15.6%. The sensitivity of a hsTnT level <14ng/L was 81.7, 81.3 and 80.0% for 7, 30 and 90d MACE with a specificity of 79.7, 78.1 and 78.6%. The sensitivity of a hsTnT level <30ng/L was 63.2, 60.0 and 58.5%, with a specificity of 92.2, 92.5 and 96.6% for 7, 30 and 90d MACE. **Conclusion:** An undetectable hsTnT level at ED arrival identifies a low-risk population of chest pain patients who do not require further investigation or admission. A hsTnT level of 30ng/L at the time of ED arrival may identify high-risk patients who warrant urgent risk stratification. Patients with hsTnT levels between 3-30 ng/L should undergo serial hsTnT testing to optimize sensitivity and specificity for MACE. The 99th percentile of normal hsTnT is insufficiently sensitive or specific to guide clinical decision-making when measured at the time of ED arrival.
Keywords: acute coronary syndromes, troponin

MP29

Prognostic utility of an undetectable baseline highly-sensitive troponin T level in ED chest pain patients

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Introduction: Highly-sensitive cardiac troponin assays offer the promise of more rapid detection and exclusion of myocardial infarction (MI) in emergency department (ED) patients with suspected acute coronary syndrome (ACS). This study examined the risk of major adverse cardiac events in ED chest pain patients with very low or undetectable highly-sensitive troponin T (hsTnT) levels at the time of ED arrival. **Methods:** ED patients with a chief complaint of "chest pain - cardiac features" who had at least one high-sensitivity troponin T (hsTnT) assay performed in the ED were identified using administrative databases during the 2013 calendar year. Patients with ST-elevation MI were excluded. Outcome data were obtained from linked administrative healthcare databases including provincial vital statistics. Outcomes included Major Adverse Cardiac Events (MACE: all-cause mortality, MI, revascularization, cardiac arrest, ventricular arrhythmia) within 7, 30, and 90 days of the index ED visit (including outcomes

occurring on the date of the index visit). **Results:** 12,783 patients were included in the study. The incidence of MACE at 7, 30, and 90 days was 15.7%, 15.9% and 16.1%. One patient with low or undetectable hsTnT levels died within 7 days of their index ED visit (0.08%, 95% CI 0.03-0.23%), with two additional deaths between days 7 and 30. None of these deaths were from a cardiac cause. Among 1,809 patients with undetectable hsTnT levels (<3ng/L) at the time of ED arrival the 7-, 30- and 90-day incidence of MACE was 0.6% (95%CI 0.3-1.0%), 0.7% (95%CI 0.4-1.2%) and 0.7% (95%CI 0.4-1.2%) respectively. Among 3,848 patients with very-low hsTnT levels (<5ng/L), the 7-, 30- and 90-day incidence of MACE was 0.8% (95% CI 0.6-1.1), 1.0% (95%CI 0.7-1.3%), and 1.1% (95% CI 0.8-1.5%) respectively. **Conclusion:** 30% of ED chest pain patients have very low or undetectable hsTnT level at the time of ED arrival. These patients have a very low risk of short- and intermediate-term adverse cardiac outcomes and may be suitable for rapid ED discharge and outpatient investigations. This finding will likely lead to substantial savings in ED length of stay and inpatient admissions for a large proportion of low-risk patients. Further work will identify optimal timing and outcome-based cutoffs for serial troponin assays for patients with detectable serum troponin levels.
Keywords: chest pain, acute coronary syndromes, troponin

MP30

Can paramedics safely transport patients with ST-segment myocardial infarction (STEMI) to a PCI-capable centre within a 45-minute transport window?

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Introduction: The regional CODE STEMI protocol involves identification of STEMI patients via electronic interpretation of pre-hospital ECGs, pre-hospital communication with the interventional cardiologist, and direct transport to a PCI-capable center, often "bypassing" emergency departments in non-PCI capable centers. The American Heart Association recommends that bypass be considered when first medical contact-to-balloon (FMC2B) times are relatively short (≤90 minutes) and transport times are <30 minutes. Extension of the transport time increases accessibility to primary PCI; we hypothesize that a modest increase in transport time to 45 minutes will not be associated with an increase in significant adverse events (AE). **Methods:** This is a prospective observational study comparing the proportion of critical AE between short (<30 minute) and long (31-45 minute) patient transports. Critical AE have been defined as cardiac arrest during care by paramedics and/or diversion to a hospital other than the PCI-capable center due to patient instability. There are two secondary outcomes. The first is a composite of non-critical AE during transport, including tachycardia (>150bpm), bradycardia (<45bpm), new arrhythmia, decreased GCS, hypoxia (oxygen saturation <92% on facemask), and need for assisted ventilation. The second is the proportion of patients in each group achieving an FMC2B ≤90 minutes. **Results:** 245 patients were enrolled, with 202 in the short group and 43 in the long group. 2 (4.7%) long patients and 3 (1.5%) short patients experienced cardiac arrest while in paramedic care ($p = 0.18$). This required diversion to a community hospital for both patients in the long group. 3/43 (7%) long patients experienced a non-critical AE vs. 37/202 (18.3%) in the short group ($p = 0.068$). FMC2B times were available for 184 patients. 10/33 (30%) of patients in the long group met the FMC2B target vs. 109/151 (72%) in the short group ($p < 0.01$). **Conclusion:** In this study, most STEMI transports were not complicated by patient instability. The rate of critical AE was very low, and was similar between long and short transports. Patients with 31-45 minute transports were unlikely to meet the FMC2B target of ≤90 minutes, suggesting a role for process improvement to better expedite reperfusion therapy in this group.
Keywords: prehospital care, cardiology, STEMI

MP31

Predicting the risk of major cardiac adverse event for emergency department patients with suspected ACS using the modified HEART score

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Introduction: Most validated clinical decision rules for risk stratification of patients presenting to the emergency department (ED) with suspected acute coronary syndrome (ACS) include subjective elements or require repeat laboratory investigations, limiting widespread adoption. The HEART score is potentially useful; but also relies on the subjective evaluation of clinical history. The objective of this study was to modify the HEART score using objective criteria and evaluate its performance. **Methods:** This was a secondary analysis of prospectively collected data for adult patients presenting to an academic ED with suspected ACS over a four-year study period. Eligible patients included those with a troponin ordered in the ED according to a medical directive. Clinical history was quantified using points (1 point for each) assigned for specific elements; central chest pain, chest pain radiating to the neck, jaw, shoulder or arms; chest pain aggravated by exertion, chest pain alleviated by nitroglycerin, chest pain squeezing in nature, chest pain similar to previous angina, or chest pain associated with shortness of breath, nausea/vomiting, diaphoresis, or (pre)syncope. A modified HEART score was used to stratify patients into low, intermediate and high risk categories. The primary endpoints were major cardiac adverse cardiac events (MACE) of myocardial infarction, cardiac arrest, death or coronary re-vascularization at 30 days and 6 months. **Results:** 1569 patients were included in this study. Mean (SD) age was 61.2 (16.4) years and 791 (50.4%) were male. Of the 501 (31.9%) patients identified as low risk; 7 (1.4%) had a MACE within 30 days and 3 (0.6%) additional patients went onto have MACE within 6 months. Of the 948 (60.4%) identified as intermediate risk; 115 (12.1%) had MACE within 30 days and an additional 27 (2.8%) patients had MACE within 6 months. The remaining 120 (7.6%) patients were identified as high risk; 56 (46.7%) had a major event within 30 days and 1 (3.2%) additional patient went onto have MACE within 6 months. **Conclusion:** A modified HEART score using objective criteria is capable of stratifying undifferentiated ED patients into low, intermediate and high risk for MACE at 30 days and 6 months. This tool compares favourably to others and may be useful in identifying patients who clearly require admission, as well those who can be safely discharged home.
Keywords: troponin, chest pain, risk score

MP32

Emergency department management of syncope - need for standardization and improved risk-stratification

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Introduction: Variations in emergency department (ED) syncope management have not been well studied. The objectives of this study

were to assess the variations in ED management across the study sites after accounting for patient case mix; assess the variations in risk-adjusted outcomes across the study sites; and analyze emergency physicians' risk perception and disposition decision-making. **Methods:** We conducted a prospective study of adults with syncope in 6 EDs in 4 cities over 32-months. We collected patient characteristics, ED management, disposition, physicians' prediction probabilities at index presentation and followed patients for 30 days for serious outcomes: death, myocardial infarction (MI), arrhythmia, structural heart disease, pulmonary embolism, significant hemorrhage, or procedural interventions. We used descriptive statistics, ROC curves, and regression analyses. **Results:** We enrolled 3,662 patients: mean age 54.3 years, and 12.9% were hospitalized. Follow-up data were available for 3,365 patients (91.9%) and 345 patients (10.3%) suffered serious outcomes: 120 (3.6%) after ED disposition including 48 patients outside the hospital. After accounting for differences in patient case mix, the rates of ED investigations and disposition were significantly different ($p < 0.0001$) across the 4 study cities (Figure 1); as were the rates of 30-day serious outcomes ($p < 0.0001$) and serious outcomes after ED disposition ($p = 0.0227$). There was poor agreement between physician risk perception and both observed event rates and referral patterns ($p < 0.0001$). Up to 23.3% (95%CI 26.4-32.9) of patients with serious outcomes were not appropriately referred. **Conclusion:** There are large and unexplained differences in ED syncope management. There is poor agreement between physician risk perception, disposition decision-making, and serious outcomes after ED disposition. A valid risk-stratification tool will help standardize ED management and improve disposition decision-making.

Keywords: clinical decision making, resource utilization, syncope

MP33

Is there a relationship between ST-segment elevation myocardial infarction (STEMI) presentation frequency and facility treatment quality? Results from a Canadian provincial registry

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Introduction: Almost half of ST-segment elevation myocardial infarction (STEMI) patients present directly to community hospitals. Since it has been shown that the volume of STEMIs presenting through an emergency department (ED) can have an effect on treatment quality measures, the current study seeks to determine if a similar relationship exists in our population. **Methods:** This prospective cohort study using data from the New Brunswick Heart Centre (NBHC)'s STEMI database identified 1196 cases of STEMI between December 2010 and April 2013. Patients were stratified into 3 groups (High-H, Medium-M, and Low-L volume) based on the annual volume of STEMIs seen at their presenting centre. Quality of care determinants including the percent of cases adhering to door-to-ECG (D2E), ECG-to-needle (E2N) and door-to-needle (D2N) time guidelines were then determined and compared between the 3 groups. **Results:** Mean age of the 1,188 cases was 61.3 years; 73.8% were male; and 69.0% underwent fibrinolysis. The total rates of guideline adherence were 43.7%, 44.9% and 47.5% for D2E, E2N and D2N times, respectively. There was no significant difference in the rate of guideline adherence between the three groups (H, M, L). The mean D2E time was 20.1 ± 46.0, 27.8 ± 110.9 and 20.2 ± 70.6 for H, M, and L volume centres, respectively ($p = 0.548$). The 90^{th} percentile D2E times were 29, 33 and 39 minutes for the centres, respectively and all three groups had very similar rates of adherence to guidelines ranging between 42-45% ($p = 0.823$). **Conclusion:** We found no difference in the rates of adherence to STEMI care guidelines between centres, though adherence was lower than reported elsewhere. Further efforts should be undertaken to identify causes of delayed STEMI management in our population which may improve overall outcomes.

Keywords: STEMI, quality indicator, emergency department

MP34

Regional changes in Methicillin-Resistant *Staphylococcus aureus* in purulent skin and soft tissue infections among patients presenting to Canadian emergency departments

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Introduction: Community-associated methicillin-resistant *Staphylococcus aureus* (MRSA) has emerged as a leading cause of purulent skin and soft tissue infections (SSTI). The evolving prevalence of MRSA in SSTIs across Canada is not well described. The objective of this study was to characterize the changing prevalence and microbiology of MRSA in patients presenting to EDs across Canada over a 5 year study period. **Methods:** Using a prospective, observational design, patients presenting to 26 hospital EDs in 7 provinces with acute purulent SSTIs were enrolled over 3 phases: P1-7/1/2008 to 4/30/2009; P2-1/16/2012 to 11/30/2012; and P3-4/28/2013 to 3/31/2014. Participating EDs collected wound swabs on all patients with purulent SSTIs. Eligible patients were those whose wound cultures grew *S. aureus.* Standard antimicrobial susceptibility testing was undertaken on all isolates. Pulsed-field gel electrophoresis, PVL gene (PCR), SCCmec work is ongoing on MRSA isolates. **Results:** There were 4,680 (P1: 1340; P2: 1623; P3: 1717) *S. aureus* positive encounters during the study period. Accounting for all sites, the overall MRSA prevalence decreased significantly between P1 (31%) and P2 (27%, $p = 0.005$), and remained unchanged in P3 (27%, $p = 0.42$). A similar trend was observed among the 12 sites that participated in all 3 phases. Among the 18 sites participating in at least two study phases, most (56%) experienced a declining trend in MRSA prevalence, while 28% observed an increase (3 Ontario and 2 Alberta sites). City-level analyses revealed variability in the MRSA prevalence. Most cities experienced a decrease in the prevalence, with Calgary, AB observing the greatest decrease (P1: 91%, P3: 29%, $p < 0.01$). The highest prevalence was seen in British Columbia (P1: 44%, P2: 66%, P3: 53%), Saskatchewan (P2: 47%, P3: 44%), and Alberta (P1: 48%, P2: 28%, P3: 30%), while the lowest prevalence was observed in Quebec (P1: 20%, P2: 19%, P3: 11%). **Conclusion:** MRSA prevalence continues to evolve across Canada. While the overall Canadian prevalence of MRSA in SSTIs remains substantial, it is variable across the country and may be decreasing regionally.

Keywords: MRSA, skin and soft tissue infection, emergency medicine

MP35

Improved survival with implementation of an emergency department sepsis bundle: a process improvement initiative

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Introduction: Despite increased availability of broad-spectrum antibiotics and advances in diagnostic testing, sepsis continues to be a critical issue worldwide. Our group formed a multidisciplinary sepsis committee, conducted an emergency department (ED) process of care analysis and developed a quality improvement protocol. The objective

of this study was to evaluate the effects of this sepsis bundle on patient mortality. **Methods:** This before and after study was conducted in two large Canadian tertiary care EDs and included adult patients with suspected severe infection meeting at least two systemic inflammatory response syndrome (SIRS) criteria. We studied the implementation of a sepsis bundle including new triage flagging, fast-tracked allocation to monitored areas, nurse-initiated medical directive to expedite initial investigations and fluid resuscitation, sepsis education campaigns and a modified sepsis protocol. The bundle was a collaborative effort and was derived through process mapping, stakeholder feedback and ED-walk-throughs. The primary outcome was 30-day all-cause mortality and use of the sepsis protocol. Change from pre- to post-intervention was described using absolute risk difference together with 95% confidence interval and we conducted multivariable logistic regression analyses to adjust for potential confounders. **Results:** We included a total of 167 and 185 patients in the pre- and post-intervention analysis respectively, and they were very similar for baseline characteristics. All-cause mortality was significantly lower in the post vs pre-intervention group (17.3% v. 30.7%, absolute difference, 13.4%; 95% CI, 9.8-17.0; $p = 0.006$). There was also a higher rate of sepsis protocol use in the post-intervention group (80.5% v. 20.3%, absolute difference 60.2%; 95% CI 55.1-65.3, $p < 0.001$). The adjusted odds ratio for mortality in the post-intervention period was 0.51 (95% CI, 0.28 to 0.92; $p = 0.026$). In the post- period we also found shorter time-intervals from triage to MD assessment, first fluid bolus and antibiotic administration, as well as lower rates of vasopressor requirement and ICU admission. **Conclusion:** Our quality improvement sepsis bundle led to decreased mortality, increased protocol use, and improved processes of care for septic patients. Canadian EDs could substantially reduce mortality by adopting similar bundled approaches to sepsis management.

Keywords: sepsis, sepsis bundle, process improvement

MP36

The timely availability and correlates of code status in oncology patients presenting to the ED

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Introduction: Oncology patients frequently present to the emergency department (ED) in the last 6 months of their life. These visits are associated with a high admission rate and 13-20% of these visits lead to death. There are no specific studies on advance directives in oncology patients. The primary objective of this study was to determine the percentage of oncology patients presenting to the ED who have a code status identifiable within their electronic medical record. **Methods:** First, a convenience sample physician cased-based survey was conducted. Second, a retrospective chart review was performed by two independent reviewers who were blinded to the study objectives. All adult patients with an ED presentation leading to admission under an oncology service over a four month period were included. Backward stepwise logistic regression was used to determine which variables affected code status documentation. **Results:** 41 ED physicians responded to the survey. Physicians indicated they would not search for a code status in 36.9% of cases. For those cases in which physicians would search for a code status, the median acceptable time frame was 5 minutes (IQR 3,10). Code status was documented in 34 (16.2%) of the 209 charts reviewed. The longest documented search time was 4.3 minutes. Search time was less than two minutes for the majority (79.4%) of patients with a documented code status. Age, gender, and presence of metastases did not influence likelihood of code status documentation. Previous admission to an oncology service through the ED was significantly associated with having a code status documented (OR 9.30, 95% CI 3.97, 21.70). **Conclusion:** Rates of code status documentation among oncology patients presenting to the ED are quite low. Time required to locate a code status within the patient's electronic medical record is surprisingly brief, with the majority obtained within two minutes.

Keywords: code status, oncology, medical record

MP37

Variability in emergency physician care for severe sepsis: how do we measure up?

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Introduction: In patients with severe sepsis and septic shock delays in recognition and timely administration of appropriate antibiotics have been shown to increase mortality. Despite this robust relationship, most emergency physicians are unaware of their personal performance in regards to this important marker of sepsis care. We sought to explore MD variation on key performance metrics in sepsis care using administrative data as a prelude to generating aggregate and individual physician-specific reports. **Methods:** Eligible severe sepsis patients were identified by: 1) An infection-related primary admitting ICD-10 diagnostic code, 2) An elevated lactate (≥2.0mmol/L) and 3) Receiving antibiotics while in the ED. We assessed a 3-year period from 2011 to 2013 and included 4 hospital sites. Multiple ED-specific time-points were fed into a common administrative database. Our primary outcome of sepsis care was the time from meeting criteria for severe sepsis to first antibiotic administration. Other indicators of quality sepsis care and compliance with published guidelines were evaluated on both an aggregate and individual level. Descriptive statistics were used for all metrics with median and interquartile range employed for the primary outcome. **Results:** There were 2197 severe sepsis patient visits cared for by 146 emergency physicians in our sample. The median time from meeting criteria for severe sepsis to antibiotic administration was 41mins (IQR = 7 to 101mins) with 441(20%) patients experiencing in excess of a 120min delay. Median time from triage to ordering of a serum lactate was 72mins (IQR = 38 to 151mins) with 453(21%) of patients having a delay greater than 3 hrs. Serial lactate was ordered in only 44% of cases, with 82% of those demonstrating a reduction in that level. Blood cultures were drawn in 86% of severe sepsis patients. **Conclusion:** ED physicians demonstrate significant variation in practice, which has the potential to adversely affect patient care. Time to antibiotics, and other markers of severe sepsis care, can be defined from administrative data and reported back to physicians.

Keywords: sepsis, antibiotics, variability

MP38

Quality improvement systems for patient-important outcomes in resuscitation

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Introduction: Despite the intuitive appeal that quality measurement improves clinical outcomes in resuscitation, the evidence to draw firm conclusions regarding quality measurement interventions in resuscitation systems has never been evaluated and synthesized. We sought to determine, among health care professionals and health care systems that

care for patients in cardiac arrest, if a quality measurement system compared to no quality measurement system affects patient- or system-level outcomes. Methods: We performed a systematic review of the literature for quality measurement systems in out of hospital and in hospital resuscitation comparing them to no quality improvement system. We used AMSTAR criteria for the conduct of systematic reviews. We searched EMBASE, Medline and grey literature. Article selection involved two independent reviewers and adjudication by a third if needed. Articles underwent quality assessment using GRADE criteria. Meta analysis was considered. Results: Out of Hospital Cardiac Arrest - For survival to hospital discharge four observational studies enrolling 6983 patients constituted low quality of evidence due to indirectness, imprecision, and inconsistency. Heterogeneity prevented calculating a pooled effect. Use of quality measurement was either equal to or better than no quality measurement. In Hospital Cardiac Arrest - For survival to hospital discharge two observational studies, constituting low quality evidence enrolling 318 patients showed neither benefit nor harm associated with quality measurement. However, a third study showed improvement for neurological outcomes. Furthermore, three observational time-series studies (Bradley, Rittenberger, Jiang) enrolling 105003 patients gave a very low quality evidence due to indirectness, imprecision, and inconsistency. Heterogeneity prevented calculating a pooled effect. Individual effects were in favour of quality measurement in 2 studies (Bradley, Rittenberger) and showed no effect for the third study (Jiang). Conclusion: Across studies the direction of the effect was consistent favoring quality improvement and at times the effect size was large and statistically significant. Data collection and feedback to providers at the individual and system level improved outcomes although confidence in estimates of effect was low or very low. Quality improvement strategies in organizations that treat cardiac arrest appear to yield favorable outcomes.

Keywords: quality improvement, cardiac arrest, resuscitation

MP39

Post-intubation hemodynamic instability in intensive care unit patients: a multicenter study

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Introduction: Post-intubation hemodynamic instability (PIHI) is an adverse event that may occur during emergent endotracheal intubation (EETI) of critically ill patients. Despite the commonly held tenant that EETI is a life-saving procedure, it is possible that the development of PIHI in patients requiring EETI may result in less than optimal outcomes. The goal of this study was to determine the incidence of PIHI and its association with outcomes in critically ill patients requiring EETI. **Methods:** Four tertiary care hospitals participated in this retrospective multicenter case series study between October 2006 and July 2010: QEII Health Sciences Centre (Halifax, NS), Hôpital de L'Enfant-Jésus (Quebec City, QC), The Ottawa Hospital (Ottawa, ON), and Hamilton General Hospital (Hamilton, ON). Patients over age 16 who required intubation under the direction of the intensive care unit (ICU) service were eligible. Medical records were accessed for 100-250 consecutive patients admitted to the ICU at each site. Overall, 479 patients requiring intubation were included for analysis. Data extracted from medical records included vital signs, intravenous fluid administration, and vasopressor medication use in the peri-intubation phase 30 minutes before and after intubation. Our primary outcome was the incidence of PIHI. Secondary outcomes included mortality, length of stay, hemodialysis requirement, vasopressor requirement, and a composite endpoint consisting of overall mortality, ICU length of stay >14 days, duration of mechanical ventilation >7 days, and renal replacement therapy requirement. **Results:** Overall, the incidence of PIHI among ICU patients requiring intubation was 46% (218 of 479 patients). Patients who developed PIHI had increased ICU mortality (37 % PIHI, 28% no-PIHI), overall mortality (39% PIHI, 30% no-PIHI), vasopressor requirement (48% PIHI, 33% no-PIHI), and the composite endpoint (71% PIHI, 52% no-PIHI). On multivariate analysis, PIHI was not associated with increased patient mortality, but was associated with the composite endpoint (OR 1.87, 95% CI 1.23-2.83). **Conclusion:** Our results demonstrate PIHI is a common adverse event in ICU patients requiring emergency airway control and associated with increased poor patient outcomes. Further investigation is required to delineate the importance of PIHI in EETI.

Keywords: post-intubation hemodynamic instability, endotracheal intubation, intensive care unit

MP40

Practice variation in the early pregnancy bleeding patient amongst Canadian emergency physicians

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Introduction: Bleeding in early pregnancy (<20 weeks) is a common ED presentation, accounting for 1.6% of all ED visits. A significant number of these patients have life-threatening illness, and nearly 50% will miscarry. Pelvic examination has traditionally been considered essential in the management of these patients, but recent evidence has questioned the reliability of this exam. **Methods:** A survey was distributed to emergency physicians and practitioners that were members of the Canadian Association of Emergency Physicians, evaluating the physician's management practices of patients with bleeding in early pregnancy. Responses were collected randomly, and the authors were blinded to any identifying information. A stepwise multiple regression analysis was used to predict the likelihood of performing a pelvic exam from 10 independent variables collected in the survey. **Results:** There were 466 respondents that completed the survey (69% male, 31% female). Respondents were trained as CCFP (9%), CCFP-EM (54%) or FRCPC (30%), and represented a wide range of practice experience and location. 70% of physicians did not always perform pelvic examination, and a majority (61%) felt that it does not change management. 18% of physicians reported rarely or never performing pelvic examination, and 30% of physicians almost always did so. 51% of respondents felt that it aids in diagnosis, or is a "standard of care" (36%). Physicians that more often perform a pelvic exam had been practicing less than five years, were more likely to perform ED ultrasound, and were more likely to arrange formal ultrasound (non-significant). The best predictor of performing a pelvic examination was physician female gender ($p < 0.01$). **Conclusion:** The survey shows that considerable variability exists amongst Canadian emergency practitioners in the use of pelvic examination for early pregnancy bleeding. A majority of physicians do not routinely perform this exam, and many felt that it does not change management. However, many physicians feel that this exam periodically aides diagnosis. This heterogeneity in practice patterns reflects the mixed literature on this subject, and different interpretations of the "standard of care". The growing number of emergency physicians that are performing ED ultrasonography, and the availability of formal radiology ultrasound, emphasizes the need for further study in this area, and definitive practice guidelines.

Keywords: pregnancy, pelvic examination, survey

MP41

Bundling elements of sepsis care can improve ED care for patients admitted to internal medicine

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Introduction: The 2012 Surviving Sepsis Guidelines introduced evidence-based 3-hour and 6-hour quality indices to optimize early resuscitation for septic shock patients; however, it is uncertain whether sepsis bundles improve outcomes for patients who are more stable. We sought to assess performance in quality measures of emergency department (ED) sepsis care for patients who were admitted to the ward. **Methods:** An inter-professional team developed a sepsis management bundle including three elements: 1) triage flagging; 2) sepsis lab panel; and 3) pre-printed order set to standardize ordering of antibiotics, fluids and serial lactates. A seven month (September 2013 - April 2014) retrospective chart review of all ED patients admitted to Internal Medicine (non-ICU and step-up) with pneumonia, sepsis or urosepsis was conducted after bundle introduction at a single site. Outcomes were time-based from triage and in-hospital mortality. **Results:** 188 cases were identified: 45 (24%) had 2 elements (lab panel, order set) with remainder managed by usual care. Patients with at least these two elements of the bundle had improvement in (mean, SD): EP ordering initial lactate (100 v. 61%), time-to-lactate (1:31 ± 1:23 v. 2:03 ± 2:13 hr) and serial lactate if initial >4mmol (100 vs 80%); EP ordering antibiotics (91 v. 81%), time-to-antibiotics (2:42 ± 1:24 v. 3:42 ± 2:16 hr); receiving 3L fluids (38 v. 10%); transfer to ICU during admission (2 v. 8%) and mortality (4 v. 13%). Usual care fared better with patient flow measures: time-to-admit (5:57 ± 2:39 v. 5:46 ± 2:13 hr) and ED LOS (17:41 ± 9:05 v. 14:47 ± 8:07 hr). **Conclusion:** Despite the controversies in the literature over the benefit of EGDT, the implementation of a sepsis bundle improved ED quality measures of care and clinical outcomes for those admitted to the internal medicine ward. Adherence to the bundle was voluntary, but quite low, with most providers delivering usual care. Ongoing feedback with front line staff may optimize uptake of the sepsis bundle while targeted initiatives towards interdepartmental processes and resources may aid in the patient flow measures.

Keywords: sepsis, quality indicator, internal medicine

MP42

Severe accidental hypothermia treated with extra-corporeal membrane oxygenation in an urban Canadian setting

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Introduction: Accidental hypothermia (AH) causes significant morbidity and mortality. Evidence suggests that severe AH causing cardiac arrest can be treated safely with extra-corporeal membrane oxygenation; however, it is difficult to predict neurologic outcomes. The goal of this study was to evaluate the effectiveness of ECMO in severe AH in an urban setting. **Methods:** A retrospective case series was performed in two academic hospitals in Winnipeg, MB between Jan 2010 and Nov 2014. Data was extracted on patients who received ECMO for AH to evaluate baseline and pre-hospital factors, resuscitation, ECMO initiation, and hospital course. The primary outcome was survival to discharge. Secondary outcomes included neurologic status at discharge, complications and cause of death. **Results:** Of 11 patients who received ECMO in the setting of AH and cardiac arrest 3 survived (27.2%). Six patients were female (54.5%). The mean age was 44.9 years (S = 6.8). Patient identity at EMS contact was known in only 5 patients (45.5%), and duration of exposure was unknown in 10 patients (90.9%). Nine patients (81.8%) were hypothermic due to cold exposure and of these, 8 patients (72.7%) were exposed due to intoxication. The mean presenting core temperature in the ED was 24.1° (S = 3.33). Four patients (36.3%) presented to the ED with asystole and none survived. For all patients the mean serum potassium at presentation was 4.64 (S = 1.33), and the mean serum lactate was 10.5 (S = 3.83). Of the 8 patients whose exposure was due to intoxication the mean alcohol level was 33.6 mmol/L (S = 15.1) and 2 (18.2%) survived. Ten patients (90.9 %) were successfully rewarmed to at least 35° with a mean rewarming speed of 5.0°/hr (S = 4.24) and a mean door-to-ECMO time of 87.2 minutes (S = 32.6). The mean rewarming time was 177 minutes (S = 110). Three patients (27.2%) developed clinical or radiographic evidence of cerebral edema, and none survived. Three patients (27.3%) survived to discharge, and all had a CPC status of 1. Six patients (54.5%) died of multiple organ dysfunction syndrome (54.5%) and two (18.1%) died of cerebral edema. **Conclusion:** ECMO is an effective means to rapidly rewarm patients who have suffered cardiac arrest due to AH. Despite this only 27.2% of patients survived to discharge. Further study should examine prognostic variables for intact neurologic survival in patients who receive this resource-intensive treatment.

Keywords: accidental hypothermia, emergency department resuscitation, cardiac arrest

MP43

Presentations to Alberta emergency departments for asthma: a time series analysis

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Introduction: Asthma is a common chronic respiratory condition and exacerbations may cause individuals to seek care in emergency departments (EDs). This study examines the monthly patterns of presentations to EDs in Alberta, Canada. **Methods:** All presentations to the ED for asthma during April 1999 to March 2011 were extracted from provincial administrative health databases. Data included age, sex, and health zone of residence. Crude rates per 100,000 population were calculated. Seasonal autoregressive integrated moving average (SARIMA) time series models were developed. **Results:** There were a total of 362,430 ED presentations for asthma and the monthly rate of presentation declined from 115.5 to 41.6 per 100,000 during the study period. About half the ED presentations were made by females and by children and youth. While the absolute number of ED presentations for asthma declined in each of the five administrative health zones in the province, the proportion of ED presentations for asthma increased in the two most urbanized zones. The ARIMA$(0,1,2)x(1,0,1)_{12}$ model was appropriate for the overall counts of presentations as well as the number of ED presentations for age and zone subgroups. These models showed strong seasonal components with the strongest estimates occurring for the pediatric subgroup and the southernmost provincial zone. **Conclusion:** Rates of presentations to the ED for asthma have been declining in Alberta during the past decade. The reasons for this decline warrant further exploration. The SARIMA models quantified the temporal patterns and may be helpful for planning research and health care service needs.

Keywords: asthma, exacerbations

MP44

A blog literacy level project: analyzing the relationship between FOAMed resource characteristics in blog posts and knowledge dissemination

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Introduction: Growing evidence supports the use of social media in medical education. An important benefit is customization of the learning environment to fit individual needs. Few investigators, however, have examined the design and stylistic characteristics of Free Open Access Medical Education (FOAMed) resources. In the present project, we attempt to identify the ideal reading level of FOAMed blog posts that allows for an optimal intersection of accessibility and credibility. We hypothesize that an optimal reading level will appeal to consumers of FOAMed resources and support dissemination of knowledge. **Methods:** We collected posts from the BoringEM.org blog; a multi-author, peer-reviewed emergency medicine FOAMed blog. Posts are written and edited by medical students, residents and staff physicians; the resulting blog posts vary in literary ease. We collected data from posts published during or after July of 2014. We used Wordpress Page to extract the Flesch Reading Ease score, a measure of literary difficulty. Two weeks following the publication of each post, we used Google Analytics to track the following metrics: page views, unique page views, and cities reached, all markers of dissemination of knowledge. **Results:** We included 6 months of blog posts (58 articles) in our final analysis. Pearson correlation showed no significant association between Flesch Reading Ease score and number of page views ($r = 0.138$, $p = 0.31$), unique page views ($r = 0.143$, $p = 0.29$), or number of cities reached ($r = -.002$, $p = 0.99$). There was a moderate correlation between word count and number of page views ($r = 0.38$, $p < 0.001$), and word count and cities reached ($r = 0.36$, $p < 0.001$). **Conclusion:** We were not able to identify an optimal reading level for FOAMed posts, as Flesch Reading Ease scores were not correlated with markers of knowledge dissemination. This may be due to the high reading level of medical practitioners participating in online teaching and learning. In the future, subgroup analyses examining the characteristics and clinical levels of our readership may shed important light on the literary characteristics that appeal to these groups.
Keywords: Free Open Access Medical Education (FOAMed), literary characteristics, knowledge dissemination

MP45

Medicus doces te ipsum: a study in self-directed ultrasound learning

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Introduction: A major limiting factor in the introduction of point of care ultrasound training into undergraduate medical curricula has been the lack of availability of trained supervisors. Modern medical education has embraced the principle of self-directed learning. This study aimed to assess the ability of pre-clerkship medical students to use self-directed simulation-based training in Point of Care Ultrasound (PoCUS), and to attempt to quantify the number of practice scans required to achieve competence. **Methods:** This was a prospective observational pilot study, involving second year medical students with no prior ultrasound experience. Participants studied introductory online learning modules covering basic theory and ultrasound methodology; followed by a period of self-directed ultrasound simulation training at a tertiary care teaching hospital emergency department ultrasound simulation suite. There were triggered assessments on live models upon completing 10 and 25 scans in each of 4 core PoCUS areas (cardiac, abdominal, aorta, pelvic). No feedback was provided to participants during or after triggered assessments. Upon completion of self-directed simulation training (200 scans total), participants were to be tested on live models by qualified staff unaffiliated with this study, using existing competency standards for practicing physicians. **Results:** Out of 14 students who began the study, only 9 remained by the time of the second of 3 intended tests. However, by the time of the second triggered assessment (25 scans in each area), two participants had improved in 1 of 4 scans, six did not demonstrate any improvement, and two participants had lower scores than on the earlier test. Structured feedback from all participants (who were not shown their evaluations from the triggered assessments) expressed dissatisfaction with the learning model. **Conclusion:** The results and feedback suggest that this self-directed learning model would not, if taken to completion, have resulted in competence. A tentative conclusion is that the combination of simulation and self-directed learning is not, without some form of guided mentoring, sufficient to attain competence in point of care ultrasound. This is in contrast to considerable literature supporting, individually, self-directed learning and simulation.
Keywords: simulation, point-of-care ultrasound, medical education

MP46

A survey to assess knowledge, perceptions and use of Canadian clinical decision rules using a FOAMed podcast as a medium for knowledge translation

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Introduction: Free, open access medical education (FOAMed) is a relatively new modality of knowledge dissemination gaining increasing popularity in emergency medicine. The impact of this educational format on end-user knowledge and behavior is not well established. The objective of the study was to test the feasibility of distributing a pre and post podcast survey and to explore the possible influence podcasts may have on knowledge dissemination. M**ethods:** An invitation to participate in an online survey was distributed to all subscribers of "EM Cases" and advertised via email and social media. The survey was designed to test knowledge, perceptions and use of Canadian-derived clinical decision rules (CDRs) as well as barriers to adoption in the ED. Completion of the survey was mandatory in order to access a podcast in which one of the CDR authors discussed their derivation and utility. Prior to distribution, the questionnaire was peer reviewed and pilot tested for clarity and comprehension. **Results:** Of 539 respondents, 433 were physicians. Mean (SD) age was 40.2 (10.9) years and 314 (72.5%) were male. Emergency physicians who identified as being in practice >10 years were the largest group of respondents (29.3%), followed by residents (26.3%). 413 (95.4%) respondents reported regular use of CDRs in practice. 76.3%, 70.4%, 49.8%, 4.5% and 4.2% of respondents indicated they used CDRs in ≥75% eligible cases for the Ottawa Ankle, Canadian Cervical-Spine, Canadian CT Head Rules and the Ottawa COPD and Ottawa Heart Failure Risk Scales, respectively. Reasons for not using CDRs varied. For well-established CDRs, the most common response was "I believe my clinical experience is as reliable", and the most cited reason for not using the newer CDRs was unfamiliarity. For all CDRs, respondents preferred the use of electronic memory aids. Of those who completed the post-podcast survey, 85.9% expressed an interest in learning more about CDRs. **Conclusion:** Inexpensive and globally accessible, FOAMed offers significant opportunities to influence clinical practice and opinion. A large proportion of respondents were interested in learning more about CDRs after listening to the podcast. Although the limitations of this novel survey methodology require further investigation, the increasing popularity of FOAMed and social media provides substantial future research opportunities.
Keywords: podcasts, FOAMed, clinical decision rule

MP47

Did Choosing Wisely choose wisely for Québec?

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Introduction: The Choosing Wisely Campaign in the US aims to promote conversations between physicians and patients around tests and procedures that should be given a careful second thought. ACEP (American College of Emergency Physicians) recently produced two lists of five such tests/interventions. Our objective was to determine physician attitudes and practices around this issue, and to assess the degree to which Québec EM physicians agree with ACEP's recommendations. **Methods:** Québec EM physicians were polled via the Association of Quebec EM Physicians (AMUQ), an organization to which most physicians working in Quebec EDs belong. A modified Dillman approach was employed and three reminders were issued to the e-mail addresses of all members by AMUQ staff, inviting them to participate in a Survey Monkey instrument. Participants indicated their agreement with the recommendations and with certain statements regarding their attitudes on a Likert scale. **Results:** 99 physicians responded to the survey with representation characteristic of MD demographics and distribution across the province. 45% (n = 44) of respondents were from Québec City and Montréal, and 50% (n = 49) of respondents had been in practice for less than 5 years. 17% (n = 17) of respondents were Royal College trained, and 68% (n = 67) were CFPC trained (the remainder being trainees). The response rate (99/800, 12%) can be attributed to the convenience based sampling method, and although concerns of sampling bias arise, the sample, on the whole, seems representative. Almost all respondents agreed that unnecessary tests and procedures were a problem in Québec (97%, n = 94), and that physicians were responsible to help patients avoid them (97%, n = 96). Physician opinions varied on the degree to which different factors contributed to the problem, and as to how comfortable physicians were advising patients to avoid these interventions. 96% of respondents (n = 95) agreed that a list of evidence based recommendations would be useful, and the vast majority of respondents agreed with ACEP's recommendations. Agreement with other recommendations was strong as well. **Conclusion:** This is the first survey of Canadian Emergency MDs related to Choosing Wisely, showing a high degree of agreement with ACEP recommendations. The practice climate and physician attitudes in Québec are favourable to Choosing Wisely interventions. These results empower researchers and policy makers in Canada to proceed with this and similar initiatives.

Keywords: choosing wisely, recommendations, list

MP48

Ethics consultation in paediatric and mixed emergency departments: an assessment of clinical ethical learning and resource needs

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Introduction: Ethical dilemmas inevitably arise in emergency departments (ED). In such scenarios, health care providers may feel that they have reached the limits of their own personal and professional ability to address ethical questions. The primary goal of this study is to understand learning and resource needs of ED staff regarding clinical ethical issues. Examination of the findings will provide a foundation for the development of an ethics education program, help to build ethics capacity, and determine how ethics consultation services may be used more effectively in EDs. **Methods:** This was a prospective cross-sectional survey of all clinical staff in three tertiary care EDs. The survey tool was pilot tested on a similar target audience at three sites for question content and clarity. **Results:** Of the 156 participants surveyed, 76% agreed with an overall positive ethical climate. 31% of participants reported encountering daily ethical challenges. Participants expressed a need for additional support to address resource issues (25), moral distress (27), and conflict management with patients or families (29). Importantly, of the 27 reported occurrences of moral distress, 21 were associated with pediatric mental health. When asked about the barriers to completing a physician-ordered scope of treatment (POST), participants were mostly limited by a lack of awareness of a POST or trigger question (39%), limited staff time (46%), and patients' short length of stay in the ED (52%). When patients met the trigger question, only 6% of participants reported a POST being initiated or completed at all times. When asked how the ethics consultation service could be utilized in the ED, providing education to teams (43%) was the most desirable method. **Conclusion:** Management of clinical ethical dilemmas is not well understood by a number of ED staff. However, knowledge of staff members' learning styles will be useful to ensure delivery of ethics education resources in the future. Pediatric EDs have unique ethical problems and staff voice specific moral distress that are different than general EDs. Based on the needs assessment, a suitable educational strategy will be developed in collaboration with the leadership of each ED and ethics consultation service.

Keywords: ethical climate, ethics education, ethics consultation

MP50

Procedural learning dynamics of a point-of-care ultrasound education experience

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Introduction: Point-of-care ultrasound (PoCUS) is a core competency in EM. Optimal delivery of PoCUS education content remains unknown. McMaster's RCPSC-EM training program has developed a PoCUS pedagogy that includes an intensive educational experience where trainees image 50+ live-models, supervised by experienced faculty. This research is the first attempt to quantitate skill acquisition following participation in such a practicum. **Methods:** This is a prospective, observational study of EM postgraduate trainees receiving two days of introductory PoCUS instruction (intra-abdominal free fluid [FF], pericardial effusion [P], abdominal aortic aneurysm [AAA], intrauterine pregnancy [IUP]). 50+ practice scans were performed on live-models. Pre-and post-intervention surveys on 7-point Likert scales were administered. Data included demographics, previous experience, and procedural comfort prior to training. The first and every tenth scan were assessed utilizing a locally developed objective structured assessment tool (OSAT). Scanning time was recorded. Statistical methods include mean/SD and median/IQR as measures of central tendency; D'Agonstino & Pearson normality, Student's t, MannWhitney U, and χ^2 tests where appropriate. **Results:** 13 participants were enrolled. All trainees had trivial or no experience across all scan types, and even after didactic teaching were not confident producing determinant images (1.5, 1.7, 1.7, 1.5 for FF, P, AAA, IUP, respectively). Confidence after supervisory practice was improved significantly for all scan types (5.2, 6.2, 5.5, 4.3). Post-intervention, trainees perceived confidence to be achieved after 31-40, 21-30, 41-50, and >51 scans (FF, P, AAA, IUP). Between initial and final OSAT, significantly fewer trainees failed assessment components in P and AAA scans (38 v. 0%, 62 v. 8%). A similar however not significant trend was shown for FF and IUP scans (54 v. 17%, 62 v. 33%). Similarly, time to completion improved significantly for P and AAA scans (97 v. 52s, 88 v. 66s), however no trend was observed for FF and IUP scans. **Conclusion:** Dedicated, supervised practical training in PoCUS improves learner confidence and aids in skill acquisition. Learner confidence and perception of skill acquisition mirror objective competence measures. Disparate scan types have

distinct skill acquisition curves; a tailored approach to practical training is warranted.
Keywords: point-of-care ultrasound, education, learning curve

MP51
Can live lectures be replaced with web based learning in medical education? A qualitative analysis
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Introduction: New educational models such as the inverted or "flipped" classroom have sought to use information technology to deliver instructional content. While several previous studies have shown that medical students find web based learning (WBL) useful and effective, the purpose of this study was to explore student *perceptions* of WBL compared to live lectures. **Methods:** Third year medical students entering their Emergency Medicine clinical rotation were invited to be part of this study. Students were assigned to receive either a live lecture or web-based videos on the topic of trauma management, and were then invited to a focus group with semi-structured questions exploring their perceptions on the experience. These interviews were recorded, transcribed and analyzed using inductive thematic analysis. **Results:** One hundred fifteen students took part in eight focus groups. Differences between their perceptions towards web-based videos and live lectures were observed. Our primary outcome, which sought to identify student preference for a particular teaching model, revealed two themes: Students generally preferred the teaching method to which they were exposed; a combination of the two formats was most highly endorsed. Our focus groups further identified three themes in favor of online learning: Control of lecture pacing; flexibility of time in completing the lecture; and equivalency in knowledge acquisition. Three negative themes were also identified: Insufficient interactivity with a teacher; inability to ask questions; and difficulties translating theoretical to practical knowledge. **Conclusion:** Students perceived that a combination of live lectures and web-based modules would be the ideal educational model for knowledge acquisition and skill application. This finding provides further support towards implementation of a "Flipped Classroom" teaching model in the delivery of medical education.
Keywords: flipped classroom, web-based learning, emergency medicine

MP52
Geriatric emergency management nurse views on prediction and management of functional decline in older adults after a minor trauma
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Introduction: A significant proportion of elderly patients visit emergency departments (ED) for minor injuries but are rarely assessed for potential functional decline prior to discharge. Many discharged patients experience persistent functional decline 6 months post injury. This study assessed geriatric emergency management nurse specialists' views to define clinically important functional decline after an injury in geriatric ED patients. **Methods:** A 13-item questionnaire was developed and consisted of demographics and attitudes on functional decline (Likert Scale), minimally important point drop to define functional decline and required sensitivity to identify elderly patients at high risk of functional decline (both open-ended questions). The Older Americans Resources and Services (OARS) ADL Scale, which consists of 7 basic activities of daily living (ADL) and 7 instrumental activities of daily living (IADL), was used to measure the point drop. The questionnaire was administered as part of a survey to all 65 geriatric emergency management nurse specialists present at a geriatric emergency management nurse specialist conference in Toronto in September 2012, where 67.7% (65/96) of all geriatric emergency management nurses in Ontario attended. Descriptive statistics were calculated to characterize geriatric emergency management nurse responses. **Results:** Fifty three (81.5%) surveys were completed. Up to 90% of the responding nurses considered a drop in function of at least 2 points in the OARS Scale as clinically significant. A sensitivity of 90% would meet or exceed the requirement by up to 90% of geriatric emergency management nurses. More than 70% of geriatric emergency management nurses considered the majority of the ADL/IADL items important to functional decline, but do not routinely assess all of the OARS Scale items. **Conclusion:** A drop of 2 or more points on the 28-point OARS ADL Scale would be deemed clinically important by the vast majority (up to 90%) of geriatric emergency management nurses. A clinical tool for identifying elderly patients at high risk of functional decline 6 months post minor injury needs to be at least 90% sensitive to be clinically acceptable to geriatric emergency management nurses.
Keywords: functional decline, geriatric emergency management, clinical decision rule

MP53
Frailty as a predictor of repeat emergency department visits and disability in the elderly: a pilot study
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Introduction: Up to half of elderly patients discharged home from the emergency department (ED) suffer an adverse outcome in the following month. Our objective was to determine whether frailty, as measured by gait speed and handgrip strength, is a key predictor of repeat ED visits and disability. **Methods:** We carried out a prospective pilot study of patients (age $\geq$75 years) being discharged from the ED at a tertiary care hospital from January to May 2014. In the ED, we surveyed patients about their comorbidities and level of disability on the Katz activities of daily living (ADL) and OARS instrumental ADL scale (combined score out of 13, lower score indicates more disability). We tested 5-meter gait speed and handgrip strength, and dichotomized measurements according to accepted cutoffs for frailty ($\geq$6 seconds for speed, $\leq$30 kg in men and $\leq$20 kg in women for strength). At 30 days, a blinded researcher contacted patients to re-administer the disability questionnaire and assess whether they had unplanned repeat ED visits. **Results:** The cohort consisted of 100 patients with a mean age of 81.6 ± 4.9 years; 58% were $\geq$80 years and 51% were female. In total, 41% of patients had slow gait speed and 37% weak handgrip strength. The mean number of comorbidities per patient on the Functional Comorbidity Index was 3.9 ± 1.9. After 30 days, 23% of patients had a repeat ED visit. Slow gait speed and weak handgrip strength were not associated with an increase in unplanned repeat ED visits (OR 0.85; 95% CI 0.31, 2.28) and (OR 0.98; 95% CI 0.37, 2.63). Patients with weak handgrip strength were more likely to revisit the ED for minor complaints (OR 4.67; 95% CI 1.13, 19.34). There was a trend to suggest that the 30-day disability score worsened to a greater extent in those who were frail; mean difference -0.19 (95% CI -0.54, 0.16) in slow vs. normal gait speed, mean difference -0.37 (95% CI -0.74, 0.01) in weak vs. normal handgrip

strength. **Conclusion:** Our study suggests that assessment of frailty using physical performance measures is feasible in ED patients at the time of discharge. These early data suggest that frail elderly are more likely to revisit the ED for minor complaints and are at risk to develop progressive disability. Gait speed and handgrip strength tests may aid physicians in identifying vulnerable elders and tailoring outpatient support services to prevent revisits and disability.
Keywords: elderly, frailty, emergency department discharge

MP54
The elderly in the emergency department: patient characteristics and emergency department utilization
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Introduction: As the population continues to age, primary health care must adapt to deliver health care services for the elderly population which may vary within the age group. The Emergency Department (ED) is a gateway to admissions into the hospital for the elderly. The objective of this study was to describe the use of emergency services by elderly patients for a greater understanding of differences within the ageing population. **Methods:** A prospective study from three emergency departments in Montreal from 2012-2013. Autonomous patients ≥75years (n = 2033) were recruited to answer a questionnaire at the initial visit and a telephone follow-up questionnaire three months later. Data were analyzed comparing patients 75-84 years v. ≥85 years. **Results:** Seniors ≥85 years arrived by ambulance more frequently vs. seniors 75-84 years (65.0% v. 51.2% $p < 0.05$). However no significant differences were found with respect to reason for visiting the ED; could not get an appointment with their GP (8.2% v. 7.9%) and were told to go to the ED by a health professionals (42.0% v. 39.0%). Also no significant differences were found in the rate of admissions (41.2% v. 42.6%) and length of stay (33.9 vs 33.1 hours) in patients ≥85 years compared to 75-84 years respectively. Patients in both groups were followed by a primary care physician (97% v. 96%) with the number of patients being followed by more than 3 specialists slightly greater in the older patient group (10.2% v. 20.7%). Top diagnoses (in order of frequency) for both groups were the same: cardiac, GI and respiratory. Most frequent chief complaints differed between groups: respiratory (16.0%), GI (14.8%) and ortho related (13.2%), general weakness (12.7%) and cardio (12%) for those in ≥85 years versus respiratory (16.5%), cardio (15.3%) and GI (14.4%), general weakness (11.5%), ortho (10.4%) for those 75-84 years. The rate of return visits during a three-month period after the initial visit did not differ between groups (25.8% in patient's ≥85 years v. 29.2% in 75-84 years) in a three-month period. **Conclusion:** No differences exist between the ≥85 years old and 75-84 age groups in terms of rates of admission, length of stay and proportion of patients with family physicians. Top diagnoses were the same type although not in the same frequency.
Keywords: geriatric emergency medicine, resource utilization, access to care

MP55
Emergency department pain management for geriatric patients with minor traumatic injuries: Who is getting analgesics?
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Introduction: Oligoanalgesia is well documented in emergency medicine and is more prominent in the geriatric population. Older adults often express pain atypically and may not be effective self-advocates for pain control. Few studies have assessed factors affecting the decision to treat pain in older emergency department (ED) patients. This study evaluates analgesic use in the ED, and upon discharge, for geriatric patients with minor traumatic injuries. **Methods:** We studied the cohort of patients prospectively enrolled in the Canadian Emergency Departments Team Initiative (CETI) study at Sunnybrook Health Sciences Centre, who were aged 65 and over and discharged home from the ED after a minor traumatic injury. CETI data was supplemented with a structured paper and electronic chart review. Pain was measured using a 10-point numeric rating scale (NRS), and cognitive status using the Montreal Cognitive Assessment (MoCA). We used a multivariable logistic regression analysis to assess predictors of receiving an analgesic. **Results:** We included 376 patients enrolled from September 2011 to February 2014. The mean age was 77.4 years, and 70.5% were female. 69.7% had normal cognition (MoCA ≥ 23). The majority of injuries was due to falls (78.6%) and resulted in 118 (31.4%) fractures in addition to sprains, lacerations and contusions. The mean initial pain NRS was 5.2/10 (IQR 3 to 5). Analgesics were given to 98 (26.1%) patients in the ED, including opioids (13%), acetaminophen (11%) and NSAIDS (1.7%). Among patients with pain above 7/10, 29.8% received analgesics in the ED; of those with a fracture, 30.5% received analgesics. A discussion about analgesics was documented in 23.9% of cases at discharge. In the multivariable analysis, factors independently associated with receiving an analgesic included higher pain scores (OR 1.31 per point increase on NRS, 95% CI 1.16-1.49) and longer ED stay (OR 1.36 per hour, 95% CI 1.14-1.61). When ED wait times were longer, patients were less likely to receive analgesics (OR 1.55 per hour, 95% CI 1.02-2.35). Older patients were less likely to receive analgesics (OR 1.64 per 10 years of age, 95% CI 1.03-2.62). **Conclusion:** A low proportion of geriatric patients with minor trauma received any analgesics. Increasing age and ED crowding were associated with less analgesic use. Further research should examine barriers to optimal pain management for older ED patients.
Keywords: pain management, geriatrics, traumatic injury

MP56
Ultrasound guided regional anesthesia in older hip fractures patients: uptake of regional anesthesia in randomly selected emergency physicians
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Introduction: Meta-analyses have shown that ultrasound-guided regional anesthesia (USGRA) is optimal in patients with hip fractures. We have previously showed poor uptake of USGRA by emergency physicians (EPs). The objective is to assess the impact of a knowledge-to-practice (KTP) intervention on the use of USGRA by EPs in older patients with hip fractures. **Methods:** We conducted a prospective cluster trial, randomized by EPs. Of 29 full time EPs, 2 declined and 2 failed to complete training. The 25 participating EPs were randomly assigned into two groups comprising 6.5 full-time equivalent shift lines in each group. The control group continued to give standard of care analgesic treatment using parenteral opiates. Intervention group EPs underwent a two-hour training session on ultrasound-guided femoral nerve blocks. This session included didactic classroom teaching, plus hands-on training using a live patient as well as mannequin simulation to practice motor skills. Intervention EPs also received follow-up reminders during the study. Patients were excluded if they were <65 years old, were unable to provide consent due to dementia, delirium or

language barriers, or critically ill. **Results:** All training was completed by Dec 31st, 2013. Intervention physicians had a median experience of 7.5 years in practice, 60% were female, 60% used bedside ultrasound at least every other shift, but only 10% had previously been trained in USGRA. Patient enrollment began Jan 13th, 2014. We screened 234 hip fracture patients in the next 12 months, of which 17 were missed (7.3%), 65 were unable to provide consent (27.9%), 46 were seen directly by consults, part-time EPs or non-participating EPs (19.7%), 26 declined (11.1%), 23 were <65 years of age (9.8%) and 76 were eligible and enrolled (32.4%). Of the 21 eligible patients seen by intervention MD's, 17 (80.9%) received an ultrasound-guided femoral nerve block, compared to 1.9% among the 52 patients treated in the control group ($\chi^2 = 42.26$, df = 1, p = 0.0001). The most common reason for not performing a block was excessive clinical load. **Conclusion:** Our KTP intervention demonstrated a significant increase in the uptake of USGRA in a randomly selected sample of full time EPs. Future research will examine sustainability of the intervention, and the impact of less intense KTP interventions on uptake.
Keywords: regional anesthesia, ultrasound, emergency department

MP57

Reasons for visiting the emergency department and patient perceptions on accessing primary care resources by seniors over 75 years of age

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Introduction: Reasons for visiting the emergency department (ED) and perceptions associated with accessing timely primary care can inform us on future initiatives aimed improving ED utilization. We describe from a patient's perspective the reasons for visiting the ED and perceptions related to accessing primary care resources. **Methods:** Community-dwelling patients ≥75 years of age presenting to one of three tertiary care hospitals EDs in Montreal between May 2012 to November 2013. Data were collected prospectively at the initial visit and at 3 months from: structured patient interviews (access and utilization of health care services, living conditions, activities of daily living); medical charts (medications, co-morbidities and follow up care); and administrative databases (socio-demographics, ED situation). **Results:** During the study period 4,985 patients were identified, of which 46% were excluded, 8% refused, 2% were withdrawn, and 2,212 (44%) participated. Approximately 33% were over 85 years old, 34% lived alone, 56% arrived by ambulance, and 49% were hospitalized. The majority, 90.5%, had a family physician (FP), 82% had a specialist, and 49.3% received some type of home care services. In the month prior, 3.6% had MD home visits, 24% had RN visits, and 4.2% social worker visits. Prior to the ED visit, 33.5% tried to contact a provider and of these 82.3% were able to speak to one. In such cases 86% of the time, the patient was told to go to the ED. When patients were asked how quickly they could get an appointment with their FP a for medical problem requiring immediate attention, 34.6% responded in ≤2 days; 30.5% responded within 2 weeks and 15.4% in >2 weeks and 26% found it difficult to make an appointment for a new problem in a reasonable time period. Major reasons for visiting the ED were: urgent problem or too sick/pain (72.9%), told to go (22%), could not get an appointment with the FP (2.1%), needed a test (1.6%) did not know where else to go and other (1.3%). Over the 3 month study period, the death rate was 8.1% and the unplanned revisit rate was 29.2% representing 646 patients making 1,014 visits. **Conclusion:** Seniors perceive difficulties in accessing their doctor for an urgent problem and/or a new problem. The principal reasons for presenting to the ED are too sick/too much pain, urgent problem and were told to go.
Keywords: elderly, perceptions, primary care access

MP58

Factors associated with non-urgent visits to the emergency department for the discharged elderly population

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Introduction: Non-urgent visits to the emergency department (ED) result in the consumption of significant resources and delayed access for more acutely ill patients. This study's objective is to determine the factors that are associated with non-urgent ED visits among elderly patients discharged from the ED. **Methods:** Community-dwelling patients aged ≥75 years and older who made an ED visit between May 2012 to November 2013 in one of 3 tertiary care hospitals in Montreal. Excluded were patients admitted or living in long-term care institutions, planned return visits and unable to provide informed consent. Data were collected prospectively from three sources: structured patient interviews (access and utilization of health care services, living conditions, activities of daily living); medical charts (medications, co-morbidities and follow up care); administrative databases (socio-demographics, ED presentation characteristics). The outcome non-urgent visit was defined as a score of 4 or 5 on the Canadian Acuity Triage Scale (CTAS). Multivariable multilevel logistic regression analysis was conducted. Results are presented as estimated odds ratios (OR) and their 95% confidence intervals [95% CI]. **Results:** We recruited 2,303 patients, of which 91 were withdrawn. Among 2,212 patients remaining, 1,119 (50.6%) were discharged and of these 315 (25.9%) patients had a CTAS 4 or 5 making up the sample of non-urgent visits. The factors independently associated ($p < 0.05$) with an increased risk of having a non-urgent visit (OR; (95%CI) were: receiving home care services during the month prior to the ED visit (1.48; 1.08-2.02), having difficulty speaking on the phone to family doctor (1.37; 1.03-1.83), reason for coming to the ED was "too sick/too much pain" v. 'urgent' or 'told to go' (1.40; 1.07-1.85). While being independent (Barthel Index = 100 points) (0.68; 0.51-0.91) and taking more medications decreases the risk of having non-urgent visits (0.92; 0.89-0.95). **Conclusion:** The factors associated with an increased risk of non-urgent visits are difficulty speaking to their doctor, reporting feeling too sick or too much pain, and receiving home care services, while polypharmacy and being independent reduces the risk of non-urgent visits.
Keywords: non-urgent visits, ED utilization, primary care accessibility

MP59

What is the association between perceived access to primary care resources and unplanned emergency department return visits in the elderly?

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Introduction: High-quality primary health care is based on a vision of accessibility. Consequences of low accessibility include health deterioration and higher emergency services utilization. This project assesses the association between elderly patients' perceptions of access to primary care resources and unplanned return visits within 3 months of the emergency department (ED) discharge. **Methods:** We recruited community-dwelling patients aged ≥75 years with an initial ED visit

between May 2012 to November 2013 in one of 3 tertiary care hospitals in Montreal. We prospectively recruited (days/evenings shifts, 7 days/week) alternating between hospitals. Data sources were: structured patient interviews (access and utilization of health care services, living conditions, ADLs); medical charts (medications, co-morbidities and follow-up care); administrative databases (socio-demographics, ED presentation characteristics). Data collection occurred at the initial visit and 3 months after. The main outcome was number of unplanned return visits to the ED within 3 months of the index visit. Multivariable multilevel Poisson regression analysis was conducted. Results are presented as estimated percent change [95% CI] in revisit rate. **Results:** During the study period 4,985 patients were identified, of which 46% excluded, 8% refused, and 2,303 (46%) were recruited. At three months, 179 had died and 91 were withdrawn, thus 2033 (88%) were retained for data analysis. Among them, 91% had a family physician (FP), 82% had a specialist, 30% received in-home support visits. The 3 month revisit rate was 570/2,033 (28%). Variables independently associated with an increase in revisit rate ($p < 0.05$) are: more ED visits in past 6 months (77%, [64%, 91%]), receiving community home care (31%, [11%, 54%]), perceived difficulty in obtaining an appointment with their FP for new problem (21%, [5.6%, 38%]), more co-morbidities (13%, [12%, 27%]), while variables associated with a decrease in revisit rate are: age ≥85 (-20%, [-31%, -6.9%]), admitted at index visit (-21%, [-31, -10%]) and decreased acuity triage level (-16%, [-23, -8%]). **Conclusion:** Adjusting for patient demographics and clinical characteristics, perceived difficulty in accessing FP for new health problems is associated with an increased rate of ED unplanned return visits within 3 months.
Keywords: elderly, ulitization, accessibility

MP60

An epidemiological profile of emergency medical services use by older adults with cognitive impairment in a provincial EMS system

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Introduction: Almost half of all Emergency Medical Services (EMS) emergency responses are for older adults (≥65 years), many of whom have cognitive impairment. Even so, there is a paucity of research on EMS use by people with dementia. We compared EMS use, processes, clinical presentations, and care provision for older adults with and without documented cognitive impairment in a provincial EMS system. **Methods:** This cohort study is a secondary data analysis of a provincial EMS operational database between January 1 and December 31, 2010. The service responds to over 140,000 calls per year and provides care to a population of over 1 million people. All emergency EMS responses for older adults (≥65 years) were included. Cognitive impairment was determined by paramedic documentation of dementia, Alzheimer's disease and/or Parkinson's. **Results:** There were 30,653 emergency responses for older adults in 2010; 3,699 (12.1%) with cognitive impairment and 26,954 (87.9%) without. Close to 15% were from long term care facilities. People with cognitive impairment were slightly older (83.5 ± 7.0 v. 79.5 ± 8.5; $p < 0.05$) and more often women. They had higher co-morbidity counts, lower documented pain scores (1-10), and fewer interventions provided. Common chief complaints as determined by paramedics were general malaise (338, 9.1%), altered level of consciousness (234, 6.3%), no patient complaint (240, 6.5%), and trauma - hip injury (252, 6.8%). The non-transport rate was slightly lower in the cognitive impairment group (344, 9.3%) compared to those without (3349, 12.4%; $p < 0.05$). **Conclusion:** Older adults with a history of cognitive impairment accounted for over 10% of emergency responses. Care provision needs to address challenges with assessment (e.g. pain control, non-specific complaints) and clinical uncertainty. A unique skill set may be required to provide optimal care to this group of patients and should be the focus of further inquiry.
Keywords: geriatrics, emergency medical services, dementia

MP61

Determining clinically important differences in pain intensity: challenges when using an 11-point numerical rating scale

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Introduction: Raw pain intensity difference (RPID) and percentage of pain intensity difference (PPID) are two frequent measurement used to report pain intensity reduction following emergency department (ED) pain treatment. However, these indexes of pain relief are affected by pain intensity baseline values or their even/odd nature when using an 11-point numerical rating scale (NRS). In contrast, slope of relative pain intensity difference (SRPID) which consists in dividing PPID by the time elapse between drug administration and final pain assessment has shown to be unbiased with regards to baseline pain values. The objective of the study is to determine the reduction in pain intensity (RPID, PPID and SRPID) associated with clinically significant pain relief and identify factors that influence this decrease in NRS. **Methods:** This prospective cohort study included ED's patients that received analgesic, had baseline NRS > 3, and a follow-up NRS pain intensity assessment within 90 minutes after analgesic administration. RPID, PPID and SRPID were all calculated from baseline and follow-up pain NRS. Patients were also asked to rate their pain relief using a 5-category Likert's subjective scale (none, slight, moderate, high, complete). Pain reliefs ranging from moderate to complete were defined as clinically significant in our study. **Results:** 361 patients were retained for final analysis; mean age was 50.2 (SD = 19.3) and 59% were women. Significant clinical relief was obtained with an average cut-off decrease of 2.5 points (95%CI 2.2-2.9) for RPID, 34% (95%CI 28.6-38.6) for PPID and 27%/hour (95%CI 22.5-30.7) for SRPID. Higher baseline pain intensity generates higher decrease of RPID, PPID and SRPID. Using a 50% cut-off for individual patient relief, PPID underestimates pain relieved patients by 12.1% ($p < 0.001$) when odd pain intensity baseline values are compared to even values (32.9% v. 45.0%, respectively). SRPID measurement did not demonstrate this bias. **Conclusion:** When assessing clinically important differences in pain intensity on an 11-point numerical rating scale, researchers and clinicians must be aware that baseline pain value (both its severity and even/odd nature) could affect the number of patients considered to be relieved from pain depending on the type of pain intensity difference used as measurement.
Keywords: pain intensity scale

MP62

Thirty-day outcomes after surgical vs. medical management of acute renal colic

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Introduction: Little is known about the outcomes of patients with renal colic after discharge from the ED. Our objective was to describe 30-day outcomes for ED patients with renal colic, stratified by initial management strategy (surgical v. medical). **Methods:** This multicenter administrative database study included all Calgary patients given an ED diagnosis of renal colic between July 1, 2013 and June 30, 2014. Demographics, CTAS categories and vital signs were captured from the

regional ED database, tests and treatments from the physician order entry database, and ED revisits, admissions and interventions from the discharge abstract database. The primary outcome was a composite of hospitalization or additional surgical procedure within 30-days of discharge from the index hospital visit. Other outcomes were ED revisits at 7 and 30 days. Logistic regression was used to adjust for differences in patient characteristics and treatments. **Results:** At 4 hospitals, 3282 renal colic visits were studied, including 1,366 (41.6%) with an index surgical intervention and 1,916 (58.4%) initially managed medically. Surgically treated patients were older (51 v. 46 years), more likely to arrive by EMS (19.5% v. 15.3%), to be female (39.5% v. 35%), and to have prior stones (33% v. 28%) or interventions (23% v. 15%). They spent more time in the ED (6.2 v. 4.3 hours), more often received IV opioids and IV NSAIDs, and more often had CT scans (67.6% v. 60.6%). Surgically treated patients were more likely to have a primary outcome event at 30-days (16.5% v. 11.2%; adjusted OR = 1.6; $p < 0.001$), and to require repeat ED visits within 7 days (22.4% v. 15.3%; $p < 0.001$) and 30-days (30.3% v. 23%; $p < 0.001$). By 30 days, 14.3% of surgically managed patients had a repeat admission and 6.6% required a second surgical procedure. By 30 days, 10.6% of medically treated patients had an admission and 9.6% underwent a surgical procedure ($p = 0.003$ for both). **Conclusion:** Many patients discharged from the ED require subsequent ED management, hospitalization and surgical intervention. In this setting, initial surgical intervention was associated with higher ED revisit and admission rates at 30 days. While this was an adjusted analysis, it did not account for some key predictors, including stone size, which will be incorporated in the final analysis.
Keywords: renal colic, outcomes

MP63

Reliability of long term pain intensity recall in elderly emergency department patients

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Introduction: The recall of past pain intensity is frequently used in clinical research but many questions its validity. Emotional distress, level of pain encountered at trauma, medication, cognitive status and actual pain level are factors that could affect the ability to recall past pain in elderly patients. The objective of the study is to evaluate the reliability of memory of pain and to identify the factors that affect it in elderly ED patients. **Methods:** This is a sub-study of a larger Canadian prospective multicenter study that evaluate functional decline in elderly (≥65) patients treated in ED for minor traumatic injury. Patients were recruited from April 2011 to January 2014 across seven university-affiliated ED in 5 major cities (Quebec, Montreal, Ottawa, Toronto and Hamilton). Patients hospitalized, living in a long term establishment, were unable to give verbal consent, unable to attend follow-ups or to communicate in French or English were excluded. Patient characteristics (including cognitive status), pain intensity on a 0-10 numeric rating scale (NRS) at triage and on initial interview (done less than 2 weeks after injury) was recorded. Three months after the injury, patients were contacted by phone and asked to recall pain intensity during their first interview (baseline). **Results:** A total of 671 patients were interviewed at baseline and at 3 months with a mean age of 76.8 years (SD ± 7.6) and (72.4%) were women. Intraclass correlation coefficient between memory of pain and pain at baseline was poor (0.31, 95%CI: 0.15-0.44). Elderly patients tend to overestimate the level of pain intensity they had at baseline by a mean of 1.8 units (95%CI 1.5-2.1) of a 0-10 numeric rating scale (mean memory of pain at 3 months = 5.0 v. 3.2 at baseline). No effects of age, sex, medication, social support, education level, comorbidities or cognitive status were significantly associated with the ability to remember pain. Stepwise multiple regression showed that pain at ED triage (12% of explained variance), pain at baseline (9% of explained variance) and actual pain at 3 months (3% of variance explained) significantly predicted pain memory. **Conclusion:** The recall of pain of elderly after 3 months is poor and is influenced by the pain intensity at the time of injury and actual pain. The validity of the long term recall of pain in clinical research is seriously questioned.
Keywords: pain intensity recall, geriatrics

MP64

Does prior stone and intervention history predict future intervention in renal colic? Results of a multicenter study

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Introduction: Patients with prior renal colic have been identified as a group in whom to avoid CT imaging, because of greater pre-test likelihood and diagnostic certainty. However, the main value of CT may not be to confirm the diagnosis (which is often clear), but to determine stone size and position, and identify patients requiring intervention. Our hypothesis was that patients with prior stone disease are more likely to require intervention with subsequent episodes, hence more likely to benefit from CT imaging. Our objective was to clarify the association of stone and intervention history on intervention rates for an active stone. **Methods:** This administrative database study included all Calgary patients with an ED diagnosis of renal colic over a one-year period. Only first encounters were included so we could study incident not prevalent cases. The study cohort's electronic records were searched for prior renal colic diagnoses and interventions (ureteroscopy, stone destruction, extraction or stenting). Three strata were identified: patients with prior intervention (Group A), prior stone but no intervention (Group B), and no prior renal colic (Group C). Patients from outside Calgary were excluded because previous renal colic episodes may have been treated elsewhere. Demographics, CTAS categories and vital signs were captured from the regional ED database, tests and treatments from the physician order entry database, and ED revisits, admissions and interventions from the discharge abstract database. Main outcomes were admissions and interventions by group. **Results:** At 4 hospitals, 2,898 renal colic visits were studied, including 615, 432 and 1,851 in groups A, B and C. Mean age was 48 years and 63% were male. Age, sex, vital signs, baseline creatinine and WBC were similar between groups. Group A and B patients were less likely to undergo CT scanning (58.5% and 58.6% v. 68.3%). Group A patients were more likely to be admitted (54% v. 41% and 39.5%), to go directly to the OR (6.3% v. 3.7% and 2.9%), to have an index visit surgical procedure (51.9% v. 39.1% and 37.9%), and to have a surgical procedure within 30 days (60.9% v. 47.7%, 46.2%). $P < 0.01$ for all comparisons. **Conclusion:** Prior urologic intervention predicts higher intervention rates during subsequent stone episodes. Patients with prior intervention are more likely, not less likely, to require CT imaging with an active stone.
Keywords: renal colic, outcomes

MP65

Post dural puncture headaches in the emergency department: a GRADE-based systematic review of research evidence

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Introduction: Post dural puncture headaches (PDPH) are common complications of lumbar punctures and anesthetic procedures. Currently, the

literature lacks an evidence-based synthesis of research informing treatment for these patients presenting to the ED. Our objective was to undertake a GRADE-based systematic review of the evidence supporting available therapies. **Methods:** PICO questions were formulated to compare treatment alternatives. Inclusion/exclusion criteria were developed prior to searching the OVID Medline, PubMed, EMBASE, and Cochrane databases. Two independent reviewers performed the abstract and full text reviews and disagreements obtained consensus through discussion and third party mediation. The online Guideline Development Tool (GRADE Working Group) was used to create evidence profiles. GRADE criteria were applied to determine quality of evidence and pooling was considered when appropriate. **Results:** A total of 292 abstracts were identified which compared alternative treatment options for PDPH whose primary outcome was improvement of pain. Of these, 31 full text articles were evaluated resulting in 16 (14 RCTs and 2 observational studies) that satisfied all inclusion and exclusion criteria, examining 12 interventions. GRADE analysis suggested high confidence in estimates of effect for several treatments. For example, bilateral occipital nerve blockade resulted in resolution of headache in 100% of subjects and epidural blood patching improved pain scores by 87.5% after 2 hours in one RCT. Moderate quality evidence, downgraded most commonly for risk of bias, was found substantiating theophylline, gabapentin, hydrocortisone, and ACTH as compared to placebo. Very low quality evidence was found favoring sumitriptan vs. placebo. One study of moderate quality revealed no significant difference between epidural blood and fibrin glue patching. All but one of these interventions were supported by single studies, thus, due to hetereogeneity a meta-analysis was not performed. Adverse effects were uncommon across the evidence base for all interventions. **Conclusion:** Patients presenting to the ED with PDPH can be offered a myriad of therapeutic options. Based on high-quality evidence, epidural blood patching and bilateral occipital nerve blockade are effective therapies when anesthesiologists are available. Pregabalin and caffeine represent reasonable treatment options in alternative settings.

Keywords: post-dural puncture headache, epidural blood patch, GRADE analysis

MP66

The rapid medical evaluation unit at the Toronto Western Hospital emergency department: a quality improvement initiative using rapid improvement event methodology

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Introduction: The Toronto Western Hospital (TWH) is an urban academic medical center in Toronto, with an emergency department (ED) volume approaching 60,000 patients per year. Despite a steady increase in patient volumes nearing 7% per year over the last decade, however, no significant structural improvements have been made in that time span. This has created many concerns, including in the Fast Track area of the ED where 60% of patients are assessed. **Methods:** A Rapid Improvement Event (RIE) is a fast and effective approach in the LEAN toolkit that is aimed at making radical changes to current processes and activities within a short timescale. It is conducted over a few days by a small but representative team of front-line workers. A RIE was conducted in March 2014 in the TWH ED in order to address the increasingly complex and inefficient FT area. Physicians and nurses tackled the issue of the care of patients whose medical needs are truly minimal, but who still contribute to ED congestion. The Rapid Medical Evaluation (RME) unit was therefore created, where patients expected to require only minimal investigations and treatment modalities would be assessed and discharged. Using Quality Improvement (QI) strategies, we sought to build and improve on the model as quickly as feasible. A separate physical area of the ED, previously inefficiently utilized, was earmarked for the RME. One ED physician and nurse were assigned to the unit at times of highest patient volumes. Improvement cycles subsequently identified and solved problems relating to patient identification, equipment, staffing, teaching and scheduling. **Results:** The 90th percentile for the time to discharge for RME patients was 2hr 31min after the RIE, a marked improvement from the 4hr 42min that similar patients would have been subject to prior to the changes. Physician initial assessment times also significantly dropped to 54min. These significant improvements in wait times were achieved without the need for increased resources or staffing. **Conclusion:** The RME area was a solution borne out of an RIE event to the problem of a complex and inefficient Fast Track area. By specifically addressing a specific patient population, those with simple complaints, and supported by QI methodology, front-line workers were able to design a new area in the ED that achieved improvements in wait times.

Keywords: quality improvement, access to care, patient flow

MP67

The Ottawa ED surge protocol: implementation of a targeted response plan

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Introduction: Fluctuations in ED patient volumes occur frequently and unpredictably many times a day leading to bottlenecks at various stages of overall ED flow; without frequent & accurate measurement of surge levels in these different stages, timely escalating response is difficult on the background of already overcrowded EDs. We sought to develop, implement, & evaluate a novel Surge Protocol that is sensitive to changing surge levels throughout the day at specific Input-Throughput-Output (ITO) components of the ED. **Methods:** This prospective quality improvement project took place over 6 months at 2 sites of an academic tertiary care centre with >160,000 ED visits/yr. An inter-professional working group developed via consensus & expert opinion specific criteria defining various levels of surge for each component of the ITO model. These criteria were tied to ED-specific & hospital-wide actions targeted at relevant underlying causes. Surge levels were measured every 2 hours. Daily patient volumes and hospital occupancy were recorded pre- & post-implementation of the protocol. Primary outcomes include frequency of reaching Moderate/Major surges, as well as inability to respond effectively to surge as defined by the frequency beyond normal variation of *sustained* Moderate/Major surge >6hr. We present descriptive statistics & Statistical Process Control charts. **Results:** During the study period, the average # of daily ED visits decreased slightly by 10 pts/day [Pre:439.4 v. Post:429.4, $p = 0.04$], while the average daily hospital occupancy level steadily rose above 100% [Pre:99.5% v. Post:101.2%, $p = 0.01$]. The proportion of time the ED reached Moderate/Major surge levels *decreased* for Input [Pre:4.4% v. Post:2.7%, $p = 0.01$] & Throughput [Pre:20.5% v. Post:18.1%, $p = 0.08$], but *increased* for Output [Pre:7.7% v. Post:10.8%, $p = 0.002$]. The frequency of *sustained* Moderate/Major surge above normal expected variation *decreased* across the board for Input [Pre:4.5% v. Post:0.0%, $p = 0.13$], Throughput [Pre:3.5% v. Post:2.7%, $p = 0.54$], & Output [Pre:7.7% v. Post:2.0%, $p = 0.01$]. **Conclusion:** Implementation of the Ottawa ED Surge Protocol led to a more effective response & management of moderate/major surges, despite significant

increase in overall hospital occupancy rates and frequency of surges in the Output component of the ED flow model. This is a simple protocol that can be easily modified and adapted at other centres to tackle ED surges & crowding.
Keywords: ED crowding, surge protocol, wait times

MP68
Inter-regional and inter-physician variation in referral and admission rates for renal colic
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Introduction: Endourologic interventions are becoming increasingly available and pose an attractive option for patients and physicians treating renal colic. We undertook a systematic review of the literature looking for randomized control trials comparing endoscopic intervention versus conservative and medical expulsive therapy for uncomplicated ureteral colic (<6mm stone size). We also undertook a mixed methods study exploring variation in consultative and admission practice among emergency department (ED) physicians for two major urban regions which each serve populations over 1 million and are within 200 miles of each other. **Methods:** Search of the conventional and gray literature by the Canadian Agency for Drugs and Technologies in Health (CADTH) comparing the treatment of renal colic patients in the ED with conservative management compared with urgent (<24hr) ureteroscopy and stone extraction. As well, we analyzed administrative data (Data Integration, Measurement and Reporting; DIMR) for the major centers from September 2013 to August 2014. Inter-physician variation in ED treatment of renal colic incorporated 4 sites and 180 ED physicians. Inter-physician variation focused on tertiary centers with 304,119 annual ED visits. Analysis was restricted to physicians seeing greater than 10 renal colic presentations in the 12-month study period. Outcomes included urology consultation and admission rates, repeat ED presentations within 30days, and rates of re-presentation. **Results:** We found no randomized trials comparing endoscopic intervention versus conservative therapy for uncomplicated ED renal colic patients. Inter-regional urology admission rates were 4.2% and 25.3% respectively in the two major urban regions. Variation in urology consultation rates among ED physicians demonstrated a mean of 48% (IQR_{25-75} of 36 to 60) with variation of urology admission rate demonstrating a median of 20% (IQR_{25-75} of 6 to 45). **Conclusion:** Endoscopic interventions appear to have become common practice in some settings. However, no research evidence supports superiority of endoscopic intervention to conservative treatment for ED patients with renal colic. Randomized control trials are needed to help outline the risk benefit balance for these patients.
Keywords: renal colic, intervention, resource utilization

MP69
Does gender influence renal colic management and outcome?
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Introduction: Gender biases in management have been described in several areas of acute care. Our objective was to determine the influence of gender on the management and outcomes of ED patients with renal colic. **Methods:** This multicenter administrative database study included all Calgary patients with an ED diagnosis of renal colic over a one-year period from July 1, 2013 to June 30, 2014. Only first encounters were included, in order to study incident not prevalent cases. Demographics, CTAS categories and vital signs were captured from the regional ED database, tests and treatments from the physician order entry database, and ED revisits, admissions and interventions from the discharge abstract database. Main outcomes were imaging, admission and intervention rates by gender. Secondary outcomes were ED revisit and admission rates over 30-days. **Results:** At 4 hospitals, 3,282 renal colic visits were studied, including 1,210 females (37%) and 2,072 males (63%). On average, women were younger than men (45.6 v. 49.2 years), but EMS arrival rates (17.3% v. 17%), CTAS acuity levels (89.8% v. 90.5% CTAS 1-3), prior stone (27.6% v. 31.5%) and intervention rates (19.3% v. 18.4%), and proportions with the chief complaint of flank pain (62.7% v. 65.3%) were similar between groups. Women had longer median wait time to physician (71.5 v. 68 min; $p = 0.02$) and were less likely to receive IV ketorolac (59.3% v. 66.3%; $p = 0.002$) but equally likely to receive IV opioids (71.5% v. 74.1%; $p = 0.11$). Women had fewer CT scans (56% v. 68%; $p < 0.001$) and more ultrasounds (17.4% v. 6.9%; $p < 0.001$). Index admission rates were similar (45.4% v. 42.3%), as were 7-day ED revisits (17.9% v. 18.5%), 7-day readmissions (7.9% v. 9.9%) and 30-day revisits (27.7% v. 25.1%). Women were more likely to have a surgical intervention at their index visit (44.5% v. 39.9%; $p = 0.01$), but at 30 days, cumulative intervention rates were similar for women and men (51.2% v. 49.2%; $p = 0.27$). **Conclusion:** Women underwent different imaging strategies than men and were less likely to receive IV NSAIDs. They were more likely to undergo early surgical intervention, but cumulative intervention rates were similar by 30-days.
Keywords: renal colic, outcomes, gender differences

MP70
The impact of removing pay for performance incentives on ED flow
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Introduction: Ministry of Health pay-for-performance (P4P) initiatives for ED activity in British Columbia existed from 2007-2014; EDs meeting discharge times of $\leq$ 2 hours for CTAS 4-5 patients, $\leq$ 4 hours for CTAS 1-3 patients, and $\leq$10 hours for admitted patients were rewarded. In April 2014 this was replaced with a penalty for not achieving a 55% admit rate in $\leq$10 hours. There was no incentive or penalty for discharged patients. We sought to evaluate the impact to regional ED performance by the change in the P4P model. **Methods:** This was a before -after study using a previously validated administrative database in the Vancouver Coastal Health (VCH) health region. We identified all patients that presented to each of the four P4P participating urban EDs during a six month period during the last fiscal year of the P4P initiative (June-December 2013) and compared the results to a similar six month period (June-December 2014) after the P4P model ceased. The primary outcome was the change in average EDLOS and the secondary outcomes were the percentage of patients meeting the 10 hour P4P target for admitted patients before and after P4P. We excluded patients who were admitted in 2013 to the Clinical Decision Unit (CDU) and then discharged as this was counted as a hospital admission. The policy was changed in April 2014 to only count traditional admissions in the 10 hour formula. **Results:** Patient volumes increased from 138,180 to 143,508 (3.8%) between 2013 and 2014. The percentage of CTAS 1-3 patients, patients $\geq$70, and ambulance arrivals were not statistically different year over year. Average ED length of stay (EDLOS) was shortened in the post P4P period for admitted patients (P4P period mean 759 min (SD 662.5) v. the post P4P period mean 739 min (SD 698) ($p = 0.0016$)). For the discharged cohorts average

EDLOS was statistically longer for CTAS 1-3 patients (P4P period mean 347 min (SD 397.7) to post P4P period mean 360.1 min (SD 438.4) ($p < .0001$)) and CTAS 4-5 patients (P4P mean EDLOS 151 min (SD 193) to post P4P mean EDLOS 163.7 min (SD 176.6) ($p < .0001$)). This effect was seen at all sites. For the 10 hour admit targets the regional rate was (59.9%) during P4P and (57.5%) post P4P. ($p < .0001$). **Conclusion:** Removing the P4P incentive may be related to longer EDLOS for discharged patients, especially those with lower acuity. Admitted patient EDLOS was not worse in the negatively incentivized period.

Keywords: pay for performance, length of stay, ED crowding

MP71

The utility of pelvic exams in emergency department patients with first trimester vaginal bleeding: a feasibility study and medical record review

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Introduction: Approximately 21% of pregnant patents will experience first trimester vaginal bleeding (FTVB) and many will seek care in the emergency department (ED). Pelvic examinations have traditionally been recommended for the diagnosis and management of all patients with FTVB. Recently, the utility of pelvic exams in this population has been questioned. We aimed to determine if emergency physicians routinely utilize pelvic exams in patients with FTVB, and if so what variables are associated with their use. We also aimed to establish feasibility for a prospective trial to evaluate the utility of pelvic exams in this population. **Methods:** This retrospective medical record review included 151 consecutive patients who presented to the Emergency Department with FTVB between January and July 2012. A sample size was calculated for the primary outcome: the proportion of patients who received a pelvic exam. Two data abstractors were trained in data abstraction and blinded to the study hypothesis. Their work was checked in a random 10% sample. Inter-observer agreement for the primary outcome was 100% **Results:** Of 151 patients included in the study 19% received a pelvic exam (95% CI 12-25). Patients with a confirmed intrauterine pregnancy during the ED visit were less likely to have had a pelvic exam compared with patients who did not have a confirmed IUP (16% v. 22%), however it was not statistically significant (OR 0.6; 95% CI 0.28-1.5). Moderate to severe bleeding was associated with the use of a pelvic exam (OR 3.9; 95% CI 1.2-11.8; $\chi^2 p = 0.029$) Variables not associated with the use of a pelvic exam included hemodynamic instability, anemia or the use of ED point of care ultrasound. **Conclusion:** The results suggest that despite traditional teaching emergency physicians use pelvic exams infrequently and only in selected patients. Given pelvic exams are not routinely used a prospective trial may not be necessary.

Keywords: pelvic examination, first trimester vaginal bleeding

MP72

The impact of an initial access physician (IAP) on emergency department patient and staff satisfaction

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Introduction: Emergency department (ED) overcrowding is a pervasive problem. The effects of overcrowding include prolonged wait times, suboptimal care, and dissatisfaction among both patients and health care providers. St Joseph's Healthcare in Hamilton, Ontario has implemented an Initial Access Physician (IAP) during peak hours to improve throughput and ED flow. The IAP is responsible for completing a brief examination and initiating investigations prior to the patient being moved to the main ED care area. The current study aimed to investigate patient and staff satisfaction with implementation of an IAP system. We expected patients seen during IAP hours to be more satisfied with their ED experience. **Methods:** The study consisted of two parts. For part one, patients were invited to complete a satisfaction survey once a disposition decision had been made (i.e. on discharge from the ED). For part two, all physician and nursing staff were invited to complete an anonymous survey assessing their satisfaction with the IAP process and the impact on patient care. **Results:** There were 422 patient satisfaction surveys completed with 253 of these patients having seen the IAP and 169 seen through the traditional non-IAP system. Overall, patients were highly satisfied with their ED care (67% of patients) and were very likely to recommend the ED to a loved one (71% of patients). This did not differ significantly between patients who did and did not see the IAP. However, patients who saw the IAP perceived their wait time to see a physician as significantly shorter (39 minutes v. 68 minutes) and were more satisfied with this wait time (70% v. 44% satisfied) compared to those patients not seen by an IAP. 55 staff satisfaction surveys were completed (37 nurses, 18 physicians). Overall, staff were satisfied with the impact of the IAP system on patient care, ED flow, and staff collaboration. **Conclusion:** The current study adds to research examining the impact of an IAP on patient and staff satisfaction. Contrary to our hypothesis, the presence of an IAP did not improve patient's overall satisfaction with their care. However, an IAP did lead to increased satisfaction with the wait time to initial physician contact. The IAP system at our institution was well received by staff and perceived as leading to improved patient care. Future research is needed to understand best practices to optimize patient satisfaction with ED care.

Keywords: triage physician, patient satisfaction, staff satisfaction

MP73

Survival from drug-related out-of-hospital cardiac arrests: a retrospective cohort study

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Introduction: Fatal drug overdose is a growing public health concern, accounting for over 35,000 unintentional deaths in Canada and the USA annually. We aimed to describe drug-related out-of-hospital cardiac arrest (DR-OHCA) in Southern Ontario, and compare demographics, treatment, and survival to discharge between DR-OHCA and OHCA events of a presumed cardiac aetiology (C-OHCA). **Methods:** We conducted a descriptive and retrospective observational study of all treated drug-related and presumed cardiac OHCA cases between 2007 and 2013 using the Rescu Epistry database. DR-OHCA was defined as OHCA where paramedics identified drugs or alcohol as primary or contributing factors. C-OHCA was defined as OHCA without other obvious cause. We excluded patients with DNR orders. Our bivariate analyses compared patient demographics, prehospital, in-hospital and post-arrest care between groups. The adjusted association between drug-related status and survival to hospital discharge was our primary outcome, computed using multivariate logistic regression adjusted for Utstein confounders. **Results:** 21497 cases were included in our analysis (1.8% DR-OHCA, 98.2% C-OHCA). In comparison with C-OHCA patients, DR-OHCA patients were significantly younger, less likely to receive bystander CPR, more often attended by advanced

paramedics, less likely to have an initial shockable cardiac rhythm, and less often transferred to the emergency department. There were no significant differences in the public vs. private location of OHCA, EMS response times, advanced airway placement, return of spontaneous circulation, hospital admission, favourable neurological outcome, or unadjusted rates of survival to discharge (9.52% DR-OHCA v. 9.34 C-OHCA p = 0.41). With adjustment for Utstein predictors of survival, multivariate regression identified that DR-OHCA was associated with survival to hospital discharge compared to C-OHCA (OR 1.56, 95%CI 1.25-1.94). **Conclusion:** Significant differences exist in the demographic characteristics, clinical presentation and clinical course of DR-OHCA patients in comparison with C-OHCA. Unadjusted survival rates in DR-OHCA and C-OHCA are similar, though DR-OHCA is associated with higher odds of survival than C-OHCA with adjustment for known confounders. Future research should focus on the types of drugs involved in DR-OHCA, as well as prevention, bystander interventions, and prehospital treatment to improve DR-OHCA outcomes.
Keywords: overdose, out-of-hospital cardiac arrest, prehospital care

Poster Presentations

P001
Quality assessment of resident charting in emergency departments
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Introduction: There is a paucity of literature regarding quality improvement in emergency department (ED) charting, specifically among residents working in the ED. Completeness of ED documentation is essential for continuity of patient care and flow of information to care providers. It is during residency that good charting practices can be imbibed. Our study seeks to detect deficiencies in documentation of ED encounters by residents and suggest recommendations for improvement. **Methods:** Charts were examined from both an academic and a community Emergency Department. Data was extracted from charts using a Microsoft Excel™ spreadsheet with established fields, based on areas of documentation considered important. The data was qualitatively analyzed to assess adequacy of charting and identify areas of deficiency. Ethics approval was obtained for the study. **Results:** A total of 500 charts were reviewed. Most charts were deemed legible (96%). Time of assessment and adequate history and physical examination were documented 100% of the time and a review of vital signs was charted 82% of the time. Reassessment time and note was only documented in 47% of charts where reassessment was expected. Also, 20% of charts lacked a record of past medical history and 34% of charts lacked documentation of the patient's medications being reviewed. Allergies were documented as being reviewed 38% of the time. While discharge instructions were provided 91% of the time, a clear impression and plan was only documented 59.6% of the time. A communique with the primary care provider was documented 41% of the time. Signoff and review by the attending physician was documented 40% and 27.6% of the time respectively. Discharge diagnosis was present in 94.6% of charts reviewed. **Conclusion:** Clear improvements are necessary in ED resident documentation of reassessments, patients' medications and allergies, primary care follow-up and review by the attending physician. Based on the deficiency in charting practices identified here, we can now implement an approach to improve documentation skills for residents rotating in the ED. Future endeavours will involve creation of an audit tool that emergency departments can use to audit their rotating residents' charting practices. Our exercise is an initial step towards efforts in improving charting in emergency department encounters.
Keywords: quality improvement, documentation, emergency department

P003
A novel automated clinical decision support system for intravenous infusions in a bleeding patient: an algorithm
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Introduction: Individual management of fluid and vasopressor infusions is crucial for the optimized fluid status and hemodynamic stability in a bleeding patient. However, this requires simultaneous evaluation of changes in several parameters. Development of Automated Clinical Decision Support (ACDS) systems is therefore encouraged. **Methods:** We created a clinical algorithm based on current knowledge and joint consensus of orthopedic surgeons and anesthesiologists. One of the parts of this is a goal directed optimization algorithm which implies evaluation of hemodynamic and hemodilution responsiveness during step-wise fluid loading. According to a mini volume loading test (mVLT), further fluid loading is not any longer justifiable when plasma dilution is not any longer enhanced. Vasopressors are then considered. Red cell transfusion is considered if signs of anemia persist after the optimization. The algorithm was put in a software package in a lap-top computer to generate appropriate intervention suggestions to the care provider. **Results:** The prototype ACDS system was created. **Conclusion:** Trials are needed to evaluate the safety and efficacy of the prototype. If validated, its software could be used in semi-closed loop infusion systems. **References:** 1) Andrijauskas et al. *The Open Conference Proceedings Journal* 2012;3:42-51. 2) Svensen et al. *Medicina (Kaunas)* 2014;50(5):255-62. DOI:10.1016/j.medici.2014.09.007. 3) Andrijauskas et al. *Eur J Anaesthesiol* 2012;29:Supplement 47. 4) Markevicius et al. *Electronics and Electrical Engineering* 2013;19 (7):65-71. 5) Markevicius et al. *Electronics and Electrical Engineering* 2014;20(9):19-24. DOI: http://dx.doi.org/10.5755/j01.eee.20.9.8520.
Keywords: automated decision support, bleeding, goal directed therapy

P004
A descriptive study of pediatric patients presenting to a community hospital with a chief complaint of nausea and vomiting
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Introduction: Nausea and vomiting in the pediatric population is a presenting complaint to emergency departments (ED) of a wide range of disease processes. Diabetic ketoacidosis (DKA) is one of the life-threatening causes of nausea and vomiting in this population and can be ruled out with a finger stick glucose test. The objective of this study was to describe the presentation and management of pediatric patients presenting with nausea and vomiting, including adherence with a local medical directive. **Methods:** A retrospective medical record review of patients aged <18 presenting to a community ED with a presenting complaint of nausea and/or vomiting from April 1, 2012 - March 31, 2013. A random sample of charts was reviewed for demographics, triage vitals, management strategies, final diagnosis, unexpected return visits and admission status. **Results:** 108 patients were included. The mean (SD) age was 4.9 (5.3) and 46% were male. Glucose was obtained at triage in 32% of patients. Of these patients, 3 were found to be hypoglycemic and 2 were hyperglycemic. There were no documented cases of DKA. Blood work was requested on 42 (38.9%) patients and imaging

was ordered for 24 patients (22.2%). 43 (39.8%) of patients received antiemetics. 71 (66%) received rehydration therapy. The most common diagnosis was gastroenteritis (36%). 14 (13%) patients were admitted to hospital and 17 (16%) patients had an unexpected ED return visit within 14 days. **Conclusion:** The medical directive for giving all pediatric patients presenting with nausea or vomiting a finger stick glucose test at triage has low compliance. In the future, larger studies could be performed to assess the ability of finger stick glucose to help diagnose DKA.
Keywords: nausea and vomiting

P005

Jr. Medics: a medical student teaching initiative focused on providing an interactive first aid program for elementary school students

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Introduction / Innovation Concept: Few teaching initiatives in emergency medicine at the undergraduate level focus on combining scholarly teaching with other CanMEDS competencies. The purpose of this educational initiative is to incorporate the role of the scholar, communicator, and health advocate in order to provide a valuable service to the Kingston, ON, community. **Curriculum, Tool, or Material:** Jr. Medics is an interactive first aid program designed by medical students for Ontario Grade 1-8 elementary students within the Limestone District School Board in Kingston, ON. Forty to sixty medical student volunteers and approximately four hundred elementary school students participate in this program yearly. In preparation for teaching this program, medical students must first participate in two student led training sessions. The first session is an educational session where medical students review basic principles of emergency medicine and topics relevant to common injuries in children. This session serves to supplement knowledge based on the Medical Council of Canada's objectives for the qualifying examination. The second session is a student led training session in first aid skills relevant to common injuries in children. Skills in fracture management, bleeding, choking, concussions, anaphylaxis, burns, heat stroke and frostbite are taught in a hands-on classroom format. After completing the training program, medical students are assigned to teams and teach the material to classrooms. They are provided with an interactive learning plan as well as the necessary first aid supplies to allow interactive and hands-on teaching. The result is a ninety minute first aid teaching program with a focus on promoting safety. **Conclusion:** An interactive first aid training program for Ontario elementary Grade 1-8 students was designed in order to provide a valuable service to the Kingston, ON, community. Medical student volunteers participate in a well-rounded educational initiative focused on emergency medicine topics which incorporates the CanMEDS roles of scholar, communicator and health advocate.
Keywords: innovations in EM education, CanMEDS, medical students

P006

Opiate use in a tertiary care teaching hospital: a 1-day audit

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Introduction: Opioids are potent analgesics but are associated with significant undesirable side effects and risks related to sedation, respiratory depression and death. In recent years there has been an increasing trend in the use of high potency narcotics, despite lack of evidence to support this practice. This increase in prescribing of high potency narcotics has been associated with a significant increase in physical dependence, tolerance and unintentional opioid analgesic related mortality. Critical incidents related to high potency opiate use have occurred numerous times in our hospital over the last 5 years, and continue despite efforts to prevent medication errors. The objective of this study was to audit hospital-wide use of narcotic analgesics and to specifically compare morphine and hydromorphone administration throughout the institution. **Methods:** This was a retrospective medical record review of all opiates dispensed in an academic, tertiary care centre over a one-day period in June 2014. Total number of doses and amount dispensed were calculated for morphine and hydromorphone. **Results:** Of the 243 adult inpatient charts audited, 132 (54%) patients received a dose of any narcotic. Of these, 68 (28%) received hydromorphone representing 51% of all opioid use, and 47 (19%) received morphine representing 36% of all opiate use. Using a hydromorphone to morphine dosing equivalency ratio of 5:1, the median parenteral dose of hydromorphone was twice the mean parenteral dose of morphine (10 mg v. 5 mg). The median oral dose of hydromorphone was 2.4 times the median oral dose (24 mg v. 10 mg) of morphine. 50% of all hydromorphone was administered in surgical care areas, and proportionate hydromorphone use increased with patient age; 46% of patients over 70 years of age received hydromorphone compared to just 15% receiving morphine. Hydromorphone use was more frequent in patients with impaired renal function (creatinine clearance <50 ml/min) at 22%, compared to morphine use (11%). Only 12% of those receiving hydromorphone had a documented allergy or intolerance to codeine or morphine. **Conclusion:** In this one day audit, hospital wide inpatient hydromorphone use was more than 50% of all opiates administered, significantly higher than anticipated. Hydromorphone dosing was more than twice that of equivalent morphine dosing, a possible factor in opiate related medication error incidents. Further study is required to understand this relationship.
Keywords: opiates, hydromorphone, medical error

P007

A multicenter comparison of three medication screening tools to identify patients at high risk of adverse drug events

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Introduction: The goal of medication reconciliation (MedRec) is to communicate medication related changes to patients and health care providers for safe patient care. Accreditation Canada recommends that all emergency departments (ED) engage in MedRec and not only for admitted patients. Our objective was to evaluate potential screening tools for future implementation in ED's to identify patients at high risk for adverse drug events that would benefit from medication reconciliation. **Methods:** Three screening tools: Patient Risk Assessment tool (PRA), Hohl Tool and Modified Hohl Tool were evaluated. A convenience sample of 300 patients were interviewed at 4 Calgary adult EDs. The sampling methodology involved interviewing every 2nd-4th patient registered, aged 18 years or older with a CTAS score of 2-5. The primary outcomes included determining which tool was more selective in identifying high risk patients and the number of positive screens that went on to hospital admission. **Results:** The PRA tool resulted in 9% fewer positive screens than both of the Hohl tools: 23% v. 32% ($p = 0.0136$) with a 78% rate of overlap. A larger proportion of the PRA positive-screened patients went on to hospital admission in comparison to the Hohl tools (55% v. 45%), however this was not statistically significant. All three tools took less than 1 minute on average to complete. **Conclusion:** The Hohl tools capture more patients with positive screens and this may result in a higher volume of medication

reconciliations and pharmacy referrals. The PRA tool appears to be more selective in screening positive for those patients that go on to hospital admission. The PRA tool would be most useful in settings where EDs wish to be more selective in screening and have limited clinical pharmacy resources. However, the Hohl tools provide a more comprehensive approach to capture patients regardless of disposition.
Keywords: medication reconciliation, adverse drug events, polypharmacy

P008

State of the evidence for emergency medical services (EMS) care of respiratory distress: an analysis of appraised research from the Canadian prehospital evidence-based practice (PEP) project

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Introduction: The Canadian Prehospital Evidence-based Practice (PEP) project is an online, freely accessible, continuously updated EMS evidence repository. Our objective was to describe the body of research for EMS care of respiratory distress. **Methods:** PubMed was systematically searched using MeSH and title/abstract key words. One author reviewed titles and abstracts for relevance. Included studies were scored by trained appraisers on a three-point Level of Evidence (LOE) scale and three-point Direction of Evidence (DOE) scale (supportive, neutral, or opposing findings). Second party appraisal was conducted for included studies. Interventions were plotted on 3x3 tables (DOE x LOE) for each clinical condition, based on appraised study scores. The primary outcome was identified and categorized for each study. **Results:** The search returned 426 records; 71 were appraised for 60 interventions in six adult and pediatric conditions. Evidence for respiratory interventions: supportive-high quality (n = 21, 35%), supportive-moderate quality (n = 4, 6.7%), supportive-low quality (n = 1, 1.7%), neutral-high quality (n = 9, 15%), neutral-moderate quality (n = 10, 16.6%), neutral-low quality (n = 6, 10%), opposing-high quality (n = 1, 1.7%), opposing-moderate quality (n = 0, 0%), opposing-low quality (n = 1, 1.7%). Seven (11.6%) interventions had no evidence. Clinical conditions with interventions with the highest quality supportive evidence were: adult asthma (n = 8, 13%), pediatric wheeze (n = 6, 10%) and adult chronic obstructive pulmonary disease (COPD) (n = 4, 6.7%). Predominant study primary outcomes in each condition: pediatric stridor - admission (5, 72%); pediatric wheeze - pulmonary function (13, 25%)/admission (13, 25%); adult asthma - pulmonary function (49, 65%); COPD - mortality (6, 20%); congestive heart failure - mortality (27, 54%); respiratory distress not diagnosed - mortality (2, 40 %). **Conclusion:** PEP found most EMS respiratory distress interventions are informed by high quality evidence with supportive results. Some interventions have no evidence. Future research should focus on high quality studies filling evidence gaps using patient-oriented outcomes to best inform EMS respiratory distress care.
Keywords: knowledge translation, emergency medical services, respiratory distress

P009

Acquisition of bacteria on healthcare worker hands following contact with patient privacy curtains in the emergency department

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Introduction: Hospital privacy curtains have been implicated in a small number of nosocomial outbreaks. The objective of this study was to evaluate bacterial transfer from privacy curtains to health care workers (HCWs). **Methods:** HCWs were invited to participate in this prospective, observational cohort study while preforming routine activities in the emergency department (ED). Imprints of HCWs fingertips were obtained on 5% blood agar plates at 3 points: when approached; 60 seconds after hand hygiene with alcohol hand rub; and directly after handling curtains. Plates were incubated aerobically at 37°C for 24 hours. The number of morphologically distinct colonies on each plate was recorded and all distinct colonies were identified to at least the genus level by MALDI-TOF mass spectrometry. *Staphylococcus aureus*, *Enterococcus spp.* and *Enterobacteriaceae* were screened for relevant drug resistance. **Results:** 30 HCWs participated in this study. Participants' hands were most heavily contaminated at baseline. The median number of distinct bacterial morphotypes per imprint was 4 at baseline, 2 post-hand hygiene and 3 post-curtain. Baseline imprints yielded 11 potentially pathogenic bacteria from 10 participants, including one instance of methicillin resistant *Staphylococcus aureus*. Median (IQR) colony counts per plate were 58.5 (19,184) at baseline; 6 (1, 40) post-hand hygiene and 9.5 (2, 62) post-curtain. Paired analyses showed a significant reduction in colony counts ($M = 12.5$, $p < 0.001$) and number of distinct bacterial morphologies ($M = 11$, $p < 0.001$) from baseline to post-hand hygiene. There was no difference between post-hand hygiene and post-curtain colony counts ($M = 1$, $p = 0.84$), however there was an increase in number of distinct bacterial morphotypes ($M = 5.5$, $p = 0.04$). 15 participants (50%) acquired ≥1 bacterial species from handling the curtains. In total, there were 81 bacterial species isolated from fingertips post-curtain, 23 (28.4%) could be considered "curtain-acquired". **Conclusion:** Baseline hand hygiene in ED HCWs is poor, with 1/3 of HCWs growing potentially pathogenic bacteria at baseline compared to only 2 after hand hygiene. Half of the participants acquired bacteria from handling hospital curtains, mostly commensal flora. Bacteria appear to be easily transferred from privacy curtains to HCWs hands, suggesting hand hygiene should be performed after touching curtains.
Keywords: emergency department, hospital curtains, bacteria

P010

Hand hygiene in the emergency department: a survey of auditing practices across Canadian hospitals

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Introduction: Hand hygiene among healthcare workers is a key strategy for reducing nosocomial infections. Various campaigns promoting hand hygiene have been implemented across the country; however, compliance is not often reported. The objective of this study was to determine which hand hygiene metrics are reported by Canadian EDs and compare hand hygiene adherence across Canada. **Methods:** Using modified Dillman methodology, a 25-item survey was distributed to infection control staff at Canadian acute care hospitals with at least 50 inpatient beds in all provinces except Quebec. Rehabilitation, psychiatric, long-term and chronic-care facilities were excluded. **Results:** Of the 178 surveys distributed, 138 (77.5%) were completed and returned. All respondents reported access to soap and water and at least one wall-mounted alcohol-based product available for hand hygiene in the ED. Audits were performed in 129 (93.5%) hospitals. However, 27 of the 129 (20.9%) reported that not all areas of the ED were audited. Areas often excluded from audits included triage (n = 14), ambulatory care areas (n = 13), rapid assessment zones (n = 12) and resuscitation areas (n = 15). The majority of respondents indicated that audits were

performed weekly (n = 29) or monthly (n = 35), however, auditing frequency varied from once a day (n = 8) to once per year (n = 13). Hand hygiene adherence was significantly lower in the ED compared to other clinical areas for all respondents (67.1% v. 79.6%, $p < 0.01$). Hospital senior management was noted to place the most importance on hand hygiene in the ED, followed by ED administrators and front-line ED staff ($p < 0.001$). Reported barriers to hand hygiene in the ED included insufficient time (n = 77), high patient volume/acuity (n = 46) and poor product placement (n = 45). Only 88 (63.8%) centres report hand hygiene compliance to a provincial body. **Conclusion:** Hand hygiene adherence is lower in EDs compared to other hospital areas. There are no uniform requirements for which ED areas are audited, how often audits occur, or reporting to regional or provincial agencies. A standardized auditing and reporting framework may facilitate comparison and future learning. Strategies for improving compliance with this fundamental method of infection control should be explored.
Keywords: hand hygiene, infection control, survey

P011
Does implementation of a local AECOPD treatment guideline improve patient orientated outcomes?
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Introduction: We have previously reported that an implementation process for a local AECOPD guideline in our emergency department (ED) increased guideline awareness, claims of use, and improved antibiotic stewardship, but had no effect on overall adherence for combined steroid, bronchodilator and antibiotic use. We wished to see if this process had any effect on patient oriented outcomes, such as return rates and treatment failure rates. **Methods:** This study was conducted at a tertiary hospital ED. Local COPD guidelines were developed by a quality improvement group. Guidelines were posted in the department and educational sessions were provided for staff. We conducted a retrospective chart review and looked at 1,849 patient visits from December 2011 to February 2012 and December 2012 to February 2013. Inclusion criteria were: history of COPD, age >40, MD diagnosis of AECOPD, LRTI or bronchitis; as well as two or more of the following: increased dyspnea, cough, production or change in sputum character for at least 2 days. Data were collected using a standardized abstraction tool, and captured exacerbation severity. For non-admitted patients, we recorded 30-day return rates and treatment failures occurring within 30 days presenting to the ED. Treatment failure was defined as intensification of drug treatment, readmission for COPD, intubation or death, within 30 days of ED discharge. Pre and post implementation data were analyzed by Fisher's exact tests. **Results:** Overall, 86 non-admission patient visits were evaluated: 35 visits prior implementation, and 51 post-implementation. In non-admitted AECOPD patients, prior to guideline implementation, 8/35 patients (23%; 95% CI 12-39%) returned to the ED within 30 days for an AECOPD related complaint compared to 7/51 patients (14%; 7-26%; p = 0.39) following implementation. Six of 35 patients (17%; 8-33%) failed their initial AECOPD treatment prior to implementation, compared to 5/51 patients (10%; 4-21%; p = 0.34) following guideline implementation. **Conclusion:** Our previous work has shown that the implementation process for a local COPD guideline successfully increased awareness, claims of use, and antibiotic stewardship among emergency staff. However, improvements in patient oriented outcomes were not statistically significant in this small cohort of non-admitted AECOPD patients.
Keywords: COPD, guideline, knowledge translation

P012
Compliance with online medical control: does order confirmation matter?
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Introduction: In Ontario, direct online medical oversight of paramedics requires that they patch by phone to a physician according to mandatory criteria set out in standardized provincial medical directives. Paramedics may also patch to a physician for consultation, or further orders according to their own judgment. Little is known regarding the compliance by paramedics with online orders provided by physicians. We sought to determine the compliance of paramedics with online medical control orders in a single Canadian EMS system. **Methods:** We performed a retrospective review of all taped audio patch recordings in a single EMS system for a one year period ending December 31, 2013. We assessed each patch to determine the rationale for the patch, the specific orders requested and whether the paramedic complied with the physician orders, defined as correct documentation of the physician order on the ambulance call report (ACR). Each corresponding ACR was also reviewed to determine if the audio file information matched the written documentation. **Results:** In all, 479 patch recordings were reviewed pertaining to 462 patient encounters. The highest proportions of patches were requests for pain medication (31.5%), followed by patches for cardiac arrest (30.3%) and arrhythmia management (11.1%). All other categories accounted for less than 5% each of the remaining patches. Of patches resulting in a physician order, 122/405 (30.1%) were not repeated back to the physician for confirmation. Patches for prehospital pain management were the most frequently unconfirmed 36/122 (29.5%). Written documentation of orders for pain medication not verbally confirmed by the paramedic (compared with orders that were verbally confirmed) was more likely to be inconsistent with the order given by the physician (33.3% v. 10.1%, $p < 0.01$). **Conclusion:** Paramedic confirmation of verbal orders is critical to ensure that all components of a patch order are met. Lack of patch order confirmation was associated with a significant increase in medication documentation errors. Training paramedics and physicians to seek confirmation of verbal orders is essential to ensure patient safety.
Keywords: emergency medical services, medical oversight, education

P013
Development of an emergency department referral tool for acute mechanical low back pain: optimization of follow-up patient care after discharge from the emergency department
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Introduction: Acute Mechanical Low Back Pain (AMLBP) is a common emergency department (ED) presentation which poses significant challenges from the perspective of optimized follow-up. The objective of this study was to develop an ED aftercare referral tool to be used for patients with AMLBP. **Methods:** A literature review was conducted identifying current clinical practice guidelines and evidence for the treatment of AMLBP. This was followed by a survey to a convenience sample of ED MDs examining factors in the aftercare treatment of AMLBP that physicians believe are important. A local geographic search was conducted identifying eligible clinics using provincial physiotherapy, chiropractic, and osteopathic associations search directories. Screening and assessment tools incorporating guideline-supported interventions were developed and applied to clinics by phone or email survey to establish eligibility. In the second phase, in-depth

assessments through clinic field visits were conducted to assess their management repertoire for AMLBP measured against the literature review and the ED physician survey. The obtained information was used to develop the final referral tool. **Results:** 336 clinics were identified that provided physiotherapy, chiropractic, or osteopathic treatments for AMLBP. Of these clinics, 83 responded and 72 participated in the first phase of the evaluation. 27 clinics were identified as primary referral clinics based on scores from our screening and field assessment tools. All clinics offered diagnostic services and therapies for AMLBP, primarily physiotherapy and manual therapy. 22 of the 27 clinics listed had the ability to manage workplace injuries while 9 of the 27 clinics were able to provide limited physiotherapy sessions to low-income patients with no charge. These final 27 clinics were arranged by city geography and included on the referral tool. **Conclusion:** We describe the development of a referral tool for AMLBP that may improve quality and continuity of care between the ED and outpatient clinics. This tool took the form of a handout listing the primary referral clinics on a map of the city with detailed information on the resources available at each site. Further research is required to validate the utility of the tool.
Keywords: back, pain, referrals

P014

A prospective comparison of emergency department crowding scores: a single centre cross-sectional study

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Introduction: Emergency department (ED) crowding is a significant problem in emergency care. The most widely known tools to measure crowding are EDWIN and NEDOCS; these are validated scores. A newer tool, the International Crowding Measure in EDs (ICMED), seeks to measure crowding and determine its cause but has not yet been validated internationally. In New Brunswick, there are three tools used in local EDs, the ED Saturation Calculators; these have not been validated. The goal of this study is to determine which of these six tools, as well as four readily available single variables, is the best measure of ED crowding, as compared to physician rating via Visual Analogue Scale (VAS). A secondary goal will be to determine which tool best predicts ED crowding up to four hours before being recognized on VAS. **Methods:** We conducted observations in crowding in a tertiary hospital ED capturing all times of day, over two weeks, and compared resultant crowding scores against clinician rating, the standard of face validity in ED crowding. Four single variables (# pts. in ED; # pts. TBS; # wait room pts.; # boarders) were also analyzed as predictor variables. In this study, physician rating is the outcome measure, based on 10cm VAS. All six scores have been calculated using data collected at 2-hour intervals. At each observation, ED Charge Physician and Charge RN were asked their clinical perception of crowding and safety using VAS. A minimum sample size of 41 crowded observations was required. **Results:** We recorded 143 events. Physician VAS showed the ED to be crowded 48% of time during the study period. With 68 crowded observations, the study was sufficiently powered. As measures for crowding, individual performances were; ICMED: $r = 0.282$; NEDOCS: $r = 0.545$; SJ ED Saturation: $r = 0.640$, "# patients in ED": $r = 0.6$. The inter-rater reliability between physician and charge nurse VAS was poor ($k = 0.265$). A regression model determined which score is most closely correlated with physician VAS. A second regression model determined which is most correlated with early ED crowding up to four hours before clinical recognition. **Conclusion:** ED crowding is challenging to measure and predict, with a subjective criterion standard. This study has determined which of the six ED crowding tools and four single variables best correlates with clinical perception of crowding in a Canadian tertiary hospital.
Keywords: crowding, emergency department, trigger tools

P015

Prehospital neonatal care: outcomes of EMS neonatal care

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Introduction: Currently, emergency medical services (EMS) are using the Neonatal Resuscitation Program recommendations to provide care for during an out-of-hospital neonatal emergency. The Alberta Health Services - EMS (AHS-EMS) is the primary provider of ground ambulance service in Alberta, Canada. Although, there is limited data on inter-hospital and Neonatal Emergency Transports provided by a Neonatal Emergency Transport Service (NETS) available, no study examined short- or long-term outcomes of neonates receiving care by an EMS crew responding to a 911 call. The objective is to describe the epidemiology and outcomes of EMS neonatal patients in two Canadian metropolitan centers. **Methods:** The AHS-EMS electronic patient database from Calgary and Edmonton was retrospectively analyzed for a two-year period (October 2010 to September 2012) to identify all neonates (≤28 days after birth) transported by the EMS. All inter-hospital and transports by the NETS were excluded. All retrieved records were reviewed for duplicates and excluded if either 1) duplicate, 2) NETS transport, 3) >28 days after birth. AHS-EMS electronic patient database files were linked with hospital admission and discharge data. **Results:** A total of 607 records were identified and after review 140 records were excluded ($n = 4$ duplicates, $n = 3$ NETS, $n = 133$ >28 days), which yielded 467 records for analysis. A total of 153 (33%) records were from Edmonton and 318 (67%) from Calgary. 310 (66%) neonates had a transport to a hospital, while the remaining 167 were not transported. Initial EMS diagnosis revealed 76 (16%) deliveries, 19 (2%) traumas, 247 (53%) apparently life-threatening event (ALTE), 92 (20%) medical complaint, 27 (9%) requests for neonatal assessment. 6 records did not contain information on field diagnosis. Mean ± SD Apgar scores for deliveries attended by EMS at 1, 5 and 10 minutes were 8 ± 2, 9 ± 1 and 9 ± 1 respectively. Overall 19% received oxygen, 2.1% received respiratory support, 0.8% were intubated and 1.9% received chest compressions. ED database linkage rates were $n = 168$ (54% of transports) and subsequent admission rate was $n = 57$ (33.9%). **Conclusion:** The majority of 911 calls are responses to ALTE, however interventions during neonatal out-of-hospital emergencies are rare. Admission rates in this cohort were higher than the overall rates within these services.
Keywords: neonatal, prehospital, resuscitation

P016

Referrals to an urban pediatric emergency department

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Introduction: Waiting times in EDs have been creeping up over the past 20 years. The main cause of this increase is overcrowding, and there are many factors that give rise to this. As this has occurred there are messages in the media suggesting that overcrowding may be due in part to inappropriate (or convenient) use of the emergency department coupled with a possible lack of primary care physicians. In our pediatric ED, it is the impression of some staff physicians that many patients have been asked to attend the emergency by a health care provider. If this is the case, then the ED is acting as a consultant service, and should be

funded for such activity. If in fact the ED has few referrals, and most of the patients do not have primary care physicians, then resources should perhaps be funnelled into outpatient primary care. The primary purpose of this study is to quantify the percentage of patients who have been referred to the ED by a health care provider. (We are unaware of any literature that currently addresses this question). The proportion who have a primary care provider will also be recorded. A secondary question is to explore if those who are referred in are sicker than those who are not referred in. **Methods:** This is a prospective cross sectional study. All the families triaged while a research assistant is present are asked to participate. Exclusions included those brought to the ED by police or EMS. A random sample are asked to give permission to review their emergency department visit after the fact. This will provide the data for the secondary question. **Results:** The study started July 14th, 2014, and is still ongoing. 540 are currently enrolled. Of these, 241 (44.6%) were recommended to attend the ED. Seventy-two percent of these were referred in by four top groups: their physician (23.7%), Health Link (20.3%), Medicentre (15.8%) and another ED (12%). Only 19% came with a referral note. Ninety-three percent (489) of the patients report having a primary care physician. Ninety-one percent attended because of an acute condition. **Conclusion:** Our emergency is providing consultative care to 44% of our patients. The vast majority of patients (93%) have a primary care physician. This would imply that our emergency is fulfilling a real medical need within the health care system rather than providing a venue for convenient health care.
Keywords: referrals, pediatrics, overcrowding

P017

Assigning costs to visits for injuries due to youth violence - the first step in a cost-effectiveness analysis

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Introduction: In 2013, a RCT of the Emergency Department Violence Intervention Program was launched in Winnipeg's HSC with the goal of reducing the recidivism rate of violent injuries among youth. The objective of this study is to assign healthcare costs to visits for injury related to violence. This will serve as a template for the planned cost-effectiveness analysis. **Methods:** Youth (aged 14-24) with injuries due to violence were included in the main study. A chart review by two extractors of visits for the first 7 months was conducted. Time in the ED, lab, diagnostic imaging and disposition were collected. Cost for ED visits was based on average ED cost per hour. Diagnostic imaging costs were estimated based on the type of test performed. If a patient was admitted, their cost was estimated using CIHI data. For this study we compared index visits to determine if there were any cost differences to baseline visits. **Results:** 81 youth were randomized in the first 7 months. There was no statistical difference between the two groups with respect to index visits; however, there was a trend toward decreased cost of ED visits based on hours in the ED in the intervention group. **Conclusion:** The costing framework is now in place to do a future cost-effectiveness analysis comparing repeat visits for intentional injury. It will help determine whether reducing recidivism through a hospital-based violence intervention program produces a cost savings to the health system.
Keywords: cost-effectiveness, prevention, youth violence

P018

No difference in opioid administration to elderly patients between rural and urban emergency departments in Ontario

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Introduction: While most clinicians acknowledge that opioid analgesia can be an important component of emergency department pain management, it is well documented that emergency department opioid administration and prescribing is influenced by age, with older patients being less likely to receive opioids than younger patients. Our objective was to investigate the effect of rural setting on the provision of opioids and other pain medications to older patients in pain in the emergency department. **Methods:** Retrospective chart review involving three rural emergency departments and one urban emergency department studying a total of 92 patient visits at the rural sites and 193 patient visits at the urban site. Information describing the emergency department visit and administration of analgesia in the emergency department was abstracted. **Results:** Twelve percent of rural patients and 32 percent of urban patients received opioid analgesia from the time of triage to discharge from the emergency department ($p = 0.0003$ for comparison). However, urban patients had higher acuity, longer stays in the emergency department, and were more likely to be admitted to hospital. After adjusting for these and other possible confounders, rural setting was not associated with a decreased likelihood of opioid administration (odds ratio, 0.722; 95% CI, 0.291-1.791). Ten percent of rural patients and 24 percent of urban patients received acetaminophen ($p = 0.0038$ for comparison), while 14 percent of rural patients and 8 percent of urban patients received a non-steroidal anti-inflammatory drug (NSAID) ($p = 0.0918$ for comparison). Men were more likely than women to receive opioid analgesia (odds ratio 3.444, 95% confidence interval 1.660-7.143). **Conclusion:** The overall rate of opioid administration was low in both settings. Rural setting did not influence emergency department administration of opioids to elderly patients in pain after adjusting for possible confounders. Interestingly, the rate of acetaminophen administration was even lower in both settings, and the rate of NSAID administration was higher than that of opioid administration in the rural settings combined. Clinical practice guidelines for treating pain in the elderly state that acetaminophen is generally considered to be the first line pharmacological treatment, and that NSAIDs should be used cautiously due to their side effect profile.
Keywords: pain management, elderly, opioid

P019

Administration of the CIWA protocol for the treatment of alcohol withdrawal syndrome in the emergency department

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Introduction: In the emergency department (ED), alcohol withdrawal syndrome (AWS) is best managed using a symptom-guided approach where patients are regularly assessed using the Clinical Institute Withdrawal Assessment for Alcohol (CIWA) scale and treated with benzodiazepines according to symptom severity. Improper application of the CIWA results in over- or under-treatment with benzodiazepines, posing serious risks to patient safety. The objective of this study was to determine how often the CIWA was appropriately applied for the treatment of AWS in the ED. **Methods:** This was a retrospective medical record review of adult (≥18 years) outpatients presenting to an academic ED (annual census 65,000) in alcohol withdrawal from July 2013 to November 2014. Patient demographics, ED length of stay, administration of the CIWA protocol, total dose of benzodiazepines administered in the ED, and number of prescriptions and unit benzodiazepine doses given upon discharge were recorded. **Results:** There were 64 patients with AWS during the study period. Mean (SD) age 44 (11) years and 55 (85.9%) were male.

Management of alcohol withdrawal was not compliant with CIWA protocol in 31 (48.4%) cases, resulting in administration of benzodiazepine when it was not required. Median (IQR) ED length of stay for patients whose management was compliant with the CIWA protocol was 6.0 (4.4, 7.3) hours compared to 8.4 (5.2, 11.7) hours for patients with CIWA noncompliance (Δ 2.4; 95% CI: 0.1, 3.8; p = 0.04). Additionally, patients with no protocol errors received lower total doses of benzodiazepine while in the ED with no adverse outcomes (40mg vs 60mg, Δ 20mg; 95% CI: 0, 30; p = 0.03). The amount of benzodiazepine given to patients at discharge was similar between groups. **Conclusion:** When properly administered, CIWA guided treatment results in lower total doses of benzodiazepine and significantly shorter ED length of stay for patients in alcohol withdrawal without increasing the number of adverse events. Given the prevalence of AWS and the documented medical errors related to inappropriate treatment in the ED, future research should focus on the development, implementation and evaluation of a quality/safety improvement program focusing on correct administration of the CIWA for patients in alcohol withdrawal.

Keywords: alcohol withdrawal, benzodiazepine, emergency department

P020

Feasibility of monitoring real-time temperatures of medications in a ground ambulance system: a pilot study

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Introduction: Many emergency medical service (EMS) agencies do not monitor temperatures of the environment in which medications are stored. The objective is to determine the feasibility of remotely monitoring temperatures, to describe temperatures observed, and to determine how often medication temperatures exceed recommended limits. **Methods:** A five-week pilot study was conducted in provincial EHS ambulances. AeroScout remote temperature tags were placed in all EHS ambulance medication cabinets and on scene medication bags. 134 ambulance medication cabinets and 162 on scene medication bags recorded reliable data. A sample of 15 Tenecteplase (TNK) storage thermoses and 15 intubation kits containing xylocaine spray and lidocaine topical gel also had remote temperature tags placed in them. Temperatures and number of times temperature exceeded predetermined thresholds were monitored round-the-clock. Temperature alert thresholds were emailed when the temperature deviated beyond 15-30˚C. Due to TNK temperature guidelines, temperatures in excess of 8˚C and 15˚C were analyzed. **Results:** Data was successfully collected from 134 ambulance medication cabinets (45.3%). Mean temperature observed was 23.3°C (95% CI, 24.3-24.4˚C, range 6.0-40.7˚C). Temperatures exceeded 25˚C 35,375 times (30.0%), 30˚C 1,752 times (1.5%), and 35˚C 76 times (0.1%). Data was obtained from 162 on scene medication bags (54.7%). Mean temperature recorded was 23.9°C (95%CI, 23.8-23.9°C, range 6.5-45.4˚C). Temperatures exceeded 25˚C 33,048 times (24.0%), 30˚C 2,356 times (1.7%), and 35˚C 168 times (0.1%). Data was acquired from 15 thermoses containing TNK (100%). Mean temperature was 24.0°C (95%CI, 23.9-24.0°C, range 6.5-31.7˚C). Temperatures exceeded 8˚C 8,335 times (99.8%), 15˚C 8,146 times (97.0%), 25˚C 1,521 times (18.0%), 30˚C 27 times (0.3%), and 35˚C 0 times. Data from 15 intubation kits (100%) showed a mean temperature of 24.0°C (95%CI, 23.9-24.1˚C, range 6.5-32.0˚C). Temperatures in the kits exceeded 25˚C 1,915 times (22.0%), 30˚C 28 times (0.3%), and 35˚C 0 times. **Conclusion:** This pilot study found remotely collected temperatures feasible with some improvements recommended for data quality. Data from the study was used to guide EHS medication storage policy recommendations.

Keywords: emergency medical services, temperature monitoring, medication storage

P021

Temperature control of medications in the EMS setting: a scoping review

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Introduction: Temperature fluctuations in the environment in which emergency medical services (EMS) medications are stored is a concern, as high or low temperatures may lead to drug instability and sub-optimal patient care. The purpose of this evidence review is to identify and synthesize relevant research evidence related to controlling temperatures of medications in the EMS setting. **Methods:** Scoping review methodology was followed. An initial search was developed using key words, MeSH terms, and focused on locating EMS studies (PubMed and Cochrane). From the results of this search a broader strategy was developed (PubMed). Inclusion criteria were primary studies on one or more drugs carried by EMS, and studied one or more of the following: temperature of medications or temperature control. Data was abstracted from included studies by two authors. Studies were mapped against the list of medications of our EMS service to identify which medications have relevant evidence. Findings were categorized into the following themes: 1) temperature monitoring in the EMS setting, 2) effects on drug stability after exposure to EMS setting, and 3) temperature control interventions. **Results:** The searches retrieved 143 records, of which 75 abstracts and 49 full text articles were reviewed, with 39 included. Of 34 EMS medications, 11 were found to not have any relevant research (32%). Five (13%) studies monitored temperatures of EMS medications or setting. Most studies reported temperature extremes. Thirty-one studies (79%) analyzed medication stability at various temperatures, mostly finding that mediations remain stable. Most of these were not conducted in an EMS setting. Three studies (8%) studied the effect of interventions on exposure to temperature extremes in the EMS setting. **Conclusion:** Environments in which EMS medications are stored often exceed temperature guidelines. Many of studies will be difficult to generalize to the EMS setting. It is unclear if temperature extremes outside of 15-25°C affect the stability of EMS medications or the effect patient care. There is little research on temperature control interventions in the EMS setting.

Keywords: emergency medical services, temperature monitoring, medication storage

P022

Evaluating a nurse initiated analgesia protocol in the emergency department

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Introduction: The level of pain for patients coming to the emergency department (ED) is rapidly assessed by triage nurses, but provision of analgesia is usually delayed until ordered by a physician. We sought to assess the effects of a nurse-initiated analgesia protocol on time to first dose of analgesia (TTA), proportion of patients receiving analgesia in under 30 minutes, and total length of stay (LOS) in the ED, for patients discharged home from the ED with a diagnosis of musculoskeletal back pain. **Methods:** We performed a health record review comparing a 3-month period before to a 3-month period after the introduction of a nurse-initiated analgesia protocol in September 2011. This protocol allows any nurse to administer Acetaminophen, Naproxen, and Tramadol to patients prior to physician assessment. We used ICD-10 codes to identify potential cases, and included consecutive patients

discharged home from the ED with a diagnosis of musculoskeletal back pain. We developed and piloted a standardized data collection tool. Fifty charts were independently reviewed by two investigators to measure agreement. We present descriptive statistics, kappa, and logistic regression analyses with adjusted odds ratios (AdjOR). We required a sample size of 400 patients to detect differences of 30 and 45 minutes in TTA and LOS respectively. **Results:** We reviewed 524 cases among which 401 met our inclusion criteria and had the following characteristics: mean age 54.8, 57.6% male, median triage pain score 7/10. Inter-rater agreement was 96.0% with a kappa of 0.92. Mean TTA was 160 min before and 118 min after the intervention ($p < 0.001$). This, in spite of the protocol being utilized in only 25 % of cases in the after-group (TTA 34 minutes in this group). Patients in the after-group were more likely to receive analgesia within 30 minutes (AdjOR 6.8, 95% CI 2.9 to 15.7; $p < 0.001$), as did those actually receiving the protocol (AdjOR 39.6, 95% CI 14.8 to 53.3; $p < 0.001$). However, there was no difference in total LOS in the ED (337, 323, and 322 minutes respectively, $p = 0.51$). **Conclusion:** Despite its infrequent use, the ED nurse-initiated analgesia protocol was associated with significantly reduced times to first dose of analgesia, and increased the proportion of patients receiving analgesia within 30 minutes of their ED arrival. We need to elucidate the barriers of use for the ED nurse-initiated analgesia protocol, and its impact on patient's perceived pain.

Keywords: analgesia, nurse initiated

P023

Learner-designed, crowd-refined: developing innovative electives in social media, education, and emergency medicine

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Introduction / Innovation Concept: The number of online open-access educational resources for learners is growing exponentially. These tools have become central to emergency medicine (EM) medical education; however, medical students and residents receive little formal training to guide the use of social media enhanced medical education. Recognizing this, two learners proposed electives to utilize and create social media resources relevant to EM education. **Methods:** Under the guidance of staff emergency physicians with expertise in social media, one medical student and one PGY1 (EM) developed electives that fulfilled objectives related to the clinical and educational use of social media in EM medical education. **Curriculum, Tool, or Material:** A one-month digital scholarship elective was created and piloted by a PGY1 (EM) that explored the concept of knowledge translation and educational scholarship. Using a framework of design thinking, relevant CanMEDS roles (communicator, scholar and collaborator) and Kern's model of curriculum development, this resident created an online, social media-enhanced curriculum to guide antibiotic choices in the ED. The process was accompanied by a reflective practice portfolio. A three-week EM and social media elective was created and piloted by a third-year medical student, focusing on the effective use of point-of-care resources and patient-care resources by medical students in the ED, to develop competency in the scholar and communicator roles of CanMEDS. The elective was documented through an online blog, and point-of-care resources for medical students were created and distributed online. **Conclusion:** This successful piloting of two electives focused on novel medical education technologies, suggests that this may be an area of future growth in current medical curricula. Learners can be mentored to engage in social media as not only as savvy consumers, but also producers of social media-based emergency medicine educational products. These unique elective experiences can serve as a foundation for formal curricula, developing skills that will prepare learners to navigate and contribute to online learning environments.

Keywords: innovations in EM education, social media, residency education

P024

A prospective evaluation of concussions presenting to three urban emergency departments

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Introduction: Patients with concussion or mild traumatic brain injury (mTBI) commonly present to the ED. No accepted standard management of concussions within the emergency department (ED) setting exists and practice variation has been demonstrated. This study enrolled patients during the initial ED visit to document the in-ED management, discharge advice, and outcomes for mTBI in an urban Canadian ED. **Methods:** A prospective cohort study was implemented in three urban EDs in Edmonton, Alberta. Adult (>17 years) patients, with GCS = 13-15 who sustained a concussion/mTBI and were seen within 72 hours of the event, were recruited by on-site research assistants. Outcome ascertainment occurred at 30 and 90 days following discharge and focused on common symptoms and their severity (using the Rivermead Post-Concussion Questionnaire {RPCQ) and general health and social functioning status. Analysis involved bi-variable analyses for dichotomous variables using chi-square testing; continuous variables will be compared using t-tests or Mann-Whitney tests, as appropriate. **Results:** Overall, 200 patients were enrolled in the study. The median age was 35 (IQR: 23, 47.25), both sexes were equally represented (102 [51%] females), and a variety of causes were documented (car crashes, work-related, assault, fall). Only 35% of subjects experienced a loss of consciousness. Overall, while non-imaging investigations were uncommonly ordered, 117 (59%) received a head CT scan. Follow-up was successful in 79% at 30 days and 73% at 90 days; however, 70 patients did not require 90-day follow-ups. Symptoms persisted (RPCQ $\geq$2, non-chronic) in 53% at 30-day and 71% at 90-day follow-ups. **Conclusion:** Concussions presenting to the ED arise from a variety of causes and persist in a large number of patients. Overall, CT scans were ordered more often than expected and emergency physicians could improve diagnosis and management of concussion patients, especially discharge advice. A standardized ED approach and follow-up services may improve outcomes for these patients.

Keywords: concussion, imaging, outcomes

P025

Variations in post-discharge treatment recommendations among concussion patients presenting to three urban emergency departments: we can do better!

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Introduction: Concussions are common presentations across North American emergency departments (ED). Studies on ED inpatients or discharged patients involve management during the ED visit and have demonstrated variability in investigations and dramatic inconsistencies among discharge planning and treatment recommendations. This study

is designed to explore the perceptions of treating physicians regarding concussion management and recommendations. **Methods:** A prospective observational cohort study was conducted and included adult patients presenting to the ED within 72 hours of a concussive event. A standardized questionnaire was administered to consecutive patients without life-threatening conditions presenting to three EDs in Edmonton. Patients who experienced multi-trauma, required admission, were intoxicated/impaired, had chronic cognitive conditions, refused, or were missed were excluded. The most responsible physician was asked to complete a two-page post-visit survey about their diagnosis and recommended management. **Results:** Overall, 200 patients were enrolled in the concussion study and 168 (84%) physician surveys were returned. Most physicians recommended over-the-counter medications, as well as physical (77%) and cognitive (62%) rest. Patients were advised to avoid sports/activities more than work (80% v. 62%; OR = 2.44; 95% CI: 1.49, 3.95); however, the time recommended to rest (1-7 days) was not significantly different between sports and work groups (52 v. 66%), respectively. Follow-up was recommended with primary care providers more so than other health professionals (75 v. 7%; $p < .0001$). Despite the presence of electronic clinical practice guidelines, only 67 (40%) patients were provided with this handout. Most physicians (76%) failed to provide patients with return-to-play/work guidance; however, 77% felt a guideline would be beneficial. **Conclusion:** Patients with concussion presenting to the ED receive variable post-discharge care and advice. Despite the existence of local electronic concussion guidelines, few patients receive adequate guidance on cognitive/physical rest, return-to-activities, or follow-up with appropriate health providers. Exploring the reasons for this under-treatment should be a research priority.

Keywords: concussion, physicians, follow-up

P026

Low physical scores six months post-injury are associated with frailty levels in older persons with minor fractures in ED

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Introduction: Fractures and minor injuries are known as risk factors for reductions in health-related quality of life measures (HRQoL) in older people. As most older people with such fractures present to emergency departments (EDs) for treatment, measuring their frailty status in EDs may help stratify their risk of reduced HRQoL post-injury. The objective of this study is to evaluate the association between measures of physical HRQoL and frailty status among independent older men and women who suffered minor fractures. **Methods:** Prospective sub-study conducted within the larger CETI cohort. It includes 282 patients aged 65 or older independent in their basic activities of daily living at the time of injury, discharged home from 7 Canadian EDs after treatment of minor fractures (lower or upper limbs, head, chest, spine, etc). Their fragility status was measured using the *Canadian Study of Health and Aging-Clinical Frailty Scale* (CHSA-CFS). Physical HRQoL was assed at 3 (T3) and 6 (T6) months after enrolment by the physical dimensions of the SF-12 Health Survey. Sociodemographic and clinical data were also collected at all time points. Generalized linear mix model were used to test for trend between frailty levels and outcomes controlling for age, sex and repeated measures over times. **Results:** For the physical functioning score at T3, significant decreased ($p = 0.0003$) were observed between the "well groups" (CHSA-CFS levels ≤ 3; mean = 75.1) and the "vulnerable and frail groups" (CHSA-CFS level 4; mean = 56.1). At T6 patients with a CHSA-CFS levels >3 (mean = 51.6) show significant decreased ($p = 0.005$) compared to those with a CHSA-CFS levels ≤ 3 (mean = 76.5). Finally, about the role playing scores at T3, the "vulnerable and frail group" (CHSA-CFS levels 4; mean = 60.1) has significant decreased ($p = 0.014$) compared to the ''well group" (CHFA-CFS ≤ 3; mean = 72.0), while at T6, all groups of fragility levels (CHSA-CFS <6; mean = 13.4) have a better score ($p \leq 0.032$) than people in the moderately frail group (mean = 66.5). **Conclusion:** Community-dwellers with a minor fractures and who screen apparently vulnerable to moderately frail states in ED experienced a greater reduction in their physical HRQoL scores over 6 months after the ED consultation. Therefore, the measure could offer quick and suitable attention in clinical care center for preventing physical decline post-injury.

Keywords: minor injuries, functional state, independent elders

P027

Short-term decreased psychosocial health scores are associated with increased levels of frailty in older persons in ED with minor fractures

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Introduction: Fractures and minor injuries are known as risk factors for reductions in health-related quality of life measures (HRQoL) in older people. As most older people with such fractures present to emergency departments (EDs) for treatment, measuring their frailty status in EDs may help stratify their risk of reduced HRQoL post-injury. To evaluate the association between frailty status of independent older men and women treated for minor fractures in EDs and psychosocial HRQoL measures three to six months post-injury. **Methods:** Prospective sub-study conducted within the larger CETI cohort. It includes 282 patients aged 65 or older independent in their basic activities of daily living at the time of injury, discharged home from 7 Canadian EDs after treatment of minor fractures (lower or upper limbs, head, chest, spine, etc). Their fragility status was measured using the *Canadian Study of Health and Aging-Clinical Frailty Scale* (CHSA-CFS). Physical HRQoL was assed at 6 months after enrolment by the physical dimensions of the SF-12 Health Survey. Sociodemographic and clinical data were also collected at all time points. Generalized linear mix model were used to test for trend between frailty levels and outcomes controlling for age, sex and repeated measures over times. **Results:** According to CSHA-CFS levels (1-6), Mental Health (MH) mean scores were 1: 80.0, 2: 80.8 $\pm$ 5.1, 3: 74.2, 4: 74.8, 5: 70.8, and 6: 56.6, respectively ($p = 0.03$). Vitality (V) mean scores were 1: 71.6, 2: 65.3, 3: 61.3, 4: 41.1, 5: 51.7 and 6: 51.7 respectively ($p = 0.03$). Finally, Sf-12 Mental Summary Scale (MCS) means scores were 1:74.4, 2: 75.2, 3: 71.9, 4:74.1, 5: 64.2, 6:64.1 ($p = 0.06$). It is noteworthy that overall scores tended to decrease significantly in patients with CSHA-CFS levels ≤ 4. Thus, compared to patients who were fit, well or well with treated comorbidities, patients who were apparently vulnerable to moderately frail had lower MH scores (78.4 v. 71.1, $p = 0.05$), lower V scores (66.3 v. 47.3, $p < 0.01$) and lower MCS (74.0 v. 68.3). **Conclusion:** Overall, community-dwelling patients with CSHA-CFS ≥ 4 show worse psychosocial HRQoL measures up to 6 months after a minor fracture. As older people with such injury do not receive differential ED care, an easy to perform frailty measure such as the CSHA-CFS could help ED clinicians identify those who may need more clinical attention.

Keywords: mental health, minor injuries, independent elders

P028

Community emergency department utilization following a natural disaster (the Goderich tornado)

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Introduction: On August 21st, 2011, an F3 tornado hit the town of Goderich, Ontario, leaving 40 injured and one dead. Specific medium-term changes in health care utilization following a natural disaster have not previously been analyzed in the medical literature. Documenting the emergency department utilization through this subacute period would be helpful to enable institutions and health care practitioners to be better prepared for future events. **Methods:** A medical chart review was conducted at the Alexandra Marine and General Hospital in Goderich. All emergency department visits made during the thirty-day period after the Tornado in 2011 *(intervention group*); 30 days prior to the Tornado in 2011 (*primary control group*); and during the similar calendar period of 30 days after the Tornado in 2010 (*seasonal control group*) were reviewed. Medical diagnoses of all patients who presented to the emergency department were collected and compared. **Results:** Fewer people presented to the emergency department following the tornado ($p < 0.001$), and those who did were significantly older than those who presented in the control periods ($p < 0.001$). A significantly greater number of patients presented with undiagnosed medical problems ($p = 0.03$) and came to refill their medications ($p < 0.001$), and significantly fewer people left the emergency department without being seen ($p < 0.001$). **Conclusion:** This study identifies the medical conditions that may potentially present to an emergency department following a tornado in a rural Ontario community. This information serves to inform the medical community and other hospitals how to increase their level of preparedness should a comparable disaster occur again in the future.

Keywords: disaster medicine, crisis resource management, ED utilization

P029

Optimal shift duration for emergency physician efficiency, effectiveness and safety: a comparison of 6, 7, and 8-hour shifts

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Introduction: Emergency departments require 24-hour physician coverage, and must develop a schedule that balances patient safety with physician efficiency and preferences. There are no studies comparing shift length in regards to safety, metrics and productivity. Our objective is to determine if there is a difference in the efficiency of patients seen per hour between 6, 7, or 8-hour shifts in the ED. Secondary outcomes include the number of patient handovers, and unscheduled ED revisit rates associated with different shift lengths. **Methods:** This retrospective study is based on one urban ED, where 81 physicians provided care for 79,941 visits during the study period (September 1, 2013 to August 31, 2014). 41 physicians met our inclusion criteria, working a minimum of 30 shifts of varying lengths over this period. Minor treatment shifts were excluded from analysis. Administrative data and an online scheduling system was used to compare scheduled shift length and number of patients seen per hour as well as percentage of patients handed over to the next physician from the total seen that shift, and return visits within 72 hours. One way analysis of variance and t-tests were used to compare the means between 3 different shift types. **Results:** A total of 3,214 shifts of varying start times (1,467 6-hour shifts, 531 7-hour shifts and 1,216 8-hour shifts) were included. Mean start times for 6, 7 and 8-hour shifts were 12:00, 17:00 and 10:00 respectively. The average number of patients seen per hour for 6, 7 and 8-hour shifts was 2.56 (95%CI 2.53-2.59), 2.75 (95%CI 2.68-2.82) and 2.50 (95%CI 2.47-2.53), respectively; $p < 0.001$ for comparison of 7 against 6 and 8 hour shifts. The average handover rate for 6, 7, and 8-hour shifts was 22.14 (95%CI 21.50-22.78), 27.45 (95%CI 26.37-28.53) and 17.36 (95%CI 16.86-17.87) percent, respectively; $p < 0.001$ for the comparison of 8 against 6 and 7. All night shifts in this ED are 7 hours; a limitation of this result is the inclusion of night shifts which have higher handover rates. There was no significant difference between shifts for 72-hour return rates. **Conclusion:** In this comparison, a 7-hour shift duration offers optimal physician efficiency, while 8-hour shifts may be more desirable from a safety perspective, as fewer handovers mean less opportunity for error.

Keywords: efficiency, safety, ED

P030

How changes to the Ontario Highway Traffic Act in 2009-2010 affected the proportion of alcohol-impaired motor vehicle collisions seen at a Level I Trauma Centre over a 10-year period

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Introduction: Despite widespread public education on the dangers of drinking and driving over the last 30 years, impaired driving is still the leading cause of criminal death in Canada. Since May 1, 2009, all drivers in Ontario with a blood alcohol concentration (BAC) between 0.05-0.08% receive a 3-day roadside license suspension. Since August 1, 2010, all novice drivers and drivers under 22 years must maintain a BAC of zero at all times. **Methods:** This was a retrospective review of the trauma registry at a Level I Trauma Centre in Southern Ontario from 2004-2013. Descriptive statistics (total, percentage, mean, medium, interquartile range, range) were calculated on demographic, crash, injury, and hospital variables for all impaired (ethanol >0 mmol/L) drivers involved in a motor vehicle collision (MVC) with Injury Severity Score (ISS) ≥12 or Trauma Team Activation. **Results:** 377 alcohol-impaired drivers were treated at our trauma centre over the 10-year period, representing 20.9% of all MVC drivers. The majority (330; 87.5%) were male. The median age was 31 (IQR = 23) years, and median ethanol was 35.3 mmol/L. Only 32.3% (n = 142) of drivers were wearing their seatbelts, and 112 (25.5%) had no protective devices in use at all. Over three-quarters (292; 77.5%) were single vehicle MVCs, with 41.9% (n = 158) of vehicles impacting a fixed object, and 35.5% (n = 134) were vehicle rollovers. The median ISS for impaired drivers was 20 (IQR = 20). A total of 29 patients (7.7%) succumbed to their injuries. The difference between the proportion of drivers who were impaired before and after the legislative change on May 1, 2009, was not significant ($X^2 = 3.31$, $p = 0.069$), but there was a decline after stricter legislation was introduced for novice and young drivers on August 1, 2010 ($X^2 = 8.37$, $p = 0.004$). A time series analysis of the data will be presented at CAEP 2015. **Conclusion:** Alcohol-impaired driving is still an important cause of severe trauma, resulting in significant injuries and a substantial impact on the health care system. Changes to the Highway Traffic Act affecting novice and young drivers made a difference in the proportion of alcohol-related MVCs. The role of tougher laws, along with public health education and awareness campaigns, need to continue to be explored to reduce the number of alcohol-related crashes and injury recidivism.

Keywords: trauma, motor vehicle collision, ethanol

P031

Do emergency physicians educate patients about the dangers of drinking and driving after a motor vehicle collision, and what are the barriers or motivators to do so?

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Introduction: Impaired driving is still the leading cause of criminal death in Canada, despite widespread public education and legislative change. Emergency physicians (EPs) have a unique opportunity to educate patients on health behaviours after life-threatening events, when they may be more receptive to advice and ready to change. A few studies have shown EP advice does change patient behaviour at least temporarily. However, there is a paucity of literature looking at the barriers preventing EPs from providing education on impaired driving. The goal of this survey is to better understand if EPs educate patients about the dangers of drinking and driving, what approach they take, the perceived effectiveness of their advice, and the barriers or motivators to broaching this subject. **Methods:** An online survey to the ninety emergency physicians and emergency medicine residents at an urban tertiary care trauma centre in Southwestern Ontario will be used to collect physicians' responses. We will explore how often EPs discuss the dangers of drinking and driving, their use of screening questionnaires and emergency department resources, resident education on this topic, and how educating patients on drinking and driving compares to other health behavior issues such as smoking cessation. We will elicit the barriers, as well as the motivators, to discussing safe driving with motor vehicle collision patients. **Results:** To be presented at CAEP 2015. **Conclusion:** We hope the information from this survey will provide insight into one avenue for combatting the ongoing issue of drinking and driving in Canada, and encourage EPs to develop strategies to educate trauma patients on the dangers of alcohol-impaired driving.
Keywords: trauma, ethanol, patient education

P032

The association of alcohol and severe bike injuries: a scoping review

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Introduction: Cycling is a popular recreational activity and mode of transportation; however, injuries while cycling can have devastating consequences. Alcohol use has been associated with increased cycling injury severity and crash risk; however, it remains a poorly studied cycling risk factor. **Methods:** A scoping review on alcohol involvement in injuries to cyclists of all ages was completed. Five electronic databases were searched without any date restriction; references of included articles were hand searched. Studies were required to: be observational studies of cyclists who suffered severe injury (defined by the study or by one of an ISS > 12, hospital admission, or fatality); conducted in Canada and/or the USA; and report cyclists' alcohol consumption. Studies using only self-reported or police reported injury data or of risky cycling activities (e.g., mountain biking) were excluded. Proportions are summarized by median and interquartile ranges (IQR). **Results:** From 2,663 citations screened, full text review of 137 articles resulted in 12 included articles. One article was included from grey literature searching (n = 13). Included studies were published between 1987 and 2013. Five studies were from Canada; nine studies were from the US. Twelve studies were conducted in one state or province; one American study used data from a national fatality registry. Seven articles defined severe injury; the most common definition was "requires hospitalization" (n = 4). Six studies were restricted to fatally injured cyclists. Half of the included studies (n = 7) included cyclists of all ages, five studies restricted inclusion to adolescents and adults, and one study restricted inclusion to cyclists 18 years or older. In all studies the majority of cyclists were male (median: 80.2%; IQR: 74.7-85.6%). Overall, alcohol was reported in a median of 16% (IQR: 8-28%) of severe injury and 25% (IQR: 22-28%) of fatality studies. **Conclusion:** Alcohol remains an important risk factor in bike crashes in North America. Studies of severe and fatal bicycling injuries report high proportions of cyclists have consumed alcohol prior to their crash. Injury prevention activities should discourage "drinking and biking". Future research on alcohol and cycling injury should be expanded to include less severe injuries.
Keywords: bicycles, alcohol, severe injury

P033

Prevalence and survival impact of ventricular fibrillation as the initial dysrhythmia in sudden cardiac arrest victims treated by a large, urban emergency medical services system in North America

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Introduction: Ventricular fibrillation (VF) is oft cited as a contributor to neurologically intact survival from out of hospital sudden cardiac arrest (OOH SCA). Ardent efforts continue in hopes of promoting higher prevalence of bystander CPR, placement and use of public access automated external defibrillators, and realizing greater success in neurologically intact survival from cardiac arrest. This study's purpose is to analyze demographics, prevalence and survival impact of VF when it is the initial dysrhythmia of OOH SCA documented by emergency medical services (EMS). **Methods:** Database query and descriptive analysis utilizing a multiple-variable database designed for use by medical oversight in a large, urban EMS system in North America. The database contains demographic, clinical resuscitation and outcomes variables on all OOH SCA victims with resuscitation initiated by the study EMS system from January 1, 1993 onward. This study's cohort included all such OOH SCA victims from January 1, 1993 through December 31, 2013. **Results:** In the 21 year period, 20,567 resuscitations occurred, of which VF was the initial dysrhythmia documented by EMS in 5,281 (25.7%) of victims. There was a downward trend of VF as the initial dysrhythmia documented by EMS from 399/999 (39.9%) in 1993 to 198/1,267 (15.6%) in 2013. For 12,333 victims in which final outcomes were captured (mid-2000 and forward), initial dysrhythmia of VF was associated with an overall discharge from hospital rate of 1,103/3,296 (33.5%). When compared to those surviving to hospital discharge without initial dysrhythmia of VF of 534/9,037 (5.9%), p = 0.000. Using bivariate logistic regression, OR = 8.01 with 95% CI 7.15-8.97. Survival with a cerebral performance category score of 1 or 2 was enhanced by initial dysrhythmia of VF as well, bivariate logistic regression yielding OR = 5.76 with 95% CI 4.84-6.86. **Conclusion:** In a particularly large cohort of OOH SCA victims, treated by the study EMS system in the over twenty years included, though the prevalence of VF as the initial dysrhythmia encountered in OOH SCA is declining, such VF does promotes neurologically intact survival with statistically significant results.
Keywords: out-of-hospital cardiac arrest, cardiopulmonary resuscitation, ventricular fibrillation

P034

Demographics of twenty-one years of sudden cardiac arrest victims treated by a large, urban emergency medical services system in North America

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Introduction: Out of hospital sudden cardiac arrest (OOH SCA) is oft cited as a principal reason for the formation and continued development of modern emergency medical services (EMS) systems. Ardent efforts

continue in hopes of realizing greater success in neurologically intact survival for the victims of such cardiac arrest. This study's purpose is to contribute in defining this cohort of victims, recognizing that effective treatment approaches and predictions of outcomes may vary based upon prevalent demographics of OOH SCA victims. **Methods:** Database query and descriptive analysis utilizing a multiple-variable database designed for use by medical oversight in a large, urban EMS system in North America. The database contains demographic, clinical resuscitation and outcomes variables on all OOH SCA victims with resuscitation initiated by the study EMS system from January 1, 1993 onward. This study's cohort included all such OOH SCA victims from January 1, 1993 through December 31, 2013. **Results:** In the 21 year period, 20,567 resuscitations occurred. 50% of all OOH SCA victims were over age 64 years, with mean age 61.0 years. 12,407 (60.3%) were male. Among primary etiologies, established through a combination of medical oversight review of paramedic documentation, medical oversight review of emergency department/hospital documentation when present, and medical examiner determination of death documentation when present, the most prevalent causes were: acute cardiac event (14,161; 68.9%); hypoxia (1,369; 6.7%); end stage renal disease (1,167; 5.7%); drug overdose (843; 4.1%), and cancer (415; 2.0%). All other etiologies were each less than 2.0%. **Conclusion:** In a particularly large cohort of OOH SCA victims, treated by the study EMS system in the over twenty years included, the most prevalent victim of out of hospital sudden cardiac arrest is male, in or beyond the sixth decade of life, with etiology being an acute cardiac event. These findings contribute in consistency of results reported by other systems. Several additional variables studied help to further define these victims and the etiologies of their arrests. Demographics of OOH SCA are important to define as they can serve in designing resuscitation treatment plans that address prevalent victim characteristics.

Keywords: out-of-hospital cardiac arrest, cardiopulmonary resuscitation, patient demographics

P035

Use of intraosseous devices in trauma: a survey of trauma practitioners in Canada, Australia, and New Zealand

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Introduction: Although used primarily in the pediatric population for decades, the use of intraosseous (IO) devices in the resuscitation of severely injured adult trauma patients has become more commonplace over the last few years. We therefore sought to determine the current experience level, beliefs and attitudes about the utility of IO device use for the resuscitation of adult trauma patients among trauma practitioners in Canada, Australia, and New Zealand. **Methods:** We administered a web-based survey to members of TAC, CAEP, ATS, and ANZAST. Our study was endorsed by the TAC Research Committee and received Ethics approval from the University of Alberta. **Results:** Overall, 425 of 1,771 members completed the survey. An IO device was available to 97% of respondents, with EZ-IO most common. 98% had previous training with IO device placement, and 72% had used an IO device in adult trauma patients (54% used it $\geq$2 times during past year). Most practitioners indicated IO is an acceptable route for administering crystalloids, blood products, medications, and vasopressors. Respondents were most comfortable placing an IO catheter in the proximal tibia, and least comfortable placing an IO catheter in the sternum. 84% responded they would *always* or *often* use an IO catheter in a patient with no IV access undergoing CPR for traumatic cardiac arrest. **Conclusion:** IO devices are readily available to trauma practitioners in Canada, Australia, and New Zealand, and most physicians are trained in device placement. The majority of respondents felt comfortable using an IO device in resuscitation of adult trauma patients.

Keywords: trauma, intraosseous devices, practice patterns

P036

Pre-intubation resuscitation by Canadian physicians: results of a national survey

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Introduction: Respiratory failure in critically ill patients is a common problem in emergency medicine (EM) and critical care medicine (CCM). However, little is known about the resuscitation of patients prior to intubation. The objective of this study was to describe the pre-intubation resuscitation practices of Canadian EM and CCM physicians. **Methods:** A clinical scenario-based survey was developed by the investigative team. Respondents were presented three scenarios (trauma, sepsis, heart failure) and asked to indicate their preferred choices of vascular access, pre-intubation fluid resuscitation, and the use of vasopressor medications for intubation using a 5-point scale ranging from "always" to "never". The survey was tested for content validity and retest reliability by members of the Canadian Critical Care Trials Group, and distributed in web-based and postal formats to all members of the Canadian Association of Emergency Physicians and the Canadian Critical Care Society. **Results:** Overall, 882 (50.2%) of 1758 physicians completed the survey. The route most physicians selected "always/often" to establish vascular access in all three scenarios was using multiple peripheral IVs (avg. 77.1%, range 68.2-93.3%), followed by the use of a single peripheral IV (avg. 68.3%, range 48.2-78.6%). Most physicians responded they would "never/rarely" insert an arterial catheter (avg. 81.5%, range 79.1-82.8%) and "never/rarely" insert a central line (avg. 63.0%, range 53.8-67.1%). On average, 25.6% of physicians responded they would "always/often" administer fluid prior to intubation in the three EETI scenarios. When administered, the most common pre-intubation fluid of choice ("always/often") in all three scenarios was a crystalloid bolus (1,740[79.8%]) of 500-999ml. Only 5.2% of respondents indicated they would "always/often" utilize a vasopressor prior to intubation, with 83.6% of physicians indicating they would "never/rarely" administer a vasopressor pre-intubation. When assessed by physician specialty, CCM physicians were 2.23 times more likely to "always/often" administer a vasopressor prior to intubation (OR = 2.23; CI:{1.91, 2.61}; $P < 0.001$) compared to EM physicians. **Conclusion:** In this scenario-based survey, pre-intubation resuscitation with intravenous fluids and vasopressor medication was uncommon. Resuscitation practices varied between EM and CCM physicians.

Keywords: endotracheal intubation, resuscitation, practice patterns

P037

Emergent endotracheal intubation: medications and device choices by Canadian resuscitation physicians

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Introduction: Emergent endotracheal intubations (EETIs) are life-saving procedures performed by emergency medicine (EM) and critical care medicine (CCM) physicians. However a standard approach to EETI

does not exist, and various medications and equipment may be used. The goal of this study was to determine medications and devices utilized for intubation by Canadian EM and CCM physicians. **Methods:** As part of clinical scenario-based survey, physicians were asked to indicate medications that they would administer to facilitate EETI, their 1st choice of intubation device, and backup procedure should the 1st choice fail. The survey was distributed to all non-trainee physician members of the Canadian Association of Emergency Physicians and the Canadian Critical Care Society via web-based and postal methods. Physicians were asked questions based on 3 scenarios (trauma; sepsis; heart failure) and provided responses using a 5-point scale ranging from "always" to "never" to capture usual practice. **Results:** A total of 1,758 physicians were sent the survey, with a response rate of 50.2% (882/1758). Most physicians indicated that a MacIntosh blade with direct laryngoscopy would "always/often" be their first choice of intubation device in the 3 scenarios (avg. 85.1%, range 79.0-88.9%; OR = 24.6; CI: {20.8, 29.2}; $P < 0.001$) followed by video laryngoscopy (avg. 37.5%, range 29.9-49.5%) and bougie-assisted intubation (avg. 19.5%, range 15.9-24.9%). The backup device physicians chose to use most often ("always/often") was an extraglottic device (avg. 58.7%, range 56.2-60.4%) followed by percutaneous cricothyrotomy (avg. 4.5%, range 4.0-5.7%) and open cricothyrotomy (avg. 3.6%, range 1.9-5.1%). The medications most commonly selected ("always/often") by physicians to use in the EETI scenarios were fentanyl (avg. 45.3%, range 42.3-50.7%, NS), etomidate (avg. 38.2%, range 24.6-50.5%, NS), and propofol (avg. 28.3%, range 25.7-36.1%, NS). EM physicians chose to paralyze the patients for EETI more often than CCM physicians (OR = 3.40; CI:{2.90, 4.00}; $P < 0.001$). **Conclusion:** Most emergency and intensive care physicians in Canada utilize direct laryngoscopy with a MacIntosh blade with as a primary device for EETI, with an extraglottic device as a backup. Paralysis for intubation was not used in the majority of cases, but was more likely to be used by EM physicians.
Keywords: endotracheal intubation, resuscitation, practice patterns

P038

A characterization of adult sport-related major trauma in Nova Scotia, 2000-2013

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Introduction: Sports are a significant cause of injury for adults in North America. Although major traumas account for a small proportion of all sport-related injuries, serious immediate and long-term consequences are common. There is a lack of information on the overall patterns of sport-related major traumas in adults at the population level. The goal of this study was to characterize the overall patterns of major adult sport-related trauma seen in Nova Scotia. **Methods:** The design of this study was a retrospective case series. Data on adult (age ≥19 years) major traumatic injuries (Injury Severity Score >12, or meeting Nova Scotia Trauma Team Activation criteria) related to sports was extracted from the Nova Scotia Trauma Program Registry over a 13-year period (2000-2013). We assessed the frequency of injuries, the mechanism and severity of injuries, admission to a special care unit (SCU), hospital length of stay (LOS), and mortality. **Results:** Of 8,759 adult major traumas seen in Nova Scotia hospitals during the study period, 138 (1.6%) were related to sports. The mean age of adults with sport-related major trauma was 40.9 years (SD 16.7), with the majority of injuries in males (118/138, 86%). Activation of the Nova Scotia Trauma Team was required in 38 cases (28%). Most injuries were blunt traumas (137/138, 99%); the mean Glasgow Coma Scale score at the scene was 13 ± 3.86. Nearly half (62/138, 45%) of trauma patients required admission to a special care unit. The highest proportion of sport-related injuries resulted from cycling (n = 71, 51.4%; 30 SCU admissions), followed by downhill skiing (n = 11, 9.0%; 7 SCU admissions) and ice hockey (n = 10, 7.2%; 4 SCU admissions). The longest hospital length of stay was from diving injuries (n = 7, mean LOS 51.2 days, SD 79.6). The majority of patients were discharged home (102/138, 74%). There were 10 deaths during the study period: 6 were from cycling (all due to traffic accidents, 4 died at scene), and the remainder were from curling, skateboarding, and ice hockey, all due to falls. **Conclusion:** In Nova Scotia, cycling is the largest contributor to sport-related major trauma in adults, followed by downhill skiing and ice hockey.
Keywords: sport, major trauma, retrospective

P039

Enhancing patient waiting room experiences in the emergency department: a collaborative design and medicine project

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Introduction / Innovation Concept: Due to the systems inability to immediately meet the needs of every patient presenting to the emergency department (ED), some patients may spend significant time waiting for care. The ED can be a complex and chaotic environment, where patients often experience anxiety waiting for treatment. A design student and medical resident collaborated to create opportunities for enhancing understanding of patient experiences in the ED waiting room (WR). The main goals for this project were 1) identifying current interaction patterns between healthcare staff and patients, 2) developing design concepts to promote communications between them, and 3) offering solutions that could be undertaken in future work. **Methods:** A patient-centered approach was used to understand and develop improvements for the experience of less urgent ED patients (CTAS III-V). The initial project goal was generation of ideas allowing exploration of multiple possibilities simultaneously. Using guided techniques such as note taking, visualization, and mapping experiences, we were able to systematically identify elements of ED care that contribute to patients' anxiety. A key step in our discovery process for the project was juxtaposition of the experience of the ED visit from a healthcare staff and a patient perspective. **Curriculum, Tool, or Material:** This multidisciplinary project identified attributes of the ED WR process contributing to the anxiety of the ED experience. These included pre-arrival, arrival, triage, registration, ED environment, staff-patient interactions, waiting for care, and filtering dimensions of waiting. We considered opportunities to improve each of these aspects. To prepare patients for future aspects of care and reduce their anxiety while waiting for treatment, a Patient Passport was developed with a goal of improved communication and process education. Creating a design that would allow patients to have something tangible may help frame the ED experience to their personalized scenario. **Conclusion:** Further work will include validation of specific factors contributing to anxiety related to the ED patient experience and of the effectiveness of this Passport in addressing them with patient feedback. Additionally, consultation will occur with ED physicians and nurses to affirm the appropriateness of the Passport content. We hope that the Passport serves as a proof of concept, within the design process, and strengthens the validity of other insights and opportunities presented within the complexity of the ED.
Keywords: innovations in EM education, wait times, patient perception

P040

Management of diabetic ketoacidosis in the emergency department

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Introduction: The management principles of diabetic ketoacidosis (DKA) in the emergency department (ED) include rapid fluid resuscitation, appropriate administration of insulin, avoidance of hypokalemia, and a search for a precipitating cause. The objective of this study was to determine how often adult patients with DKA are provided with treatment in the ED that meets the current guidelines published by the Canadian Diabetes Association. **Methods:** This was a retrospective medical record review of patients 18 years of age and older with a discharge diagnosis of DKA at one of two academic tertiary care EDs from April 2011 to April 2013. Patients were excluded if they were diagnosed with alternative hyperglycemic states. **Results:** 102 patients were included. Mean (SD) age was 36.9 (16.5) and 54.9% were male. 70.6% of patients had their glucose levels checked at triage. 76.5% of patients had at least 2 litres of fluids given in the first 4 hours since physician assessment, which meets the guideline. 97% of patients had an initial potassium level that met the guideline recommendation of ≥3.3 mmol/L prior to insulin initiation. 29 patients (28.4%) received a bolus of insulin at initiation, which is discouraged by the guidelines. Of the 85 patients that were on an insulin infusion, 49 (57.6%) had the recommended hourly fingerprick glucose test. 34% of patients had their serum electrolytes checked every 2 hours, as is recommended. The incidence of hypokalemia during ED stay was 18.6%. 43.1% of patients had a precipitating cause of their DKA identified by the emergency physician. **Conclusion:** The results of this study provide impetus to educate emergency department staff about the management guidelines for DKA, particularly regarding fluid administration and electrolyte management. A specific care pathway may standardize treatment and facilitate adherence to guidelines.
Keywords: diabetes

P041

A traumatic tale of two cities: a comparison of trauma mortality rates between a structured trauma team response system and emergency department led trauma care in Level 1 Trauma Centres

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Introduction: Hospital trauma care organization can have profound effects on patient outcomes. There are significant differences between trauma systems in New Brunswick and Nova Scotia trauma centres, which serve similar populations. The Queen Elizabeth II Health Sciences Centre (QEII) in Halifax, Nova Scotia is a Level 1 Trauma Centre and teaching hospital that operates an organized trauma team with formalized activation criteria. The Saint John Regional Hospital (SJRH) in Saint John, New Brunswick is a Level 1 Trauma Centre and hybrid community/teaching hospital in which trauma care is led by the Emergency Department physician and additional services are called as needed. These pre-existing differences in systems between the two systems provide the opportunity for a natural comparison. We wished to examine difference in mortality between these systems (TT vs. ED). **Methods:** This prospective observational cohort study compares trauma patients who suffered a kinetic injury, had an Injury Severity Score (ISS) >12, and who presented to a level one trauma centre in Nova Scotia (Trauma Team) or New Brunswick (Emergency Dept). Eligible patients were identified from the NS and NB provincial trauma registries over a two-year period. 111 cases met criteria in NB and were compared to 266 cases in NS. Hypothesis testing was conducted using Fischer's exact test. **Results:** There was no difference noted in the overall survival to discharge or 30 days between patients primarily admitted to the Trauma Team system (88%, n = 266) and Emergency Dept. system (89%, n = 111; p = 0.86). For more severely injured patients (ISS > 24), while there appeared to be a higher crude mortality in the Emergency Dept. system (39%, n = 33) than the Trauma Team system (30%, n = 79), this was not statistically significant in this small cohort (p = 0.38). **Conclusion:** We found no significant difference in the overall mortality rate, as well as the mortality rate in more severely injured patients between the Trauma Team and Emergency Department based systems in two Level 1 trauma centres. To fully understand this data, a case-based analysis will be required to account for confounding variables and to allow further research and evaluation of the different hospital trauma systems in NB and NS.
Keywords: trauma systems, trauma team, emergency department

P042

A traumatic tale of two cities: a comparison of time to computed tomography between a structured trauma team response system and emergency department led trauma care in Level 1 Trauma Centres

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Introduction: Emergency department trauma care organization can have profound effects on patient outcomes. There are differences between trauma systems in New Brunswick and Nova Scotia trauma centres. The Queen Elizabeth II Health Sciences Centre (QEII) in Halifax, Nova Scotia is a teaching hospital and operates an organized trauma team (TT) with formalized activation criteria. The Saint John Regional Hospital (SJRH) in Saint John, New Brunswick is a hybrid community/teaching hospital in which trauma care is led by the emergency department (ED) physician and additional services are called as needed. These pre-existing differences in systems between the two systems provide the opportunity for a natural comparison. We wished to determine if the trauma system (TT vs. ED) affects the time in which trauma patients receive computed tomography (CT) scans. **Methods:** This prospective observational cohort study compares trauma patients who suffered a kinetic injury, had an Injury Severity Score (ISS) >12, and who presented to a level one trauma centre in Nova Scotia (TT) or New Brunswick (ED). Eligible patients were identified from the NS and NB provincial trauma registries over a two-year period. 111 cases met criteria in NB and were compared to 266 cases in NS. Hypothesis testing was conducted using a combination of Mann Whitney U and χ^2 tests. **Results:** Median time to CT, with interquartile range, was longer in the Emergency Department (ED) led system (75 min (53-127), n = 85) than in the Trauma Team (TT) based system (50 min (35-91), n = 178; p = 0.002). In patients with severe head injury (defined as AIS head >2, with a GSC <9 or intubated) 80% (n = 35) of patients in the TT system received a head CT within one hour compared to 48% (n = 23) in the ED (p = 0.01). **Conclusion:** There was a significant delay in how quickly trauma patients received CT scans in an ED led Level 1 trauma centre compared with a Trauma Team based centre. There were also a higher proportion of patients with severe head injury who received a CT scan within an hour in the Trauma Team led system. However, to truly attribute a cause to this difference, case level data and system processes must be analyzed in more detail. This justifies the need for a cross provincial case-based data sharing agreement.
Keywords: trauma team, computed tomography, emergency department

P043

Teaching thoracic ultrasound for trauma to non-ultrasound trained trauma care providers

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Introduction / Innovation Concept: Supine chest radiography has low sensitivity for detecting traumatic pneumothorax. However, several studies have demonstrated high sensitivity and specificity for bedside thoracic ultrasound for the detection of occult pneumothorax not seen on chest x-ray. Furthermore, the "lung point," an ultrasound sign of pneumothorax, is 100% specific and can be used to accurately determine pneumothorax size. Ultrasound is also more sensitive than supine chest x-ray for hemothorax detection in trauma patients, and ultrasound allows for earlier management by tube thoracostomy. Training in bedside thoracic ultrasound has been demonstrated to be easy for ultrasound-trained practitioners, requiring only a single session for care providers to learn to identify normal lung, and lung pathology. However, it is not known how easily non-ultrasound trained providers can learn these skill, how well skills are retained, nor how training changes practice patterns. The objectives of this study are to provide an education workshop to trauma care practitioners, and to evaluate their knowledge, comfort, and practice of bedside ultrasound for thoracic trauma before and after the workshop. **Curriculum, Tool, or Material:** A single education session consisting of a pre-course quiz, a short didactic session, and a hands-on teaching session was provided to residents training to provide trauma care, but not formally trained in ultrasound. A knowledge consolidation quiz after the session was used to confirm course participants retained all teaching points, and correct scanning techniques were verified during the hands-on session. A follow-up exam was completed six weeks after the course. The exam was used to measure knowledge retention, and to confirm participants were able to accurately recognize normal lung, pneumothorax, and hemothorax on lung ultrasound video clips. Participants' practice patterns of ultrasound use, and stated comfort with ultrasound use in trauma, before and after the thoracic trauma ultrasound workshop, were also compared. **Conclusion:** Participants' knowledge of thoracic ultrasound in trauma increased following the workshop, and remained at a high level at the follow-up time. Participants were also able to recognize hemothorax and pneumothorax with very high accuracy six weeks after the workshop, and reported increased comfort and use of ultrasound at follow-up. This module is simple, portable, and useful for thoracic ultrasound training for residents and physicians engaged in trauma care.
Keywords: innovations in EM education, point-of-care ultrasound, trauma

P044

Work stressors affecting emergency physicians and residents: an international survey

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Introduction: High levels of occupational stress can cause health and performance issues within the specialty of emergency medicine (EM). These issues can lead to increased burnout and attrition from the profession. We examined workplace stress experiences for both trainees and certified EM specialists in settings where the specialty of EM is new (South Africa) and better established (Canada). **Methods:** An online cross-sectional survey of EM trainees and physicians in both countries was conducted using the validated Management Standards Indicator Tool (MSIT, Health and Safety Executive, UK), a 35-item questionnaire where each item is weighted on a five-point scale. The MSIT assesses six key domains of work related stress with lower scores indicative of higher stressors. Comparisons were made using standard statistical tests. **Results:** There were 77 South African, and 510 Canadian respondents. In Canada, specialists (N = 396) had significantly higher Demands (2.6 (95%CI 2.6-2.7) v. 3.0 (2.8-3.1)) and Manager support stressors (3.3 (3.3-3.4) v. 3.9 (3.6-4.0)) than trainees (N = 36). Canadian trainees had higher Role stressors (4.0 (3.9-4.1) v. 4.2 (4.2-4.3)). In South Africa, trainees (N = 39) had higher stressors than specialists (N = 36) on Demands (2.2 (2.1-2.3) v. 2.7 (2.5-2.8)), Control (2.6 (2.4-2.7) v. 3.5 (3.3-3.7)), Role (3.6 (3.4-3.7) v. 4.0 (3.7-4.3)) and Change (2.4 (2.2-2.6) v. 3.0 (2.7-3.3)). South African trainees had significantly higher stressors on ALL domains than Canadian trainees. While South African specialists had lower Control stressors than Canadian counterparts, they had higher Peer support and Relationship stressors. **Conclusion:** Risk factors for work-related stress are higher in all domains among South African EM trainees compared with Canadian trainees, and differ from South African EM specialists. Canadian EM trainees reported a lack of role clarity. Canadian specialists had lower work control, but better peer support and work relationships than SA specialists. We hope to further our research to identify targeted interventions to help reduce or manage these disparities.
Keywords: work stressors, international EM, support

P045

Early diagnosis of descending necrotising mediastinitis in the emergency department

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Introduction: Descending necrotising mediastinitis is a rare condition with high morbidity and early CT imaging is essential for diagnosis, which is often delayed due to the myriad of presentations. We present a case of atypical presentation that was diagnosed early via CT imaging obtained in the emergency department. **Methods:** A 65 year old Chinese lady with a history of schizophrenia presented to the emergency department with productive cough, fever and palpitations. On examination she was tachycardic, tachypnoeic and febrile with mild anterior neck swelling and tenderness noted. A full septic workup was obtained with chest and lateral neck radiographs in view of her anterior neck tenderness which demonstrated collection of air in the soft tissues anterior to the trachea. Subsequent fibre-optic laryngoscopy showed erythema and swelling of the peritonsillar space with no foreign bodies or ulcers. A neck and thoracic CT was obtained to further delineate the distal extension of the collection. Necrotising infection as evidenced by extensive air pockets and fat stranding spreading down to the mediastinum was observed. **Results:** The patient underwent multiple wound debridement and washouts with wound cultures eventually yielding streptococcus constellatus. She was discharged well after 3 days of ICU stay and a total of 25 days of inpatient admission. **Conclusion:** This case illustrates the importance of early imaging in the diagnosis of descending necrotising mediastinitis and demonstrates that a lateral neck x-ray may be useful in early assessment of suspected patients.
Keywords: mediastinitis, imaging

P046

Shelter crowding and increased incidence of sleep difficulties among evacuees following the Great Eastern Japan Earthquake and Tsunami

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Introduction: Crowded emergency shelters are hypothesized to increase prevalence of sleep difficulties among disaster-affected victims. However, no studies have examined this relationship. **Methods:** On

March 11, 2011, the Great Eastern Japan Earthquake and Tsunami struck Ishinomaki city, one of the largest cities in the northeastern part of Japan. To test this hypothesis, we conducted a retrospective study by reviewing medical records of 30 medical clinics at the evacuation shelters located at public facilities in Ishinomaki city from March 15 to April 30, 2011. Patients who resided in the targeted shelters were enrolled. Outcomes were the cumulative and daily incidence of physician-diagnosed patients with sleep difficulties per 1,000 evacuees at each shelter. On the basis of a locally weighted scatter-plot smoothing technique, we categorized 30 shelters into the two groups: crowded (mean space per person <5.0 m^2) and non-crowded shelters (≥ 5.0 m^2). The cumulative incidence was compared between crowded and non-crowded shelters using Mann-Whitney U test. Quasi-least squares methods were applied to assess the range of change in daily incidence of sleep difficulties at crowded shelters compared to non-crowded shelters with other covariates. **Results:** During study periods, a median number of evacuees at 30 shelters was 7,201 (IQR 5,586-10,971), and 1,579 patients were diagnosed as sleep difficulties. The difference of a median cumulative incidence of sleep difficulties between at crowded and non-crowded shelters had no statistical significance (crowded shelters; 3.1 per 1,000 person-days; IQR, 2.2-6.5, and non-crowded shelters; 3.0 per 1,000 person-days; IQR, 1.3-3.6, $p = 0.43$). A multivariable model that adjusted for other covariates showed that the crowded shelters had a higher daily incidence of sleep difficulties by 2.2 per 1,000 person-days (95%CI, 0.1 to 4.3; $p < 0.04$) compared to the non-crowded shelters. **Conclusion:** Shelter crowding was associated with an increased incidence of sleep difficulties after the major natural disaster.
Keywords: disaster medicine, epidemiology, psychiatry

P047

Use of health link prior to an emergency department visit in a Canadian metropolitan setting

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Introduction: Health Link Alberta is a 24/7 toll-free number that provides Albertans health advice on the most appropriate care, including ED visits. In 2013, 8.1% of Albertans reported they called prior to their ED visit. This study assessed how the usage of Health Link Alberta has changed over time and examined factors associated with calling the line prior to an ED visit. **Methods:** A cross-sectional survey of consecutive patients aged >17 years, with non-life-threatening conditions presenting to six EDs located in hospitals at the Edmonton metro area (Edmonton and Fort Saskatchewan) was completed from June to December 2014. Data were compared to a similar survey in 2013. Associations among sociodemographic factors and use of Health Link prior to an ED visit were explored in a backward logistic regression model and reported as odds ratios (OR) with 95% confidence interval (CI). **Results:** Of 1,114 respondents, 8% reported they called Health Link Alberta prior to their ED visit. There were no differences between the 2013 and 2014. Females (OR = 3.34; 95% CI: 1.94, 5.75) were more likely to use this provincial resource; other sociodemographic factors such as age, marital status, race, employment status, education level, smoking status and having a family physician were not significant predictors of the use of Health Link prior to visiting the ED. **Conclusion:** The use of Health Link prior to an ED visit remains low in adult patients seeking acute care services in this region. Since this research could not measure the effectiveness of the intervention (either to defer or encourage presentation), the effectiveness and costs of this service could not be assessed. More research is needed to understand how sociodemographic factors influence health literacy and decisions to access ED services.
Keywords: ED utilization, ED crowding

P048

The use of epinephrine in digital nerve block of the toe

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Introduction: There is a persisting myth of the dangers of the use of epinephrine as part of the anesthetic in digital nerve block despite a growing field of contradictory evidence. This myth is based on 48 cases in the last 120 years, many of which did not use epinephrine or had other contributing factors known to be harmful. Our study of the use of lidocaine with 1:100,000 to 1:200,000 epinephrine for digital nerve block of the toe prior to a surgical procedure in a wide range of patients (including those with vascular comorbidities) shows the safety of the use of epinephrine in a large and diverse patient population. **Methods:** We retrospectively reviewed all toe procedures performed in the Thorndale Lions Medical Clinic involving epinephrine from January 25th, 2009 to May 31st, 2014. We collected and analyzed all patient profiles and postoperative complications (gangrenous necrosis, reperfusion injury, infection, persistent granulation, and other) associated with each toe surgery. We primarily assessed the number of cases of ischemia and gangrenous necrosis as well as looked at the significance of differences in rates of complications between patients with diabetes and non-diabetic patients. **Results:** 1,241 toes were included in the analysis of this study. In all 1,241 toes (including those with vascular comorbidities), there was not a single case of ischemia and gangrenous necrosis. Furthermore, there was no significant difference in the rate of any complication between patients with diabetes in comparison to non-diabetic patients. **Conclusion:** This study adds to a growing base of evidence on the safety of lidocaine with 1:100,000 to 1:200,000 epinephrine for digital nerve block. We were able to successfully show its safety in toe blocks within a large and diverse population.
Keywords: adverse events, epinephrine, pain management

P049

Disaster befalls: optimizing our emergency department's preparedness for mass disaster

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Introduction: Mass casualty events occur infrequently yet are a pivotal time for the emergency department (ED) as the front line in receiving casualties during a disaster. Code Orange protocols guide the reallocation of resources and personnel. Hospital-wide exercises test the general principles and elements of a disaster plan and ensure that it is up to date, accessible and relevant. We sought to assess ED staff knowledge and comfort with the Code Orange protocol pre and post a hospital-wide disaster exercise. **Methods:** An inter-professional ED team developed a survey encompassing a blend of multiple choice, Likert scale and open-ended questions and deployed to all ED clinicians, allied health and support staff one month prior and four-months post a hospital-wide mock table top exercise. All ED staff who participated in the hospital-wide exercise were also invited to complete an open-ended survey on their experiences, barriers and opportunities for improvement. **Results:** Ninety-three (70%) health care workers responded pre- and 109 (82%) post. Wide variability was found at baseline - 100% aware of Code Orange, 95% aware of hospital-specific protocol; however 42% had never reviewed

protocol in past 1-5years and 67% never participated in a mock exercise. Many expressed mixed feelings about whether the ED was prepared to activate a Code Orange and few had the education, understanding or experience to feel comfortable in a real disaster. Four months post, 36% felt the ED is unprepared, 50% would not feel comfortable in a Code Orange situation, and 90% would like more training and exercises. 20 (90%) ED staff debriefed after the exercise identified role clarity, communication and modifications to the ED specific disaster plan as important avenues for improvement. **Conclusion:** While a hospital-wide table top exercise encouraged ED staff to review Code Orange, an overwhelming directive for education, training and development of ED specific resources has been given. The importance of having an optimized disaster plan is underscored by the presence of several events in Toronto that may elevate the risk for mass casualty events.
Keywords: emergency department, survey, disaster simulation

P050

Who gets a repeat Troponin-T and why? Measuring the proportion of serial troponins and factors associated with repeat highly sensitive Troponin-T in a Canadian emergency department

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Introduction: The sensitivity of cardiac biomarkers to investigate low-risk patients presenting to the ED to rule out acute coronary syndrome (ACS) has improved. But, there are no widely accepted guidelines as to when a single versus serial highly sensitive troponin-t (hsTnT) cardiac biomarkers should be used. Our objective was to measure the proportion of ED patients who received 2 or more hsTnT as compared to a single hsTnT and to examine patient, provider and contextual factors associated with the ordering of serial hsTnT. **Methods:** We conducted a retrospective cohort study of all patients presenting to Sunnybrook Health Sciences Centre ED between March 9 and November 11, 2014 who were aged >18, had a chief complaint of chest pain, at least 1 hsTnT, and were discharged home. We excluded CTAS 1 patients or those referred to a consulting service. We used logistic regression to assess predictors of serial hsTnT use. **Results:** There were 2,019 patients, with a mean age of 55 years, 56.9% were females, 47.2% presented during daytime hours, and 70.7% of patients had a CTAS score of 2. At least 2 hsTnT's were ordered in 35.0% of patients. The mean values of hsTnT in our patients were as follows: 7.6 for the 1st, 13.0 for the 2nd and 18.3 for the 3rd hsTnT. Patient factors predicting serial hsTnT included older age, male sex, higher CTAS and higher initial TnT values. Significant contextual factors included being triaged to a monitored bed, but crowding did not impact serial hsTnT use. Being assessed by a resident increased serial hsTnT use (odds 1.34). While there was significant variability in serial hsTnT use between treating ED physicians with a range of 30-84%, this was not statistically significant in multivariable analysis. **Conclusion:** Controlling for expected patient and contextual factors, being seen by a resident increased the odds of receiving serial hsTnT among patients with chest pain ultimately discharged from the ED. Future research should look at the causes of variability between individual physician practice patterns, and the impact of training in use of serial hsTnT, and develop guidelines to avoid potentially unnecessary repeat testing.
Keywords: high-sensitivity cardiac troponin, acute chest pain, acute coronary syndromes

P051

ResusHour: a portable, resident-led, resuscitation-based simulation curriculum

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Introduction / Innovation Concept: Team-based simulation training of resuscitation scenarios is becoming an educational cornerstone of emergency medicine residency training programs. Recent advancements in technologies, especially at dedicated simulation centres, have allowed simulation scenarios to reach near real-life fidelity. However, logistic and financial barriers limit the use of these facilities for frequent and regular learning sessions. ResusHour was created in order to overcome these barriers and to provide emergency medicine residents with a portable and more frequent exposure to resuscitative team-based simulation education. **Methods:** ResusHour is a biweekly, resident-led, resuscitation simulation session. Separate sessions are held for junior (R1-2) and senior (R3-5) residents and occur after emergency medicine educational grand rounds. Educational grand rounds rotate between three hospitals at McGill University, thus employing a simulation mannequin without hardware or software integration allows for maximum portability and consistency of the sessions. To optimize fidelity, a simulation monitor program that utilizes two portable tablet devices is used to both control the progression through the simulation and display real-time vital signs, laboratory results, and radiographic images to the learners. Kits containing essential medical equipment are given to each team member depending on their role (such as intravenous lines, medications, intubation equipment, etc.). **Curriculum, Tool, or Material:** The curriculum of ResusHour separates junior and senior residents. Each session is comprised of two cases. The junior resident session cases consist of one ACLS based scenario and one scenario based on their concurrent residency required readings. Both senior resident cases are derived from their concurrent required readings. The cases are created and run by a senior resident with the aid of a staff physician. A staff physician is present at each ResusHour session and participates during feedback on the learners' performance. The sessions are consistently rated highly by residents for their portability, fidelity, and educational experience. **Conclusion:** ResusHour has enabled our residents to participate in regular, high fidelity, and portable resuscitation simulation scenarios on a regular basis without the use of a dedicated simulation centre. Using the principles and ideas from ResusHour, residency programs without access to a simulation centre are able to provide high-quality simulation based education.
Keywords: simulation, education, innovations in EM education

P052

Implementation of protocols and visual algorithms in a helicopter EMS service

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Introduction / Innovation Concept: Emergency medical services (EMS) systems, including aeromedical services, are an important link in the health system chain of survival. When critically ill patients require transport, air ambulances are an important resource to provide specialized and timely care to these patients. In Alberta, the Shock Trauma Air Rescue Service (STARS) provides helicopter air transport to approximately 1,500 patients a year. STARS practitioners have previously used the STARS Medical Control Guidelines, a standard set of textual guidelines developed by Medical Directors, to guide treatment. Recently in partnership with Alberta Health Services EMS, a novel set of algorithms for the critical care patient were developed to guide practitioners. An important challenge was training a clinically diverse (i.e., physician, nurse, paramedic) and geographically dispersed group of practitioners to safely apply the new protocols that contained greater than 130 clinical content and 800 non-clinical changes. **Methods:** During the development of these protocols, all changes in content from the guidelines to the algorithms were captured in a

database by the development group. The education team then developed key objectives for the training, emphasizing the rationale and methods for applying these protocols, and the changes in clinical content that occurred. Online training modules were then developed for practitioners to access. **Curriculum, Tool, or Material:** Using an online, open-sourced learning platform (Moodle), educators incorporated the changes in practice into online lessons that focused on the objectives that had been outlined. These lessons were broken down into three components: accessing the algorithms, applying the algorithms with patients, and describing clinical content changes. Practitioners were able to navigate these lessons at their leisure using the online platform, and were given 60 days to access and complete the training. Additionally, simulation training and lecture presentations from medical directors (rounds) were available to practitioners monthly with a focus on the same objectives. **Conclusion:** All practitioners were able to successfully complete the online training within the allotted time. The online learning platform allowed a clinically diverse and geographically dispersed group of practitioners to be successfully trained on the new format and clinical content of the medical protocols.
Keywords: HEMS, education innovation

P053

Detection of Protein S100B in plasma and urine after a mild traumatic brain injury

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Introduction: Mild traumatic brain injuries (mTBI) are frequent and even if they sometimes may seem minor, their consequences can be worrisome. Among potential new tools to help a better identification of patients at risk of persistent symptoms after a mTBI, a number of biomarkers have been described to be elevated after a mTBI of which the S100B protein is probably the most promising. Current literature describe that this particular protein can be detected in blood, cerebrospinal fluid or even urine. Urinalysis is a minimally invasive method, but the concentration and stability of proteins could possibly interfere with its use. The main objective of this study was to assess whether S100B concentrations can be measured in urine when detectable in plasma after a mTBI. **Methods:** This study is a planned sub-analysis of a larger prospective cohort study involving the follow-up of mTBI patients. Eligible all patients who met the following inclusion criteria: patient sustained a mTBI, aged 14 years or more, assessed in the emergency department (ED) of a tertiary trauma center within 24 hours of injury, and who did not require hospitalization. For each patient, relevant clinical data and blood and urine sample were collected at the initial ED visit. The exact time of trauma and samplings were recorded for all patients. After adequate manipulation, serum and urine were be stored at -80C. The concentrations of S100B, were analyzed by ELISA. **Results:** One hundred and thirty-six patients with mTBI were included in this study. Forty-seven of them had detectable S100B protein in plasma, however the protein was not detectable in urine, even when plasmatic concentration was very high. **Conclusion:** S100B protein elevation in plasma does not cause a detectable concentration in urine. Otherwise, further research will be necessary to better identify the exact significance of detectable plasmatic S100B protein after a mTBI.
Keywords: mild traumatic brain injuries, biomarkers, concussion

P054

The utility of a standardized evaluation tool to identify high-risk older adults in the ED: a pilot project

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Introduction: The number of geriatric patients seen in Canadian emergency departments (EDs) has increased in recent decades. Geriatric patients are more likely to present to EDs with complex physical and social presentations putting them at increased risk of hospitalization, functional decline, and death. It has been demonstrated that simple to use geriatric screening tools can help care providers to recognize and prevent poor outcomes in this population. Consequently, the 2013 American College of Emergency Physicians *Geriatric Emergency Department Guidelines* recommends the routine screening of all geriatric patients using the *Identification of Seniors at Risk* (ISAR) Tool, a validated screening tool used to recognize seniors at risk for functional decline. This project looks to determine whether the use of ISAR and its follow-up sister instrument, the *Standardized Evaluation and Intervention for Seniors at Risk* (SEISAR) tool, can improve emergency physicians' capabilities to admit and discharge geriatric patients in a hospital lacking an emergency-specific geriatric assessment protocol. **Methods:** Patients aged 70 and older presenting to the Royal University Hospital ED in Saskatoon, Saskatchewan with any diagnosis will be screened during primary assessment with the ISAR tool and if a positive result is obtained, they will be subject to the SEISAR tool. Rates of readmission, hospital admission, admission to higher-level care, and death will be measured at 30 days post-intervention and compared to the same pre-intervention statistics. Qualitative survey of the utility of the tools by emergency physicians using them will also be examined. **Results:** We hypothesize that routine implementation of the ISAR/SEISAR tools will reduce rates of all measured endpoints while improving the safety and efficiency of disposition from the ED. **Conclusion:** As seniors continue to account for a significant proportion of ED visits, evaluating the efficacy of geriatric screening tools is a critical step in developing a more comprehensive prospective strategy to improve geriatric outcomes in the ED. Regular application of the ISAR and SEISAR tools early in ED assessment may improve rates hospital admission, ED readmission, admission to higher-level care, and mortality in patients aged 70 and older.
Keywords: geriatric emergency medicine, quality improvement, screening tools

P055

Use of an emergency department wait times website in emergency departments in a Canadian metropolitan area

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Introduction: Like many regions, Alberta Health Services (AHS) displays wait times on its website for the main urban emergency departments (ED). This study analyzed factors associated with the use of this online tool by patients presenting to six EDs in the metro area of Edmonton, Alberta. **Methods:** A cross-sectional survey of consecutive patients aged >17 years, with non-life-threatening conditions who attended six EDs located in Edmonton and Fort Saskatchewan was completed from June to December, 2014. Data were compared to a similar survey in 2013. The proportion of patients checking the AHS ED wait times website prior to their ED visit was calculated. Associations between the use of the ED wait times website and key sociodemographic factors were explored using backward logistic regression models and reported as odds ratios (OR) with 95% confidence interval (CI). **Results:** A total of 1,114 patients completed the survey; 8.2% checked the AHS website prior to their visit; a 1.4%

increase compared with estimates from the previous year in three Edmonton/urban EDs (6.8%). Females (OR = 1.71; 95% CI: 1.02, 2.85) and individuals with higher education (OR = 2.02; 95% CI: 1.13, 3.63) were more likely to use the website prior to their ED visit. Compared to individuals younger than 25 years, individuals in the age groups of 26-40 years (OR = 0.47; 95% CI: 0.24, 0.90), 41-55 years (OR = 0.19; 95% CI: 0.08, 0.44) and 56 years and older (OR = 0.20; 95% CI: 0.08, 0.47) were less likely to use the website. No significant differences by marital, employment, smoking status, ethnicity and having a family physician were identified. **Conclusion:** The use of a website informing on wait times prior to visiting metro EDs has increased minimally over time; however, the uptake levels remain low. Factors associated with the low use of the website may be related to lack of familiarity with new technologies to disseminate health information.

Keywords: health information technology

P056

Access to family physicians among patients visiting emergency departments in the Edmonton Capital Region in Alberta

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Introduction: Patients who are not able to visit their family physician (FP) or do not have one often present to the emergency department (ED) as an alternative care solution. As such, it seems possible that limited access to primary care services may serve as a contributing factor to ED overcrowding. The objective of this study is to evaluate the frequency and factors associated with having a FP among adult ED users in a metropolitan area in Alberta. **Methods:** A cross-sectional survey of consecutive patients aged >17 years, with non-life-threatening conditions attending six EDs in Metro Edmonton (Edmonton and Fort Saskatchewan) was completed from June to December 2014. Data were compared to a similar survey in 2013. Backward logistic regression explored sociodemographic factors associated with having a FP and reported as odds ratios (OR) with 95% confidence interval (CI). **Results:** Of 1,114 patients who completed the survey, 77.5% had a FP (compared to 74.4% in 2013). Among those with a FP, 85.9% had visited their FP over the last 3 months. Reasons for not having a FP were related to recent relocation in the province (24.6%), no interest (19.7%) and difficulties finding a FP (15.2%), retirement, departure or death of prior FP (12.7%), and perception that a FP was not needed (11.5%). Other reasons (16.4%) included preference for walk-in-clinics, or being a visitor in the province, among others. After adjusting for sociodemographic factors, female (OR = 1.62; 95% CI: 1.14, 2.3), and individuals in the age groups of 41-55 years (OR = 2.81; 95% CI: 1.63, 4.83) and 56 years and older (OR = 4.23; 95% CI: 2.29, 7.79) were more likely to have a FP. In contrast, individuals that were not married (OR = 0.47; 95% CI: 0.32, 0.69), non-Caucasian (OR = 0.43; 95% CI: 0.29, 0.62) and smokers (OR = 0.49; 95% CI: 0.34, 0.71) were less likely to have a FP. **Conclusion:** The proportion of ED patients without a FP remains higher than the provincial or national average (20%). Increased access to FPs may not mitigate input issues in ED overcrowding; however, should improve chronic disease management and access to important follow-up assessment. Reasons for not having a FP have changed over time and may be associated with more migration into the province and sociodemographic factors that can trigger important inequalities in access to care.

Keywords: access to care, ED crowding, survey

P057

Frequency of self-reported occupational illnesses and injuries in emergency departments in the Edmonton Capital Region in Alberta

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Introduction: Occupational illnesses and injuries contribute substantially to overall morbidity in Canada and often require immediate attention in emergency departments (EDs). Evaluation and treatment of occupational illnesses and injuries in the ED provide a unique opportunity to identify work-related factors that can adversely affect health outcomes of working patients. The objective of this study is to determine the proportion and characteristics of ED visits for work-related or exacerbated illnesses and injuries. **Methods:** A cross-sectional survey of consecutive patients aged >17 years, with non-life-threatening conditions attending six EDs in Metro Edmonton (Edmonton and Fort Saskatchewan) was completed from June to December 2014. Descriptive statistics were used to summarize the characteristics of patients visiting the ED for a work-related or exacerbated illness/injury, the characteristics of the incident and the outcomes of the ED visit. **Results:** Of 1,114 patients who completed the survey, 6% reported that they visited the ED for an illness or injury related to their work. These patients were mainly males (74.1%), Caucasian (73.8%), worked full-time (84.4%) in the areas of construction and trade services (34.9%), and government, education and health services (17.5%). The majority of incidents leading to the ED visit occurred in the afternoon (46%), with 60% of patients receiving first aid at the workplace and stopping work due to the incident (71.4%). Canadian Triage and Acuity Scale scores upon ED arrival were: 2 = 9.7%, 3 = 37.1%, 4 = 41.9%, and 5 = 11.3%. The majority of patients were discharged home after their ED visit (92.1%), and less than half (42.9%) planned on filling a claim to the Workers Compensation Board. **Conclusion:** Self-reported measures of work-related illnesses and injuries are common and sub-optimally reported. This research can provide a cost effective way of approximately quantifying the proportion of cases of work-related illness and injuries that present to the ED. They are also useful for obtaining information on the socio-demographic characteristics of respondents and about the respondents' occupational history of exposures.

Keywords: survey, work-related presentations, occupational

P058

Concussion study enrollment in two urban emergency departments: who are we missing?

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Introduction: Patients presenting to an emergency department (ED) with concussion (with or without loss of consciousness) are common across North America. Studies on concussion primarily enroll discharged patients, or those presenting within 72 hours of injury, which may result in a large number of missed patients who could benefit from interventions to mitigate post-concussive symptoms. This study was designed to explore the bias associated with traditional exclusion criteria. **Methods:** A prospective observational cohort study including adult patients with concussion who presented to ED within 72 hours of the event. A standardized questionnaire was administered to consecutive patients with no life-threatening conditions presenting at two EDs in

Edmonton (Canada). Patients who experienced multi-trauma, required admission, were intoxicated/impaired, had chronic cognitive conditions, refused, or were missed were excluded. A minimal data set was developed to determine the bias associated with these criteria. **Results:** Overall, 1,102 patients were screened in 21 months and 212 (19%) were enrolled in the primary concussion follow-up study. The primary reasons for exclusion were: admission (229 [21%]); presentation >72 hours after the injury (222 [20%]); "other" causes (165 [15%]); and diagnosed with cranial hemorrhage (44 [4%]). Few refusals (6%) or missed (6%) cases were identified. **Conclusion:** Patients with concussion presenting to the ED are a diverse group and traditional research appears to miss delayed presentation and admitted patient groups, both of which are at high risk for post-concussion sequelae. Researchers should explore the comparative effectiveness of interventions to mitigate post-concussive syndrome in both groups.

Keywords: concussion, mild traumatic brain injuries, methodology

P059

An emergency medicine residency program as Emergency Medical Services medical advisor: a performance assessment by EMS stakeholders

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Introduction: Medical direction of emergency medical services (EMS) by a physician is a requirement supported by both the Canadian Association of Emergency Physicians and the American College of Emergency Physicians. Despite this recommendation, many EMS services and health authorities have difficulties finding a physician to act as medical director/advisor. In 2012, our Royal College Emergency Medicine residency program assumed the role of EMS medical advisor for our health region in order to provide this essential service while simultaneously attempting to enhance our residency program's EMS curriculum. Given that this was a novel approach to EMS medical direction, we wanted to determine whether our residency program acting as EMS medical advisor met the needs of EMS stakeholders across our health region. **Methods:** Study authors met and identified 30 potential EMS stakeholders from our health region. These EMS stakeholders included: paramedics, ambulance service directors and health region administration staff. Fourteen survey questions were developed based on the EMS medical advisor contract deliverables. Each deliverable was to be answered on a 5 point Likert scale, with opportunities for comments. The survey was initially distributed online to 8 EMS stakeholders for review, and modified based on their feedback before being sent out to the 30 survey participants. **Results:** 23/30 (77%) EMS stakeholders responded to the survey. For 12/14 of the survey questions, stakeholder responses averaged as "agree to strongly agree" that the obligations were fulfilled. For the remaining two obligations (patient care report auditing and response to complaints) stakeholder responses averaged as "neutral to agree." Qualitative comments varied among respondents with the majority describing the positive aspects of this approach to the medical advisor position. **Conclusion:** This study provides evidence that an emergency medicine residency program can effectively provide EMS medical advisor services.

Keywords: emergency medical services, performance

P060

64-slice CT compared to MRI to clear cervical spine injury in high-risk blunt trauma patients

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Introduction: Careful clearance of cervical spine (CS) injury including ligamentous injury is of paramount importance, as results of a missed injury may have serious consequences. In obtunded patients, clearance of CS injury can be particularly challenging. Maintaining CS precautions until a MRI can be obtained is associated with increased complications. As imaging technology changes, re-evaluation of practice is needed to ensure an evidence-based approach to safely clear CS injury. **Methods:** The BC Trauma Registry was queried for all blunt trauma patients ≥16 years old who were admitted to Vancouver General Hospital (VGH) from April 1, 2008 - March 31, 2012. High-risk (GCS <14) blunt trauma patients were included if they were admitted to the ICU and had a 64-slice CT and MRI of diagnostic quality. All images were re-interpreted by a trauma neuroradiologist blinded to clinical outcome to assess for any missed pathology. Details of any injuries missed by CT and any clinical impact were abstracted from charts. **Results:** There were 5,891 adult blunt trauma patients admitted to VGH from April 1, 2008 - March 31, 2012. Of these, 44 patients met inclusion criteria and had a negative 64-slice CT scan, 8 of which had a positive finding on MRI. 1 of the MR positive patients had significant canal narrowing and degenerative changes on CT scan, confounding the interpretation. Of the remaining 7 MRI positive patients, 5 of the findings were not clinically significant and spinal precautions were discontinued, 1 patient died before the clinical impact of the MR could be assessed, and 1 patient had a clinically significant injury. This patient was recorded as moving x 4 during transport to the hospital and had purposeful movements upon hospital admission. A more thorough clinical examination found unequal movement between the left and right side. None of the 14 patients with a negative 64-slice CT scan who was moving equally x 4 or withdrawing x 4 upon CT imaging had a clinically significant injury identified using MRI. **Conclusion:** In high-risk obtunded blunt trauma patients admitted to the ICU, a negative 64-slice CT scan alone is insufficient to clear clinically significant cervical spine injury. When considered in conjunction with a clinical examination, a negative 64-slice CT scan may be sufficient to clear clinically significant cervical spine injury. A prospective study is required to confirm these findings.

Keywords: trauma, computed tomography, magnetic resonance imaging

P061

Effect of radio frequency ablation for atrial fibrillation on ED utilization

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Introduction: Atrial fibrillation (AF) is the most common cardiac dysrhythmia encountered in the emergency department (ED). It affects more than 1% of the general population with prevalence increasing as the population ages. Many patients with paroxysmal AF present repeatedly to the ED for medical management, including cardioversion. Outpatient referral for radiofrequency catheter ablation (RFA) has been increasingly advocated for long-term control of AF. The objective of this study was to examine the long-term effectiveness of RFA and its effect on ED utilization. **Methods:** We performed a before/after retrospective medical record review using a cardiovascular lab procedure database to identify residents of the Kingston, ON region who underwent first time RFA for paroxysmal AF between January 2010 and June 2012. We then identified their ED visits using regional NACRS data for the two-year intervals before and after RFA. Using ICD-10 codes and manual case review, visits were categorized as being related to AF, other cardiovascular issues (other arrhythmias, CVA, chest pain), treatment problems, or other reasons. AF visits were further described

by the care provided. A descriptive analysis of counts and proportions was conducted with statistical inference. **Results:** Of 105 first time ablations from our centre for paroxysmal AF we identified 38 regional patients for study. Prior to ablation they averaged 1.95 visits/year with AF accounting for 48.6% of visits. Post-ablation, they averaged 0.67 visits/year with 21.6% of visits being for AF. Other cardiovascular presentations accounted for 14.9% of visits pre- and 7.8% of visits post-ablation. Adverse effects of treatment including bleeding accounted for 4.0% of visits pre- and 5.9% of visits post-ablation. Non-urgent visits for follow-up or blood work accounted for 6.8% of visits pre- and 13.7% of visits post-ablation. ED visits resulted in 13 and 5 hospital admissions pre- and post- ablation, respectively. Overall, patients experienced an average reduction of 1.28 total ED visits/patient/year [95% CI 0.77 - 1.90]. **Conclusion:** Patients treated with RFA for paroxysmal AF experienced fewer ED visits post ablation. There was a reduction in hospital admissions and there were few visits for post procedure care. While this study is limited by it's before/after design, small size and single-center design it is supportive of ED physicians coordinating timely referral for consideration of RFA.

Keywords: atrial fibrillation, cardioversion, radiofrequency ablation

P062

In acute trauma care, can emergency physicians interpret *Viscoelastic Hemostatic Tests* (VHT) and modify their transfusion strategies according to their results? An experience in knowledge transfer

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Introduction: Adapting one's own transfusion practice according to the results of VHT is an approach that is new for most emergency physicians. In April 2014, we introduced a VHT (ROTEM) in our emergency department (ED). The aim of this study was to measure the impact of a comprehensive Knowledge Transfer Approach in our ED with regard to the introduction of this new test. **Methods:** A standardized questionnaire was constructed and tested before the introduction of the project. Teaching activities were as follows: three 60 minutes teaching sessions and four small groups meetings. Additionally, documentation was sent to physicians about the technology, and posters with treatment algorithms were placed in the ED acute care area. These teaching strategies were done in the 6 months preceding the introduction of the VHT in the ED. **Results:** Initially, 5% of the ED's physicians had some previous knowledge or experience with VHT. Although 89% of the physicians went to teaching sessions or read the documents, only 15% of them actually used the instrument. The percentages of physicians whom agree or totally agree to the questions asked were as follows: 1) Do you think trauma cases benefit from the technology? (79%); 2) Do you think VHT help identify transfusion needs? (86%); 3) Should VHT be used in the ER? (75%); 4) Will you be ready to use VHT in the medium-term? (82%); 5) Do you want additional training? (82%); 6) What teaching activity or tool would help you feel more comfortable with this technology? a) A cell-phone APP (57%), b) A pocket card (57%), c) Additional retroactions on cases seen in the ED (54%), d) More posters in the ED (50%), e) Clinical quiz sent by email (50%), f) Written documentation explaining the principles of VHT (46%), g) Simulation sessions (25%), h) Formal teaching sessions (14%). **Conclusion:** In a teaching hospital, it is possible to integrate a new and complex approach within a relatively short training period, as long as the Knowledge Transfer strategy is comprehensive.

Keywords: trauma, knowledge transfer, coagulopathy

P063

Evaluation of recent onset atrial fibrillation management in the emergency department

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Introduction: Atrial fibrillation (A Fib) is the most common arrhythmia managed by emergency physicians. The Canadian Cardiovascular Society guidelines on the management of A Fib in the emergency department (ED) outline two major treatment modalities: rate control and rhythm control. However, there is a lack of direction within the guidelines as to which treatment modality should be chosen for patients with recent (<48 hours) onset A Fib. Choice of treatment modality is left to the discretion of the emergency physician. The goal of this study is to evaluate the practice patterns of emergency physicians at London Health Sciences Centre when treating recent onset A Fib in the ED. **Methods:** A retrospective chart review was performed on adult (>17 years) patients with an ED discharge diagnosis of A Fib from April 2013 to March 2014 presenting at two academic EDs. Patients were excluded if the A Fib was not of recent onset (<48 hours). Patients were grouped into rate controlled, rhythm controlled, or both rate and rhythm (R + R) controlled groups based on the treatment(s) they received. Treatment outcomes, adverse events, and length of stay in the ED were also analyzed. **Results:** Ninety-five ED encounters met inclusion criteria. The majority of patients were treated with rhythm control only (50.5%), followed by rate control only (29.5%) and R + R control (20%). The rate control, rhythm control and R + R control groups had a similar proportion of males (50.0%, 56.3% and 52.6% respectively) but differed significantly in age of patients (mean age = 68.4, 57.4 and 63.3 years, respectively; $p = 0.003$). Normal sinus was the most common post treatment rhythm within all three groups (72.9% rhythm control, 63.2% R + R control, 39.3% rate control). The rate control group had the highest percentage of adverse events (25% v. rhythm control = 20.8%, R + R control = 15.8%). There was a significant difference in the length of stay between groups (rate group = 299 min, rhythm group = 229 min and R + R group = 331 min; $p = 0.011$). **Conclusion:** Rhythm control was the most commonly used modality to treat recent onset A Fib in the ED. This modality had the highest normal sinus rhythm outcome rate and shortest length of stay. These patients were younger than those treated with the other modalities. Future research should aim to determine the most effective and safest strategy for ED management of recent onset A Fib particularly for high risk patient populations.

Keywords: atrial fibrillation

P064

Quality assurance analysis of archived POCUS studies in an academic tertiary care emergency department

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Introduction: Point of Care Ultrasound (POCUS) has become routine practice in emergency medicine (EM) and is a requirement in Canadian EM training programs. As part of informal quality assurance, our academic, tertiary care institution endorses wireless archiving of POCUS clips on a hospital-based server, which are accessed through POCUS management software (Q-path, Telexy Healthcare, Maple Ridge, BC, Canada). Although there are provincial criteria for select POCUS study remuneration, there are no provincial or nationally recognized standards as to what constitutes an acceptable archived

study. Our institution has locally-defined archiving standards for the four main POCUS indications adopted nationally. The objective of this study was to evaluate physician POCUS archiving compliance with provincial billing and local program standards. **Methods:** We performed a random audit of 279 archived POCUS studies for which provincial remuneration was billed (code H100) by ED physicians in 2013. These studies were examined for compliance with both provincial billing standards and local program archiving criteria. **Results:** Overall, obstetrical studies were the most frequently billed scans by our physicians. Seventy-two percent of total billed POCUS scans fulfilled provincial remuneration criteria for both image generation and documentation, with 59% of eligible scans fulfilling the same criteria for our locally-defined standards. Of the POCUS scans that did not fulfill criteria for provincial remuneration, 78% were due to inadequate image generation compared to 89% for our locally-defined standards. Eighteen percent of billed scans had no images saved to Q-path. The auditors disagreed with 18% of images interpreted by ER physicians, mostly due to premature conclusion of a negative scan without proper image generation. Scans for assessment of free fluid in trauma were the most commonly disagreed upon study, with 50% disagreement rate amongst our auditors. **Conclusion:** An informal quality assurance program is inadequate to maintain satisfactory compliance with locally established image archiving standards. Lapses in image archiving and documentation of thorough study appear to be the most common problems.

Keywords: point-of-care ultrasound, billing

P065

A scoring system to predict hospitalization of non-urgent patients in the emergency department

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Introduction: Non-urgent emergency department (ED) patients are a controversial issue in the era of ED overcrowding. However, a substantial number of post-ED hospitalizations were found, which prompted for investigation and strategy management. The objectives of this study are to identify factors associated with non-urgent ED patient hospitalizations and to develop a scoring system to forecast admission risk for these patients. **Methods:** This retrospective study was conducted using a tertiary hospital emergency department database in 2010. Adult non-trauma patients triaged as TTAS level IV or V were considered non-urgent and included in the study. Multivariable logistic regression analysis was applied to determine factors associated with hospitalization. A scoring system was then developed. The performance of the scoring system was analyzed by the receiving operating characteristic (ROC) curve. **Results:** A total of 21,061 non-urgent patients were included for study. The overall hospitalization rate was 13.26 % (2,793/21,061). In the multiple logistic regression model, patients with characteristics of males (OR = 1.13), age >65 years old (OR = 1.61), heart rate > 100/minute (OR = 1.57), SBP ≤ 110 mmHg (OR = 1.39), fever (OR = 1.65), consultation with other specialties(OR = 2.74), use of CT (OR 2.47), MRI (OR = 9.27), X-ray (OR = 1.53), blood tests (OR = 15.29), and presented with skin swelling/redness (OR = 6.17) were predictors for hospitalization. The AUROC for the predicting scoring system was 0.882 (95% CI: 0.876-0.889). **Conclusion:** The study demonstrates that physician assessment was important to ensure patient safety and guard against unsafe redirect policies. The derived prediction model may prove useful to identify patients who required admission.

Keywords: triage, emergency department, non-urgent

P066

Can low acuity patients be referred out to primary care from triage? A mixed-methods evaluation of a one year program at a tertiary care trauma center

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Introduction: There has been little success in addressing the growing concern over the rising demand of low-acuity patients presenting to EDs. A collaboration between a tertiary ED and a primary care clinic led to the development of a process for the non-urgent patient population who presented to the ED. The goal of this quality improvement initiative was to describe the impact as well as patient and caregiver perceptions of the program. **Methods:** Patients were reviewed independently by two registered nurses based on criteria: age, cognition, mobility, vital signs, pain, and at a low risk for presenting complaint. The patients that met these were offered a referral to a primary care clinic. A convenience sampling of patient and provider acceptance was measured via a survey. Metrics determined the number of patients identified, the refusal rate of those patients, the number of patients seen at the primary care clinic, and no-show patients. **Results:** 1,116 patients (1.4% of all presenters) were identified as being appropriate; 779 patients accepted referral to the primary care clinic. Of the patients referred to the clinic 86% were seen at the clinic, 9% were no shows, and the remaining 5% were unable to be contacted, decided to go to their family physicians, or felt better and did not require medical services. In April 2014, the ED changed the time point of referral to presentation at triage from referral in treatment space. This change resulted in an increase in referrals. Results from the provider survey (N = 73) in excess of 88% indicated that the process is safe, appropriate, supports patient centered care and choice while providing access to care in the most suitable setting. Results from the patient survey (N = 43) represent approximately equal proportions of people who agreed to the referral and those who chose to remain in the ED. Of those who choose the referral to PCN clinic pathway, 94% of respondents indicated they were seen in a timely manner and 88% agree their health care needs were addressed. **Conclusion:** ED to primary care clinic referral has become a regular operational practice in this urban ED, with volumes of greater than 90 patients per month being referred to the clinic. Consequently, they received quality care, at the right place, at the right time from the right provider.

Keywords: quality improvement, resource utilization, triage

P067

The role of chest radiographs in acute asthma: a systematic review

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Introduction: Acute asthma is a common presentation to the emergency department (ED). Most patients do not require a chest radiograph (CXR) and given the frequency of presentation, its contribution to ED flow delays, safety (radiation exposure) and cost concerns, reducing CXR ordering in acute asthma is a possible Choosing Wisely target for emergency practitioners. The objective of this study is to synthesize the evidence and generate clinical recommendations. **Methods:** A comprehensive search of the literature was conducted including nine different databases (e.g., MEDLINE, EMBASE and CINAHL). All study designs examining the utility of CXRs conducted in the ED for patients with acute asthma were eligible. Two independent reviewers using standardized inclusion and exclusion criteria assessed the articles for

inclusion and conducted a quality assessment using the Canadian Institute of Health Research-Effective Public Health Practice Project (CIHR-EPHPP) quality assessment tool. Results are reported as proportions and pooled data represents the median for the outcome. **Results:** From 289 citations, 5 published studies met the inclusion criteria involving 864 patients with 463 (54%) CXRs ordered. Four studies included patients with previously diagnosed asthma; one included new cases (33 CXR/77 patients). Positive CXR outcomes were defined variably among studies (e.g., pneumonia [44 {9.5%}], heart failure [2{0.4%}], pneumo-mediastinum [1{0.2%}]). There was considerable diversity in terms of design, follow-up, and outcomes in the included studies. Across all selected studies, the quality was low to moderate. Overall, the median proportion of positive CXRs was low (14%; range: 8-18%) and was highest in admitted patients; positive CXRs were infrequent in discharged patients. Factors associated with positive results were not clearly evaluated in most studies. **Conclusion:** Although only a small number of studies were identified and variability was demonstrated, the existing literature suggests CXR use could be reduced in patients presenting to the ED with acute asthma. Recommendations for when a CXR is indicated (e.g., features of pneumonia, chest pain, first-time asthma, and admission) could assist clinicians with decision-making. EDs should explore ways to implement, measure, and report this outcome.

Keywords: asthma, radiographic imaging, Choosing Wisely

P068

Surviving opioid overdose with naloxone (SOON): results of an international working group

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Introduction: Naloxone distribution is a promising, rapidly expanding intervention to decrease opioid-related mortality. Although distributed mostly through harm reduction programs and public health agencies, pilot programs are underway to expand the intervention to clinical settings. Naloxone kits are impractical, training and resuscitation protocols are inconsistent, and effectiveness trials have not been completed. The objective of this project was to explore, through consensus opinion, ways to advance the practice, investigation, and implementation of bystander resuscitation and naloxone administration for opioid-associated resuscitative emergencies (OARE). **Methods:** The Surviving Opioid Overdose with Naloxone (SOON) Working Group, an international panel of expert and community stakeholders, met to discuss naloxone distribution. Participants advanced four areas of activity: 1) rigorous research methodology to study the effectiveness of implementation strategies; 2) user-friendly delivery technologies; 3) standardized resuscitation and basic life support (BLS) guidelines in OARE; and 4) knowledge translation strategies to broaden access. **Results:** 1) We identified the research question: what is the effectiveness of bystander resuscitation and naloxone administration in reducing opioid-related mortality? Study populations, outcomes, data sources, and research methods were clarified. 2) Commercial intramuscular and intranasal naloxone delivery devices are in development. They should require minimal assembly and training, be reasonably priced, inconspicuous, and integrated with BLS maneuvers. 3) An international guideline is essential to address the limited evidence for resuscitation in OARE. We recommend a standard BLS algorithm, with the addition of naloxone prior to chest compressions. Consensus was not reached on the role of rescue breathing. 4) We explored strategies to overcome barriers to participation in naloxone distribution and opportunities to develop educational tools. **Conclusion:** International consensus discussion identified innovative research methods, naloxone delivery devices in development, the need for universal and simplified bystander resuscitation guidelines, and new knowledge transfer strategies that may guide the investigation and implementation of bystander resuscitation and naloxone administration in OARE.

Keywords: overdose, opioid, naloxone

P069

Alternative care prior to emergency department visits in Alberta: stop blaming the patient

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Introduction: When access to health services is required, the emergency department (ED) is often one of the few options available to patients. Recent volume increases for ED visits in Canada have been infrequently studied. This study assessed the association between sociodemographic factors and attempts to access alternative care prior to presentation in urban EDs. **Methods:** A cross-sectional survey of consecutive patients aged > 17 years, with non-life-threatening conditions attending six EDs in Metro Edmonton (Edmonton and Fort Saskatchewan) was completed from June to December, 2014. Data were compared to a similar survey in 2013. Backward logistic regression explored the association between seeking alternative care prior to the ED visit and key sociodemographic factors and reported as odds ratios (OR) with 95% confidence interval (CI). **Results:** Of 1,114 respondents, 65.9% attempted to seek advice or alternative care prior to visiting the ED. Compared to 2013, this number has increased (from 49.9%). Of those who explored other alternatives, 38.5% visited a physician. Patients mainly visited family practitioners (46%) and walk-in clinics (12.9%), while 13.1% visited other health care providers. Additionally, 27.4% of patients called a physician office, and 28.3% attempted other treatments or sought additional advice from another sources. The majority of those who called a physician's office (60.7%) were advised to go to the ED. After adjusting for important socioeconomic factors, it was found that females were more likely to seek alternative care prior to an ED visit (OR = 1.29; 95% CI: 1.00, 1.76). Factors such as age, marital status, education, race, employment status, smoking status and having a family physician did not account for differences between individuals who seek alternative care prior to visiting the ED and those who did not. **Conclusion:** Overall, an impressive proportion of patients in this zone sought valid alternatives of care prior to their ED presentation. Poor system wide access to services helps to explain some of the increased patient volume experienced by EDs in this region. Additional research is required to understand why patients still chose to attend the ED despite accessing primary care providers.

Keywords: overcrowding, primary care access

P070

Needs assessment regarding an educational initiative for the assessment of alcohol withdrawal in the emergency department

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Introduction: Alcohol withdrawal syndrome (AWS) is best treated using a symptom guided approach, where treatment is based on hourly assessments using a standardized tool (Clinical Institute Withdrawal

Assessment-Alcohol, CIWA). In general, AWS is not well assessed or managed and there are limited educational opportunities to teach this competency to emergency department (ED) staff. Our objective was to conduct a needs assessment as part of a plan to develop an AWS knowledge translation program for ED staff. **Methods:** Using modified Dillman methodology, an electronic survey was sent to 122 clinical staff of a tertiary care, academic ED. Questions assessed knowledge gaps and preferred topics of interest related to the management of AWS. Prior to distribution, the questionnaire was peer reviewed and pilot tested for feasibility and comprehension. Responses were stratified based on clinical role. **Results:** 82 (67.2%) participants completed the needs assessment, 22 emergency physicians (EPs), 57 nurses (RNs) and 3 alternate care providers (ACPs). When asked about their ability to diagnose alcohol withdrawal symptoms, 20 (90.9%) EPs responded they were confident compared to 45 (75.0%) RNs & ACPs (Δ15.9%; 95% CI: -5.0, 29.8). More RNs & ACPs agreed there should be a specialized course on alcohol withdrawal in the ED compared to physicians (85% v. 63.6%, Δ21.4%; 95% CI: 1.4, 43.2). RNs & ACPs were more in favor of inter professional learning compared to their EP colleagues (86.7% v. 50.0 %, Δ36.7%; 95% CI: 14.6, 57.0); however, these groups expressed different interests. All respondents believed it would be important to review AWS, common errors in diagnosis and treatment, current guidelines and identifying/understanding metabolic abnormalities related to AWS. Physicians preferred a review of pharmacology related to AWS and discharge planning instructions and prescriptions, while RNs & ACPs preferred to practice administration of the CIWA tool and review issues related to a team approach to treatment. **Conclusion:** All participants agreed on the need for better education on the topic of AWS including a basic understanding of its pharmacology and physiology. Inter professional programs may be possible; however learner-specific preferences for AWS educational topics were identified suggesting the program should be tailored to accommodate the needs of learner groups, specific to their practice.

Keywords: alcohol withdrawal, needs assessment, emergency medicine

P071

CRicothyroidotomy in-situ simulation Curriculum (CRIC): a novel competency-based training program for emergency medicine residents

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Introduction / Innovation Concept: The CanMEDS 2015 framework emphasizes the importance of competency-based education within residency programs. Emergency medicine (EM) residents are required to achieve competence in cricothyroidotomy performance; however, clinical opportunities are rare. Simulation-based technical skill education offers a training alternative when skills cannot be acquired within the clinical environment. In-situ simulation (ISS), a training strategy that occurs within the actual patient care environment, can be used to further augment environmental fidelity. We developed a novel training curriculum using ISS to develop cricothyroidotomy competency among EM residents. **Methods:** In a national survey of Canadian EM residents we found that most had never performed a cricothyroidotomy in clinical practice thus a need for further training. Local EM airway and simulation experts developed the curriculum using current literature for technical skill acquisition. The curriculum consisted of two training techniques: 1) deliberate practice, which identifies specific skill components that are practiced followed by immediate feedback; and 2) unannounced ISS during the resident's ED shift, designed to recreate the urgency and realism of a cricothyroidotomy. The curriculum was offered to Royal College EM residents at the University of Toronto as a pilot for focused competency-based procedure training and to evaluate the feasibility of unannounced ISS during an ED shift. **Curriculum, Tool, or Material:** Core knowledge of the skill was first delivered through a didactic session. Using task-training models, participants performed a cricothyroidotomy following deliberate practice principles until they met all components of a previously validated task-specific checklist, global assessment score and timed completion in <100 seconds. Two weeks later, an unannounced high-fidelity ISS "can't intubate, can't oxygenate" scenario was conducted in the ED, requiring the performance of a cricothyroidotomy. Focused debriefing on skill performance followed. The impact of resident absence on patient care and opinions of participants and supervising staff EM physicians were used to establish ISS feasibility. **Conclusion:** This curriculum offers a novel competency-based approach for cricothyroidotomy training by combining deliberate practice and ISS. We demonstrated the feasibility of ISS as a technical skill training technique within the ED. This curriculum may provide a transferable framework for skills training in other emergent but rarely performed procedures.

Keywords: innovations in EM education, simulation, competency-based education

P072

Major trauma in the province of New Brunswick: a descriptive epidemiological study and mortality assessment

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Introduction: The implementation of a structured regional trauma system aims to decrease injury-related mortality among trauma victims. The New Brunswick Trauma Program (NBTP), a province-wide trauma system, was implemented in February 2010 to service the province's largely rural population. Using unpublished data from the NBTP trauma registry, we aim to better describe and understand major trauma in the province over a two-year period. We hope to provide up to date and accurate information that can be used to inform provincial policy development and implementation, as well as establish a framework for future longitudinal studies. **Methods:** A retrospective observational study design was used to study major trauma in patients discharged from leading trauma centres (level I or level II) between April 2011 and March 2013, who fulfilled the predetermined selection criteria. Cases that were transported to hospital by EMS, had an ISS over 15 and arrived to hospital within 24 hours of injury were included. Cases that were discharged from hospital alive within 3 days of injury were excluded. Geolocation, pre-hospital times, course in hospital and vital statistics were gathered. Statistical hypothesis testing and regression analysis was used to assess the effect of known risk factors on mortality. **Results:** Validation of our dataset with newly developed inter-institutional processes resulted in a completion rate of 100% for all data points with the exception of pre-hospital time and geolocation. Preliminary analysis of the 381 cases show a male to female ratio of 2.7, an average age of 51.8 years, an average ISS of 24.1, an average length of stay of 17.4 days, and that 35% of cases were discharged directly home and 27% of cases died in hospital. **Conclusion:** This project has led to the development of revised inter-institutional processes based upon the actions required to ensure completeness and validation of our data set. These processes will allow for further data gathering and analysis of major trauma in the coming years.

Keywords: trauma, registry, systems

P073

Role of ED ultasound in diagnosing dissection of thoracic aorta

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Introduction: Thoracic aortic dissection (TAD) is a vascular emergency associated with high morbidity and mortality and often with delayed diagnosis. Standard diagnostic imaging used in its differential diagnosis includes CT scanning and if available, transesophageal echo (TEE). A small number of case reports have demonstrated a potential role for ED ultrasound (EDUS) in suggesting the presence of TAD. They have identified a dissection flap extending below the diaphragm, a pericardial effusion or both in Type A or B dissections. Our objective was to assess the potential for EDUS in suggesting a diagnosis of TAD in a consecutive case series from our institution. **Methods:** Potential cases were identified using a 10 year search of ICD 10 code 171.01 (dissection of thoracic aorta) of our intuition's National Ambulatory Care Reporting System database. Each identified case was reviewed using hospital medical records, diagnostic imaging and autopsy reports to confirm a diagnosis of acute TAD for inclusion. These records were then assessed to permit description of anatomic type and for the presence of pericardial effusion and/or extension of dissection below the diaphragm. Data are presented with counts and proportions with 95% CI. **Results:** 146 records were identified of which72 cases met inclusion criteria. There were 38 and 34 Type A and B TAD's respectively. Overall, a dissection extended below the diaphragm in 48/72 (66.7%). In the 10 of 24 (41.7%) with no extension below the diaphragm, a pericardial effusion was present. In total, 80.6% (58/72: 95% CI 71.5; 89.2) of the thoracic aortic dissections had sub-diaphragmatic extension or pericardial effusion. **Conclusion:** These results suggest a role for EDUS in the early diagnosis of TAD. A positive EDUS result would not replace CT/TEE as the gold standard for diagnosis, but may prompt their earlier use. It may also provide an alert for earlier engagement of surgical collaboration. There are limitations to consider in the interpretation of these results. The true sensitivity of EDUS is likely to be lower than the potential detection proportion presented here. This case series provides no information on the specificity of EDUS in the diagnosis of TAD. While this is a retrospective case series, prospective confirmation of these results in this uncommon disorder would be challenging.

Keywords: ultrasound, aortic dissection

P074

First trimester patients with surgical diagnoses: clinical factors and ED management

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Introduction: First trimester pregnancy concerns may be related to normal pregnancy, signs of miscarriage or related to a more serious surgical diagnosis. The recent shift to outpatient management of early pregnancy complications, including ectopic pregnancy, makes ED identification of patients at higher risk for surgical intervention essential. The objective of this study was to examine the clinical factors and ED management of patients with early pregnancy concerns that subsequently required operative management within 14 days. **Methods:** This was a retrospective chart review of all first-trimester pregnancies seen over a one-year period (January - December 2013) by ED physicians for pregnancy concerns who had a surgical intervention within 14 days of their ED visit. Patients were excluded if they were direct to another service, >12 weeks gestational age, known ectopic, or known incomplete abortion. **Results:** 33 patients were included, of which 25 had a POCUS. No patient who received POCUS had an incorrect diagnosis of IUP. Of these 25 patients, 15 were referred for admission (8 ectopics, 4 incomplete abortions, 2 LIUP and 1 molar pregnancy); 8 were referred to an EPAU (Early Pregnancy Assessment Unit) (5 ectopics, 3 incomplete abortions); 1 had pre-arranged outpatient follow-up (incomplete abortion) and 1 had a planned ED return for formal US (incomplete abortion). 3 patients were taken to the OR based on the history and POCUS findings (1 ectopic, 1 incomplete abortion, 1 LIUP). 8 patients did not have a POCUS; 3 were referred for admission (1 ectopic, 1 incomplete abortion, 1 cholecystitis), 3 had EPAU follow-up (2 ectopics, 1 appendicitis), 1 had a planned ED return for formal US (appendicitis), 1 had no follow-up (therapeutic abortion). The final surgical diagnoses were: 16 (48%) ectopics; 10 (30%) incomplete abortions; 1 (3%) molar pregnancy; 1 (3%) cholecystitis; 2 (6%) with appendicitis; and 2 (6%) LIUPs. **Conclusion:** Ectopic pregnancy is the predominant surgical diagnosis for patients assessed in the ED with early pregnancy concerns. In this review, all ectopic pregnancies were either identified in the ED or via appropriate follow-up. No patient with ectopic pregnancy was misinterpreted as having an IUP on ED POCUS. POCUS appeared to expedite surgical intervention in 3 patients. Future research should investigate if ED physicians can safely use the clinical picture and POCUS to disposition patients without formal US.

Keywords: POCUS, first trimester pregnancy, ectopic pregnancy

P075

Regional nerve blocks for hip and femoral neck fractures in the emergency department: a systematic review

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Introduction: Hip and femoral neck fractures are common in elderly patients who are at an increased risk of complications if their pain is suboptimally managed. This systematic review seeks to determine if regional nerve blocks reduce pain, reduce the need for parenteral opiates, and reduce complications compared to standard pain management with opiates, acetaminophen, or NSAIDS. **Methods:** A systematic review of MEDLINE, EMBASE, CINAHL, and the Cochrane Central Register of Controlled Trials was performed. Included studies were all randomized controlled trials of adult patients with a hip or femoral neck fracture (Population) who had a 3-in-1 femoral nerve block, traditional femoral nerve block, or fascia iliaca compartment block performed preoperatively (Intervention). Comparison must have been made with standard pain management with opiates, acetaminophen, or NSAIDS (Comparison) and outcomes must have included pain score reduction (Outcome). The article selection process, data extraction, and risk of bias assessment were performed independently by two authors and compared for inter-rater reliability. **Results:** The literature search found 401 articles, of which 9 were selected for inclusion in the review with a kappa score of 0.79 (95% CI 0.51-1.00). No meta-analysis could be performed due to heterogeneity in reporting in the individual trials. Eight out of nine studies concluded pain scores were improved with the regional nerve block compared to standard pain management. A significant reduction in parenteral opiate use was seen in five out of six studies. No patients suffered life-threatening complications related to the nerve block; however more minor complications were under-reported. Most of the studies were at a moderate to high risk of bias. **Conclusion:** Regional nerve blocks for hip and femoral neck fractures have a benefit in reducing pain and the need for IV opiates. There is still a need for further randomized controlled trials to determine the length and magnitude of treatment effect, cost and time effectiveness, and risk of complications.

Keywords: regional anesthesia, nerve blocks, hip fracture

P076

Pain management of acute appendicitis in Canadian pediatric emergency departments

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Introduction: Appendicitis is the most common surgical cause of abdominal pain in children. Despite the established efficacy of adequate analgesia and lack of benefit to delaying its administration, children with suspected appendicitis remain at high risk for suboptimal pain management in the emergency department. Our primary objective was to describe the pattern of pain management for suspected acute appendicitis in children across Canadian pediatric emergency departments (PEDs). **Methods:** A retrospective medical record review was undertaken at 12 Canadian PEDs. Children aged 3 to 17 years admitted to hospital with an ED discharge diagnosis of appendicitis or suspected appendicitis were included. Data were collected starting in both February and October of 2010, using a study-specific data electronic extraction tool. A minimum of 50 charts were collected from each site. Data were summarized using descriptive statistics. **Results:** A total of 619 health records were eligible for inclusion. The mean patient age was 11.4 years (range 3-17). Sixty-eight percent (422/619) were triaged as "urgent" (Level 3, Canadian Triage Acuity Score). Sixty-one percent (381/616) of children received analgesia while in the PED, with significant variation across sites ($p < 0.01$). Overall, 47.8% (295/616) of children received any opioid for analgesia. Of those who received analgesia, 71.7% (273/381) of children received morphine, 38.1% (145/381) received acetaminophen, and 9.4% (36/381) received ibuprofen. The median time from triage to an initial dose of analgesia was 196 minutes (101-309.5). Forty-three percent (117/269) of those receiving analgesia were administered the initial dose following documentation of surgical consult. Of those who underwent ultrasound, 43.7% (121/277) received their initial dose of analgesia following the study. **Conclusion:** Suboptimal and delayed analgesia remains a significant issue for children presenting with suspected appendicitis in the PED. Administrators should consider implementing triage-initiated protocols to improve timeliness and access to analgesia for children with appendicitis.

Keywords: analgesia, appendicitis, pediatric emergency medicine

P077

Optimizing the view of the esophagus for ultrasound-assisted intubation in the emergency department

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Introduction: Intubation in the emergency department is very different from intubation from an elective procedure. It can be fraught with difficulties due to dynamic patient and environmental factors. As a result, esophageal intubations happen more frequently; which are associated with more complications. Ultrasound has been used to help confirm endotracheal tube (ETT) placement however there is no standard or agreed upon scanning technique. Our study sought to compare the adequacy of ultrasound images of the airway using several different techniques described in the literature. **Methods:** This was a prospective convenience sampling study at a single centre urban teaching hospital. Individuals that met study inclusion criteria had their neck imaged by ultrasound at the cricothyroid membrane (CTM), suprasternal notch (SSN) without pressure, SSN with pressure, SSN with pressure to the left of midline and SSN with pressure to the right of midline. Information on the study participant's age, sex, weight, neck circumference was recorded. The time to visualize the trachea and esophagus and confidence level of the operator was recorded. **Results:** This study is still currently in progress. The preliminary rates of adequate images were 9/13 (85%) for CTM, 9/13 (85%) for the SSN without pressure, 12/13 (92%) for the SSN with pressure, 12/13 (92%) for the SSN with pressure to the left of midline and 0/13 (0%) for the SSN with pressure to the right of midline. Individuals performing the ultrasound were able to confidently locate the esophagus in fewer than 10 seconds at the suprasternal notch with pressure and suprasternal notch with pressure to the left of midline. **Conclusion:** Our study preliminary data shows that in emergency department patients, the highest rates of adequate airway ultrasound imaging for intubation were seen by placing the transducer at the SSN with pressure, and at the SSN to the left of midline. While the final results of the study are still pending, individuals looking to confirm endotracheal placement via ultrasound seem to have better detection of the anatomy at either of the two locations. Further study is warranted to see if these locations can dynamically improve detection of esophageal intubation.

Keywords: point of care ultrasound, endotracheal intubation, emergency department ultrasound

P078

Geographic clustering of emergency department presentations for atrial fibrillation and flutter in Alberta, Canada

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Introduction: Atrial fibrillation and flutter (AFF) is the most common arrhythmia seen in outpatient setting and affects approximately more than 300,000 adult Canadians. The aims of this study were to examine trends over time and geography in emergency department (ED) presentations made by adults (age ≥35 years) for AFF in Alberta, Canada during 1999 to 2011. We used statistical disease cluster detection techniques to identify geographic areas with higher numbers of individuals presenting with AFF and higher numbers of ED presentations for AFF than expected by chance alone. **Methods:** All ED presentations for AFF made by individuals aged ≥35 years were extracted from Alberta's Ambulatory Care Classification System. The Alberta Health Care Insurance Plan provided population counts and demographics for the patients presenting (age, sex, year, geographic unit). Statistical analyses included numerical and graphical summaries, directly standardized rates, and statistical disease cluster detection tests. **Results:** During 12 years, there were 63,395 ED presentations for AFF made by 32,101 individuals. Standardized rates remained relatively stable over time at about 2 per 1,000 for individuals presenting and about 3 per 1,000 for ED presentations for AFF. The northern and southeastern parts of the province were identified as clusters of individuals presenting for AFF and ED presentations for AFF, and several of the areas were clusters in multiple years. **Conclusion:** This population-based study spanned 12 fiscal years and showed variations in the number of people presenting to EDs for AFF and the number of ED presentations for AFF over geography. The potential clusters identified may represent geographic areas with higher disease severity or a lower availability of non-ED health services. The clusters are not all likely to have occurred by chance and further investigation and intervention could occur to reduce ED presentations for AFF.

Keywords: atrial fibrillation, clustering, cardiology

P079

A traumatic tale of two cities: do patients receive more prehospital interventions in an advanced emergency medical system compared to a standard emergency medical system?

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Introduction: The level of care provided by paramedics and other health care professionals in the prehospital setting varies between jurisdictions. The provinces of New Brunswick (NB) and Nova Scotia (NS) provide a natural experiment where two different emergency medical service (EMS) systems serve two populations with similar demographics. NS operates an advanced emergency medical system (AEMS) with paramedics of various competencies ranging from Primary Care Paramedics to Critical Care Paramedics. In contrast, New Brunswick (NB) has a standard emergency medical system (SEMS) where paramedics were mandated to perform at the level of primary care paramedics. We sought to determine if a higher percentage of trauma patients received specific interventions in an AEMS compared to those treated in a SEMS. **Methods:** This prospective observational cohort study examined trauma patients (age >15 years) who suffered a kinetic injury (Injury Severity Score >12) for whom EMS were called, and who were transported directly to a level 1 trauma centre in NB or NS. Patient data was recorded in the NS and NB trauma registries between April 1, 2011 and March 31, 2013. 101 cases that met inclusion criteria in NB were compared with 251 cases in NS. Hypothesis testing was conducted using Fisher's exact test to compare the results data extracted from the two registries. **Results:** Differences were observed in the percentages of trauma patients who received interventions in the AEMS compared to those in the SEMS. In the AEMS 15% (n = 38) of patients received a prehospital airway intervention compared to 3% (n = 3) of patients in the SEMS ($p < 0.01$). There was also a higher number of patients who received prehospital intravenous access in the AEMS (78%, n = 195) when compared to the SEMS (31%, n = 32; $p < 0.01$). There was no significant difference in the administration of oxygen between the AEMS (66%, n = 165) and the SEMS (72%, n = 71; p = 0.45). **Conclusion:** A higher percentage of patients received airway and circulatory prehospital interventions in an advanced EMS system. We report on comparative mortality rates separately. These results provide evidence supporting the need for case level data sharing between the two provinces so that system and outcome differences can be better understood and emergency medical service provisions can be improved in both provinces.
Keywords: trauma, emergency medical services, systems

P080

Identification, characteristics and management of anaphylaxis between 2003 and 2012: a perspective of an Australian pediatric emergency department

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Introduction: The prevalence of allergic disease has increased substantially over the past 50 years and affects up to 40% of the population. Recently this has been most striking in young children, who are bearing the brunt of an emergent 'new' epidemic of food allergy. Anaphylaxis is the most severe form of an allergic reaction, which is potentially fatal. The incidence of anaphylaxis in Western Australia (WA) is unknown; no data is available regarding characteristics and management. We aim to analyze children with anaphylaxis who presented to our emergency department (ED), comparing 2003/2004 to 2012. **Methods:** Cases of anaphylaxis (0-16 years) were identified from the ED computerized medical record base followed by a retrospective case note study. 63 cases (16 f) in 2003, 65 (16 f) in 2004 and 175 (55 f) in 2012 were identified and analyzed, comparing identification, triggers, characterization and management in 2003/2004 to 2012. **Results:** In 2012 the diagnosis of anaphylaxis was retrospectively verified by an Allergist in 157/175 cases (90%) compared to only 89/126 (70%) in 2003/2004. Between 2003 and 2012 presentations with 'true' anaphylaxis increased by 350% (n = 45 in 2003, n = 157 in 2012), particularly in children <2 years. Out of a total of 246 cases more than 1/3 did not present with any rash, 11% had cardiovascular compromise, 86% respiratory symptoms and 28% had a previous history of asthma. The most common cause for anaphylaxis was food allergy with an emerging raise from 45/89 (44%) in 2003/2004 to 102/157 (67%) in 2012, predominantly induced by peanuts and treenuts. Intramuscular adrenaline was indicated but not administered in 34/89 cases in 2003/2004 and 62/157 in 2012. It was predominantly not given by family members. Adrenaline was administered by medical staff in 82% of the cases in 2003/2004 compared to 94% in 2012 when indicated. In 2003/2004, follow up with an Immunology service was not arranged in 77/99 cases, while it was adequately organized in 156/157 in 2012. **Conclusion:** The number of presentations with anaphylaxis, particularly food allergies in young children has dramatically increased in WA between 2003 and 2012.The identification and management of anaphylaxis as well as the arrangement of follow up by an Immunology service has significantly improved within the last 10 years.
Keywords: anaphylaxis, food allergy, pediatric emergency

P081

Measuring the safety net function of an emergency department: a descriptive analysis of social worker support to a large multicenter urban ED

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Introduction: Emergency departments (ED) are increasingly required to address the social circumstances related to patient presentations in the ED setting. Social workers (SW) play a pivotal role on the ED healthcare team for addressing the myriad of issues that relate to the extra-medical emergency needs of patients yet this is not reported in the literature. Our objective was to describe the nature of the demand for SW consultation in an urban ED setting. **Methods:** Using administrative data extracted from a city-wide electronic health record we undertook a one-year (July 1, 2013 - June 30, 2014) analysis of ED social worker referrals made through a network of four acute care hospitals serving a population of 1.2 million inhabitants. The study design was descriptive reporting proportions. The outcomes of interest were the percentage of ED patients in whom SW consultation was sought, ED LOS and most common presenting complaints and reason for referral. SW support to urban EDs is available 16 hours per day at each site. **Results:** During the study period there were 15,446 consultation requests to SW representing 5.1% of 304,119 annual visits across the entire city. The demographic characteristics of patients referred to SW are an average age of 55.4 $\pm$ 21.2 years. Referrals for male patients exceeded females 53.0% to 47.0%. The 5 most common presenting complaints for patients referred to SW were SOB (7.9%), Abdominal Pain (7.3%), Major Traumas (6.2%), Depression / Suicidal (5.3%) and Altered Level of Consciousness (4.2%) The top 5 reasons for referral were Discharge Planning (17.0%), Illness Adjustments (16.2%), Financial Concerns (15.9%), Addictions Issues (11.2%) and Resource Counseling (9.2%). Median ED LOS for patients seen by SW was 8.5 hours (IQR 5.3-13.6) compared to 3.7 hours (IQR 2.2-6.2) for all patients while the admission rate for patients seen by SW was 78.0% in comparison to 16.6% overall. Less than 1% of SW consultations were recorded as directly requested by the ED physician seeking to communicate with SW. **Conclusion:** SW support is in high demand in this large urban ED. Presenting complaints of patients who require SW consultation do not reflect social problems and nurses play an overwhelmingly predominant role in engaging SW for patient care.
Keywords: social work, emergency medicine, referrals

P082

Cardiac enzyme testing in the emergency department before and after introduction high-sensitivity troponin testing

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Introduction: Recently, high-sensitivity Troponin (hsTnT) assays have been developed which allow for faster detection of rising cardiac enzymes. However, there are concerns that increased sensitivity of hsTnT may lead to unnecessary investigations. The purpose of this study was to compare the use of cardiac enzyme testing in the ED before and after introduction of a hsTnT assay. **Methods:** This was a retrospective medical record review of all visits to one of two academic tertiary care EDs (annual census 125,000) during two separate one-year periods; before (February 2011 - January 2012) and 6 months after (August 2012 - July 2013) introduction of hsTnT. Frequency of Troponin tests ordered, frequency of positive tests, time between repeat tests, and ED length of stay were compared between the two groups. **Results:** The number of initial Troponin tests ordered was 16.7% of all ED visits in the TnT period and 17.4% in the hsTnT period. Positive initial tests increased from 9.2% to 10.8%. For patients with an initial test, the number who went on to have repeat testing increased from16.4% to 29.2% (Δ 12.7%, 95% CI: 11.9-13.6%). Positive repeat tests increased from 5.6% to 8.3%. The median (IQR) time between initial and repeat tests decreased by 57 (52, 62) minutes from 237 minutes to 180 minutes. For patients discharged home after repeat testing, the median (IQR) ED length of stay decreased by 30 minutes (24, 37 minutes) from 402 minutes to 372 minutes. **Conclusion:** This study suggests that hsTnT has reduced the time waiting for repeat testing and the ED length of stay for patients discharged after repeat testing. It also suggests increased frequency of repeat testing and increased frequency of positive results.

Keywords: troponin

P083

Intro to Code Blue (ITCB): combining resident-as-teachers with acute care simulation training for medical students

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Introduction / Innovation Concept: Hands-on practice with CPR and managing code situations is currently absent from the University of Calgary pre-clerkship curriculum. Additionally, there is no formal pre-clerkship curriculum that primarily recruits residents-as-teachers. ITCB's goals were to 1) increase resident-teaching experience with multiple teaching modalities and 2) establish an effective student educational model for acute care learning. **Methods:** Seventy-eight students were divided into groups of maximum four. One facilitator (from nineteen residents and one staff) was assigned to each group. Facilitators delivered a thirty-minute lecture on an approach to code blues and select clinical presentations (acute coronary syndrome, anaphylaxis, tension pneumothorax, and upper gastrointestinal bleeding). Four Simulation OSCEs were run on the same topics, where learners took turns as team leader. Unchecked items on OSCE checklists were the foundation of constructive feedback and discussion. Participants filled pre- and post-program surveys, where they rated their confidence in various domains. Students also completed an examination, comprised of thirty-seven questions (multiple-choice and short-answer), both pre-program and post-program (one hour to forty-three days afterwards). **Curriculum, Tool, or Material:** The ITCB resources can be found at http://ucalgary.ca/codeblue. An agenda, information manual, presentation slides, and Simulation OSCE checklists were provided to participants for self-preparation. Additionally, facilitators received presenter notes. **Conclusion:** Confidence of learners ($N = 42$) increased in all questioned domains ($p < 0.001$ for all), including team leading/participating, managing acute care presentations, and CPR/BVM skills. Average examination scores ($N = 42$) increased from 63% to 92% ($p < 0.001$). Facilitators ($N = 6$) made gains in confidence across all questioned domains ($p < 0.05$ for all) including conducting lectures, teaching approaches, running simulations, and facilitating debriefs. ITCB, as an educational model, enhances the self-efficacy of resident-as-teachers and simultaneously improves students' knowledge and self-efficacy in managing acute care situations.

Keywords: innovations in EM education, simulation, emergency medicine education

P084

Teaching shifts in the ED: moving learners from students to clinicians

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Introduction: ED overcrowding has compounded the struggle for emergency physicians to balance the competing issues of learner needs and patient flow. Solutions directed at one of these issues in isolation can have unintended negative consequences on the other, making it imperative to develop effective EM educational solutions that address the problem of patient flow. The impact of 'teaching shifts', which allow clinical clerks and teachers to interact without the pressure of patient care, on patient flow in our institution has been previously examined and found to be positive. The objective of this study was to determine how structured teaching shifts impact knowledge application and self-efficacy (context specific self-assessment of competence to perform a specific task) of third year medical students. **Methods:** In 2012-2013, all clinical clerks at a single Canadian medical school participated in three teaching shifts at the start of their mandatory EM rotation. These shifts used a combination of teaching modalities supervised by one faculty member without patient care responsibilities. Knowledge application was assessed using a paper-based clinical case activity pre and post teaching shift curriculum and scored by two blinded faculty using a modified pre-validated clinical assessment tool. A paired-sample t test was conducted to evaluate the change from pre to post teaching shifts. We developed a self-efficacy questionnaire based on experience and validated through Exploratory Factor Analysis. The questionnaire examined self-efficacy on four dimensions–General, Suturing, Trauma and Team–and was analyzed for effect size using Cohen's d. **Results:** There was an improvement in students' knowledge application scores from pre ($M = 4.59$, $SD = 1.17$) to post ($M = 5.09$, $SD = 1.25$), $t(104) = 3.10$, $p < 0.01$. Qualitatively, there was substantive improvement in both capture of critical diagnosis and increased system inclusion in the generation of differential diagnoses. There was statistically significant improvement in all of the self-efficacy dimensions with large effect size (General $d = 1.56$, Suturing $d = 1.25$, Trauma $d = 2.41$ and Team $d = 1.63$). **Conclusion:** Teaching shifts are an effective educational intervention that improve knowledge application and self-efficacy of clinical clerks in the ED.

Keywords: education, undergraduate medical education, knowledge needs

P085

Physician initial assessment times for mental health presentations in an adult emergency department

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Introduction: It has been estimated that 5-10% of adults presenting to Canadian emergency departments (EDs) have a mental health concern as their primary complaint. Studies show that ED staff often feel unsuited to provide care for patients with mental health concerns in the ED setting when compared to patients whose presenting complaint is not mental health related. The goal of our retrospective data analysis was to determine if this hesitation is reflected in the prioritization of care when these two groups of patients fall within the same Canadian Triage and Acuity Scale category. **Methods:** Time to physician initial assessment (PIA) was calculated using the time from patient triage registration to the time the ED physician documented as their initial assessment. The PIA times were retrieved from the National Ambulatory Care Reporting System for a tertiary care ED with an annual census of 65,000 patients. Monthly mean PIA values were stratified in 2 dimensions: mental health diagnosis versus non-mental health diagnosis upon ED discharge, and admittance to hospital versus discharged home from the ED. Discharge diagnoses were classified using ICD-10 F codes. **Results:** A pairwise t-test found no significant difference ($p = 0.22$) between the mean PIA times of patients admitted with a mental health diagnosis (1.81 ± 0.53h) and those with a diagnosis lying outside of the mental health disorder codes (2.01 ± 0.66h). A similar pattern was present for patients with mental health complaints (1.83 ± 0.58h) and patients with non-mental health complaints (1.87 ± 0.63h) who were discharged home from the ED ($p = 0.77$). Further, the variance in the ED PIA times observed throughout the year affected the groups similarly. Pairwise correlation analysis between the two groups revealed significant correlation between the mental health and non-mental health admitted groups ($r = 0.655$, $p < 0.05$) and non-admitted groups ($r = 0.597$, $p < 0.05$). **Conclusion:** From the data set we employed there was no significant difference in the initial assessment times of patients with mental health complaints compared to patients with other complaints. Fluctuations in the wait times experienced by patients with mental health complaints followed the normal fluctuations experienced by all patients at this ED. Future studies should engage in a prospective analysis to better capture the patient population as they present at triage rather than their discharge diagnosis.
Keywords: mental health, wait times

P086

Interim results of a pilot randomized control trial of an ED-based violence intervention program

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Introduction: Winnipeg has one of the highest homicide rates in Canada. Twenty percent of youth who are treated with injuries due to interpersonal violence return to our ED with a repeat injury within a year. Many U.S. trauma centers have initiated hospital-based violence intervention programs; however, large effectiveness trials have not yet been completed. This pilot study will determine recruitment, safety, fidelity and adherence to an intervention as part of a pilot randomized control trial. The main trial will assess the effectiveness of this hospital-based violence intervention. **Methods:** In November 2013, we began a randomized control trial to evaluate an Emergency Department Violence Intervention Program in our hospital. Youth injured by violence who are randomized to the intervention receive WrapAround Care from support workers for approximately one year. They aim to address issues that the youth identifies as putting them at risk of future violence. **Results:** After one year, 131 youth were randomized into equal arms (with respect to age, gender and severity of injury). The intervention has been deemed safe. All youth are safely housed, many are engaged in addictions counseling and many have re-engaged in school. This presentation will present early results from this feasibility stage, including initial recruitment, safety and narrative stories from participants. A larger effectiveness trial is planned to evaluate repeat injury rate and interactions with the justice system amongst participants. **Conclusion:** Secondary violence intervention projects are feasible to implement and evaluate in hospitals in Canadian cities with a high rate of violence prevalence. Early results are extremely promising.
Keywords: youth violence, intervention

P087

Meta-analysis of randomized control trials of hospital based violence interventions on repeat intentional injury

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Introduction: Interpersonal injury is a chronic condition with repeat intentional injury (RII) being reported as ~20% within the next year. A meta-analysis of randomized control trials (RCTs) of hospital-based violence interventions (HVIPs) has not been performed. The objective of this study is to perform a meta-analysis of HVIPs evaluating the effectiveness in reducing RII. **Methods:** Search criteria were developed with a librarian. Articles reporting a RII rate for all ages, all genders were included. Exclusions included studies of child maltreatment, intimate partner violence, sexual violence and elder violence. Ten databases and a hand-search were included. After removing duplicates, abstracts and subsequently full text scans were each reviewed by two abstractors. Disagreements were resolved with a third investigator. Included articles were double-extracted using an extraction form. RevMan 5.3 was used to complete the meta-analysis. Odds ratios, confidence intervals and I^2 are reported. **Results:** The electronic database search located 814 abstracts and the hand-search located 158 abstracts. After de-duplication, 626 abstracts were reviewed. Full Text scan included 67 articles and the final meta-analysis included 5 RCTs. 372 participants were included in the 4 studies (192 intervention arms, 180 control arms). The odds of a repeat visit for a RII is 0.32 (CI 0.15, 0.67) if participating in the HVIP vs. control ($I^2 = 55\%$). **Conclusion:** The statistical heterogeneity in results is substantial and there are differences in program eligibility and delivery that must be considered when interpreting these results. Despite this, HVIPs show promise in protecting from RII.
Keywords: violence, injury prevention

P088

Iron deficiency anemia in the emergency department: under-recognition and over-transfusion

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Introduction: Patients presenting to the emergency department (ED) with iron deficiency anemia (IDA) are often not recognized and may be treated inappropriately with red blood cell (RBC) transfusion. This exposes the patient to unnecessary risks such as alloimmunization and transfusion reactions, when safer and more economical therapies exist (such as intravenous (IV) or oral iron). However, no current guidelines for the use of RBC transfusion in the setting of IDA exist. **Methods:** A retrospective medical chart audit was performed of IDA patients transfused in the ED from August 1 - October 31, 2013. The primary objective was to determine the proportion of patients with IDA in the ED who received appropriate RBC transfusions according to our institutional guidelines. Secondary objectives were to ascertain the level of recognition of IDA in the ED and use of iron supplementation by ED physicians. **Results:** Over the study period, 171 patients received RBC transfusions in the ED. A total of 15 (9%) had IDA. Of these 15 patients, 7 (46%) received a transfusion that

was appropriate, 3 (20%) received a transfusion appropriate for indication but not dose, and 5 (33%) were inappropriate. A total of 9 units of unnecessary RBCs were transfused. Transfusions were more often appropriate when patients were admitted to hospital (5/8; 63%) then when patients were discharged from the ED (2/7; 28%). Of the 15 IDA patients, 10 had an IDA diagnosis recognized by an ED physician, this including all 7 of the patients who were transfused appropriately. Three (60%) of the 5 inappropriately transfused patients did not have a recognized IDA diagnosis in the ED. Management of IDA with iron supplementation was variable; only 1 of the 7 patients that were discharged from the ED was treated with oral iron and none received IV iron. **Conclusion:** This assessment revealed that IDA patients presenting to the ED are sometimes under-recognized and over-transfused. Further, it identified that use of transfusion alternatives for IDA, especially use of IV iron, could be improved in the ED. Guidelines for appropriate use of transfusion for, and overall management of IDA in the ED may be necessary to improve quality of care for IDA patients and avoid inappropriate use of RBC transfusion, a finite resource. We propose using these data to design a targeted quality improvement initiative for appropriate IDA management in the ED.

Keywords: iron deficiency anemia, transfusion, quality improvement

P089

The diagnostic utility of biomarkers for predicting serious bacterial infection in adult ED patients with sepsis

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Objective: To compare the sensitivity, specificity, positive and negative predictive value of 3 biomarkers (absolute neutrophil count [ANC], venous lactate and C-reactive protein[CRP]) for the diagnosis of serious bacterial infection in adult emergency department patients. **Methods:** This was a retrospective cohort study of emergency department patients seen between Septemeber 2012 and July 2013 who met the criteria for sepsis when they presented to the ED at triage (suspected infection and 2 or more of : fever >38 or <36°Celsius, heart rate >90/min, respiratory rate >20/min, or altered level of consciousness). Patients were classified as having a serious bacterial infection (SBI) or not. SBI was defined as any infection requiring intravenous antibiotic administration and admission to hospital. **Results:** 180 subjects met the criteria sepsis. Mean age was 64.7 years (SD = 28.6 years) and 62% were male. 78 subjects (43.3%) met the criteria for SBI. The sensitivity, specificity, positive and negative predictive values and 95% confidence intervals for each biomarker for SBI is as follows: Elevated ANC (>8.0 x 109/L): 90% (95% CI 80.4-95.1%), 67.6% (95% CI 58.6-77.3%), 67.9% (95% CI 57.9-76.6%); 89.6 (95% CI 80.1-95%). Elevated lactate (>2.1 mmol/L): 44.8 (95% CI 33.7-56.5%), 91.8% (95% CI 81.2%-96.5%), 74.5% (95% CI 59.3%-85.5%) ; 67.7% (95% CI 58.9-75.4%). Elevated CRP (>10 mmol/L): 91% (95% CI 81.8-96.1%), 61.8% (95% CI 51.5-71.1%), 64.5% (95% CI 54.8-72.3%), 90% (95% CI 79.9-95.5%). Elevated ANC and CRP had significantly higher areas under the ROC curve than lactate (Ps < 0.05). **Conclusion:** Both elevated CRP and ANC were better at predicting serious bacterial infection than elevated venous lactate measurement

Keywords: sepsis, biomarkers

P091

Using modified Glasgow Blatchford Score cut-off values in the risk stratification of emergency department patients with non-variceal upper gastrointestinal bleeding

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Introduction: The Glasgow-Blatchford Score (GBS) is a validated screening tool used in acute non-variceal upper gastrointestinal bleeding (NVUGIB) to differentiate 'low-risk' patients suitable for outpatient management from 'high-risk' patients who may require blood products or endoscopic intervention. However, uncertainty remains regarding the sensitivity and specificity of the GBS as well as the optimal cut-offs and management implications of these thresholds. We conducted a validation of the GBS's ability to predict the need for endoscopic intervention or transfusion in a tertiary care setting. **Methods:** A retrospective chart review identified all patients with acute NVUGIB presenting to the Foothills Medical Center between April 2013 and May 2014. GBS values were assigned based on clinical and laboratory data available at first presentation to the emergency department (ED). Outcome data were collected from a review of electronic medical records and paper charts. Primary outcomes were the need for endoscopic intervention or blood transfusion during the ED visit or hospital stay. Secondary outcomes included admission rates and ED length-of-stay (LOS). ROC curves were derived for the GBS with respect to the primary outcome. **Results:** 228 acute NVUGIB patients were identified (mean age 63 years). 64 (28%) had a GBS ≤4. 154 (68%) received endoscopy within 48 hours of ED presentation. The primary outcome of endoscopic therapy occurred in 30 (13%) patients while transfusion occurred in 68 (30%). Overall admission rates were 74% and mean ED LOS was 10.39 hours (95% CI 9.54 - 11.24). Using the literature-based cut-off of 1 to identify at-risk patients, the GBS was 100% sensitive and 100% specific in predicting primary outcome events. ROC analysis revealed that the GBS cutoff that provided maximal clinical utility in our population was 4, which offered 96.6% sensitivity and 43.3% specificity. The AUC for the GBS with respect to the primary outcome was 0.78 (95% CI 0.72 - 0.84). **Conclusion:** The GBS predicts the need for clinical intervention in our population. A modified GBS cut-off of ≤ 4 may identify a greater proportion of patients suitable for expedited outpatient endoscopy rather than admission to hospital.

Keywords: gastrointestinal bleeding, validation, clinical decision making

P092

Review of fixed-wing medevac patients and processes in northern Alberta

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Introduction: Retrospective chart review of fixed-wing transport of critically-ill patients in Northern Alberta (NA) was conducted to assess cohort characteristics and time interval metrics associated with a new increased time of transport to tertiary hospitals. The review was prompted by the 2013 move of fixed-wing medevac flights to the Edmonton International Airport (EIA). **Methods:** Critically-ill and time-sensitive fixed-wing medevac patients were identified randomly via EMS administrative database; inclusion was based upon the two highest triage categories as per the Interfacility Triage Matrix (Red and Yellow patients). Inclusion criteria included both trauma and non-trauma patients transported to the two tertiary trauma/interventional cardiology centres (Royal Alexandra Hospital-RAH and University of Alberta Hospital-UAH). They serve as the major referral hospitals for NA. Exclusion criteria included neonatal transfers and transfers to other hospitals. The study period was March 15 to August 31, 2013 and January 1 to March 31, 2014. Chart review was performed non-blinded by the primary authors using a priori data determinations. Time metrics were calculated for the entire patient journey from incident (e.g. MVC) to arrival at tertiary hospital. **Results:** 232 separate patient transports were reviewed (out of 767 transport to RAH/UAH during

study period - 30.3%). Sample characteristics included (medians) age: 48, gender: 65% male, non-trauma: 66%, mortality (death within 24 hrs. of transport, unadjusted): 3.5%, discharge within 48 hours of transport: 19.2%. The largest consumer of time was the interval from arrival at sending hospital to a call for medevac: 2 hrs. 17 min. The shortest interval was time the medevac crew spent at the sending hospital: 30 min. Transport time from EIA to final hospital was 48 mins, representing 14% of the patient's overall journey (versus over twice the time at the sending hospital prior to call for medevac). No deaths within the cohort were attributable to EMS care nor the time interval of EIA to final hospital. (Times reported in medians). **Conclusion:** The program evaluation of critically-ill and time-sensitive fixed-wing transported patients in NA characterized the population served by this essential service, demonstrated time metrics informing the entire patient's journey from incident to tertiary hospital, and found no EMS association with death in those cases that died within 24 hrs. of transport.
Keywords: emergency medical services, medevac, critically-ill

P093
Pelvic inflammatory disease: diagnosis and treatment in a tertiary emergency department
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Introduction: Pelvic inflammatory disease (PID) is an inflammation of the upper genital tract. Studies have shown that diagnosis of PID can differ between clinicians, based on experience, and treatment guidelines are not followed consistently. The objective of this study was to determine variables present in clinical diagnosis of PID. The secondary objective was to assess the adherence of our local centre to current guidelines for treatment of PID set out by the Public Health Agency of Canada. **Methods:** A retrospective chart review of all females patients from February 2012 - February 2014 with an emergency department (ED) discharge diagnosis of PID. Charts were reviewed for patient demographics, presentation to the ED, treatment in ED, and discharge instructions. Data was reviewed to determine the prevalence of variables in a clinical diagnosis of PID and PID treatment. **Results:** One hundred ten patients were found to have a diagnosis of PID. Minimum diagnostic criterion was met in 75 patients (67.2%). Ten (9.1%) were found to have a positive culture (9 positive chlamydia cultures and 1 positive gonorrhea culture). The most common clinical findings in this group were abdominal pain (100%), cervical motion tenderness (60%) and adnexal tenderness (50%). In patients with a negative culture clinical findings were similar with abdominal pain being present in 80.9% of patients, cervical motion tenderness in 45.5% and adnexal tenderness in 27%. Treatment of PID varied among clinicians with 51 patients (46.3%) receiving treatment according to the guidelines. The most common errors in treatment were not using a parenteral 3rd generation cephlasporin, ceftriaxone or cefoxitin with probenecid (n = 49, 44.5%). Another common error was not using a 14 day course of doxycycline (n = 37, 33.6%). **Conclusion:** A clinical diagnosis of PID can be difficult to make, however, it is important to diagnosis and treat early, to prevent complications. Literature supports that minimum criterion for a diagnosis of PID includes abdominal pain with adnexal and/or cervical motion tenderness. This was met in 67.2% of patients which may be due to incomplete charting or illegible hand writing rather than improper diagnosis. Treatment of PID was also not consistent with guidelines. These findings suggest that emergency medicine physicians' diagnosis and treatment of PID are not meeting Canadian guidelines and further education and awareness of guidelines are needed.
Keywords: pelvic inflammatory disease, gynecology, emergency medicine

P094
A scoping and systematic review of delirium in the emergency department: mapping the confusion about ED confusion
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Introduction: We aimed to: 1) conduct a scoping review to summarize all original English and French articles related to delirium in the emergency department (ED) and 2) to identify current knowledge gaps requiring further primary research as well as areas that are suitable for formal systematic review. **Methods:** We conducted a comprehensive literature search for research articles utilizing words "delirium", "acute confusional state", and "emergency" plus "medicine", "accidents", "department", "room" and "ward" published between January 1985 - August 2014 and listed in one of 4 databases: MEDLINE, Embase, PsychINFO or CINAHL. Our exclusion criteria were: 1) not focused on delirium and ED, 2) case report, 3) drug/alcohol withdrawal, 4) focused on medication or side-effects, 5) not an original article, 6) basic science studies or animal studies. **Results:** The search identified 2,291 articles. Of these, 508 duplicates were removed leaving 1,671 articles from which 1,506 articles were excluded leaving 165 articles. Two reviewers categorized each article, according to their primary focus, into one of six main domains identified: 1) delirium prevention: 9 articles. Volunteer visits, multifactorial intervention programs and the involvement of pharmacists have been shown to reduce the incidence of delirium; 2) diagnosis/ detection / risk factors: 66 articles. Traumas, poor functional status and advanced age have been identified as risk factors. Numerous screening instruments have been identified but few have been internally validated in the ED; 3) biomarkers: 2 articles. Elevated levels of TNF-a, lactate and epinephrine, are associated with delirium; 4) management of delirium: 28 articles. Treatment is cause-specific. Inter-physician variability in the antipsychotic agents used as part of its general management exists; 5) causes, prognosis and out-comes: 45 articles. Infectious, structural and environmental causes have been identified; 6) subtypes: 2 articles. Hyperactive delirium is the most prevalent type (50% of cases) followed by mixed types (25%) and hypoactive delirium (20%). **Conclusion:** The literature on ED delirium is focused on diagnosis and screening areas (40% of included articles). Important knowledge gaps include: prevention, use of biomarkers and delirium subtypes. Further systematic review is warranted in the highly heterogeneous area dealing with its management.
Keywords: delirium, emergency, scoping review

P095
Effect of an IAP physician on the treatment of sepsis
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Introduction: Sepsis is a common presentation in the emergency department (ED) and is associated with significant mortality and morbidity. Ever since the Rivers publication showing improved survival with early goal-directed therapy, every effort has been made to ensure early identification and aggressive resuscitation of septic patients. An initial assessment physician (IAP) system is used in some large emergency departments to improve flow. However, there is no data on whether it improves patient care and outcomes. This study aims to look at the effect of an IAP physician on time to treatment in the ED. **Methods:** This is a retrospective cohort study of patients with a discharge diagnosis of sepsis at St. Joseph's Hospital ED in Hamilton, Ontario. The IAP program was implemented in January 2013. Time to antibiotics and time to fluids were compared for patients who meet criteria for sepsis in triage during the time period of June - December 2012 and June - December 2013. Secondary

outcomes were hospital length of stay and mortality. **Results:** 58 and 88 patients in 2012 and 2013 respectively met the inclusion criteria and were included in the study. After implementation of the IAP physician, there is a decrease of 51 minutes in mean time to fluid administration (113 v. 63 minutes, $p = 0.001$), and a decrease of 83 minutes in mean time to antibiotics (194 v. 110 minutes, $p < 0.001$). There was no difference in hospital length of stay (20 v. 14 days, $p = 0.28$), or mortality (29% v. 17%, $p = 0.22$). **Conclusion:** Implementation of an IAP physician significantly decreases time from triage to fluid and antibiotic administration in patients presenting with sepsis, with no improvement in hospital length of stay or mortality.

Keywords: sepsis, triage physician, IAP

P096

Rates of positive findings on advanced abdominal imaging in the emergency department

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Introduction: Advanced abdominal imaging (CT or US) is used frequently in the Emergency Department (ED) however little information is available on the rates of positive findings. Our objectives were to determine rates of positive findings and identify factors related to positive findings. **Methods:** We conducted a historical cohort study at two large university affiliated EDs with a combined annual census of 140,000 patients. We assessed patients >18 years old receiving CT or US during a 15 day period from October 1 – October 15, 2012 to enroll 400 patients (the maximum number to feasibly be reviewed in the time constraints of the study). We excluded trauma patients, and those with confirmed pregnancy. Data were collected from the Ottawa hospitals vOacis and PACS systems using a designed data collection tool. Data on physical findings, vital signs, labs, positive findings on radiology reports and length of stay were collected. Positive findings were defined as pathology on the final radiology report. Two investigators reviewed unexpected findings for clinical significance (findings not expected based on presentation and physician requisition). Data was analyzed using SPSS. **Results:** 398 patients were imaged during our study. Mean age 49.6, 59.1% female. 71.9% had positive findings and 81.5% of all positive results were deemed to be clinically significant, 58% had expected findings. Men were more likely to have positive findings (81.6% v. 65.1%) with similar rates of clinically significance (82.0% v. 81.0%). Patients with peritonitis were more likely to have positive findings (77.5% v. 68.5%, 87.1% v. 100% clinically significant). Rates of positive findings were equivalent in groups with regardless of temp or HR, but were increased in patients with abnormal RR, SpO2, or glucose. Abnormal WBC, lipase and LFTs also correlated with increased positive findings. Urine dip finding of blood or nitrites were also associated with a higher rate of positive findings. Rates of positive findings were not affected by time of test ordering 73.8% during times of open access v. 77.6% during times when consultation was required. **Conclusion:** These results provide insight into the use of CT and US in the ED, and provide practical data on rates of positive findings. Nearly 75% of imaging had positive results and a most were clinically significant providing physicians with diagnostic certainty. Rates did not change when consultation was required.

Keywords: advanced abdominal imaging

P097

The development of a multidisciplinary CME/CPD accredited ultrasound course: point-of-care ultrasound (PoCUS) for physicians in practice

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Introduction: Physician performed PoCUS is a rapidly evolving imaging technique with widespread clinical application to many medical specialties. Given the increasing clinical use of bedside ultrasound, its increasing popularity amongst younger physicians, and the continued development of new applications, there is a risk of this technology outpacing the training opportunities available for physicians in practice. The geographic and rural challenges of Newfoundland and Labrador (NL) create barriers to dissemination of this training. To develop a local CME/CPD accredited PoCUS introductory course, a needs assessment (NA) sought to assess specialty of training, perceived PoCUS importance, frequency and comfort of use, and interest in further training. **Methods:** A 14-item electronic survey assessing respondent demographic, PoCUS use, PoCUS competency, and interest level in pursuing local training, was distributed to Primary Care and Specialist physicians across NL using the PDCS (Professional Development and Conferencing Solutions) and CPSNL (College of Physicians and Surgeons of Newfoundland and Labrador) databases. **Results:** An undisclosed number of recipients received the NA, with 166 total responses (164 complete). Various medical fields of practice were represented, with Family Medicine ($N = 83$), and Emergency Medicine (47) the majority of respondents. $N = 87$ (54%) had access to PoCUS, while $N = 20$ (12.4%) had no access. 78% deemed PoCUS "Very Important" or "Important" to practice, yet 58.2% of respondents were not using PoCUS in practice. Physician perceived comfort level with PoCUS applications was generally low. 34% of respondents had previously completed a formal training course in PoCUS. 77.9% of respondents were "Very Interested" or "Interested" in pursuing PoCUS training in NL. **Conclusion:** PoCUS is clearly established as an important adjunct in medical care across a diverse range of medical specialties and geographic settings in NL. The NA demonstrates a clear desire amongst the practicing physician community for a Newfoundland based PoCUS training program. The creation of a multidisciplinary ultrasound curriculum targeted to meet the specific needs of the practicing clinician is being developed, to occur November 29, 2014.

Keywords: ultrasound, rural, multidisciplinary

P098

Current practice and expressed needs for the management of Transient Ischemic Attack (TIA) in British Columbia emergency departments

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Introduction: Current practice in managing transient ischemic attack (TIA) is largely dependent on local policy and resource availability, despite published best-practice guidelines. This has a negative impact on TIA clinics, where they exist, due to high volume of referred mimic patients from the emergency departments (ED). A clinical decision support system (CDSS) for accurate diagnosis and risk stratification of TIA patients is necessary, both in urban and rural settings. **Methods:** This was a web-based survey of 103 clinical heads of ED and Urgent Care Centres (UCC) in BC. The survey followed standard survey methodology, consisting of up to five contacts. The survey instrument focused on ED/UCC and facility characteristics, current practice and expressed needs for TIA management. Ethical approval was obtained. **Results:** Response rate was 28.2% ($n = 29/103$). Most respondents were based in rural settings (62.1%; 18/29). For TIA management, only 55.2% (16/29) have a clinical pathway. Standard investigations (e.g., lab, ECG) were common across all sites. However, imaging was not

standardized: 58.6% (17/28) routinely utilized CT head non-contrast, 31% (9/28) routinely utilized CT angiogram and 0/28 (0%) routinely utilized MRI. Referral to outpatient TIA clinics appears well-established (86.2%; 25/29). Management of TIA patients in the ED was seen as needing improvement (68.9%; 20/29). More than three-quarters of respondents (75.8%; 22/29) were interested in a CDSS for TIA—and the preferred delivery of support was in a smartphone based tool (89.7%; 26/29). A diagnostic biomarker for TIA was also highly rated (96.6%; 28/29). **Conclusion:** Recent guidelines for stroke best practice recommend urgent and same-day imaging (CT or MRI) for TIA patients at highest risk for recurrent stroke. Yet there is a disparity in these BC sites in access for imaging. A CDSS for TIA that is mobile, delivered at point-of-care, and provides individualized recommendations for imaging and referral would improve ED/UCC efficiency and expedite appropriate TIA management.

Keywords: transient ischemic attack management, TIA biomarker, online survey

P099

Consequence validity of third-year clerkship clinical assessments: a quantitative survey

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Introduction: Results in education have little intrinsic meaning without validity, and thus medical education researchers have suggested that the validity framework of The Standards for Educational and Psychological Testing should be used to justify the interpretation assigned to assessment results. Within this framework, the fifth source of validity evidence is consequential, which describes the impact and consequences of assessments. This study builds upon qualitative data obtained in phase 1 of this project in order to further characterize medical student and staff perspectives of the consequences of third-year clinical clerkship assessments at the University of Ottawa. **Methods:** Fourth-year medical students and faculty completed an online survey using FluidSurveys online software. The survey was designed in consultation with expert methodologists using themes previously identified in phase 1 of the project. Likert and comparative rating scales were used to elicit student and staff opinion on consequence validity of clerkship assessments using five key domains: knowledge acquisition, self-improvement, preparation for future exams, career planning, and accuracy. Participants were emailed using a modified Dillman method and the data was analyzed using descriptive statistics in IBM SPSS software. **Results:** The survey tool was piloted to ensure appropriateness, relevancy, and clarity of questions. The final results were consistent with the themes identified in phase 1; such as the impact on learning and clinical practice, their utility in the preparation for future licensing exams and residency applications, as well as their perceived burdens and benefits. Again, students found objective structured clinical exams to be the most useful assessment across all five key domains. In addition, the majority of students reported feedback to be most useful when given at a multitude of different times and that rapport with preceptor was the strongest factor affecting the utility of clerkship assessments. **Conclusion:** This research provides educators with valuable insight into the consequential validity of third-year clinical clerkship assessments from both student and staff assessor perspectives. These findings have the potential to enhance the delivery of medical education and optimize student learning via improved, evidence-based assessment techniques.

Keywords: medical education, clinical assessments, clerkship

P100

All-terrain vehicle related injuries and deaths in Newfoundland and Labrador: a retrospective review

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Introduction: Serious injury and death as a result of all-terrain vehicle (ATV) accidents has been reported in a number of Canadian provinces (Krauss, Dyer, Laupland, & Buckley, 2010, Lord, Tator & Wells, 2010, Sibley & Tallon, 2002). This study describes the frequency, nature, severity, population affected, economic impact, efficacy of related legislation and risk factors involved in ATV related injuries and deaths in the province of Newfoundland and Labrador (NL) between 2003- 2013. **Methods:** A retrospective review of injured or deceased ATV riders of all ages entered in the Newfoundland and Labrador Trauma Registry (NLTR) from 2003- 2013 was conducted. Variables studied included age, sex, use of protective equipment, blood alcohol, admission date, discharge date, discharge status, as well as referring and receiving institution. **Results:** The NLTR indicated ATV accidents resulted in a total of 298 hospitalized patients and 8 deaths between 2003 and 2013. This resulted in 2,759 admission days, with a total economic burden of $1,618,807. During this time more males ($M = 23$, $SD = 8.39$) than females ($M = 4.09$, $SD = 2.70$) were injured or died in ATV accidents ($t(20) = 7.12$, $p < .0001$). Head and thorax injuries were found to be the most common injury at 42%. Only 58% of patients registered in the NLTR wore helmets. Mean injury severity scores according to injury type were calculated; head injury ($M = 11$, $SD = 9.51$), thorax ($M = 10$, $SD = 8.30$), abdominal/pelvis ($M = 9$, $SD = 7.62$), upper extremity ($M = 9$, $SD = 8.53$), other injuries such as superficial wounds ($M = 9$, $SD = 10.56$) lower extremity ($M = 8$, $SD = 8.34$), and spinal injuries ($M = 8$, $SD = 6.52$). **Conclusion:** This study describes ATV related injuries and deaths registered in the Newfoundland and Labrador Trauma Registry. Despite legislation enacted in 2005, ATVs remain a significant source of morbidity and mortality for the people of NL. Information from this study should be used to guide ATV public education programs and legislative amendments if necessary.

Keywords: all-terrain vehicle, emergency, injury prevention

P101

Does the implementation of a teamwork online teaching module correlate with improvements in teamwork amongst STARS Air Medical Crew?

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Introduction: Teamwork has been a major focus in the medical community of late. Lerner et al suggest more effective teamwork can improve patient care and reduce the workload and potential burnout of healthcare professionals. The aviation industry indicates that particularly in a high-risk, high-intensity environment, effective teamwork allows individuals to make fewer mistakes. With benefit to both patients and healthcare professionals, this should be a high priority within medical education; however it is difficult not only to define teamwork, but to formulate effective ways of teaching teamwork skills. **Methods:** We identified 11 individuals going through the air transport induction training during our project timeline who were of varying backgrounds, yet equal in their experience of transport medicine. Participants were split into 4 groups. Groups chose a "team leader" to act as the head and coordinate with the sending physician and make final decisions on

patient care. Each group participated in one simulation prior to the teamwork training and one simulation following the training. Each group was evaluated by the simulation facilitator and two independent evaluators. The participants also completed a self-evaluation of their teamwork skills after each simulation. The training consisted of an online module which was an excerpt from the TeamSTEPPS training program. **Results:** We involved 11 independent participants; 73% were male, 27% were female; 82% were paramedics, 18% were nurses; and 0 had less than 5 years of experiences, while 18% had 5-10 years of experience, and 82% had over 10 years of experience. Both the self-evaluation and evaluator scores showed no significant improvement between pre and post intervention simulations. One team had remarkably lower evaluator scores than the other 3 teams. Upon further discussion with this team, they were caught off-guard by a personal conflict and easily became frustrated and distracted to the point they could not execute treatment protocols. The leader of this group also said that if this happened in the field, it was his practice to "package the patient and get out of there", and deal with stabilizing the patient once in transport. **Conclusion:** Significant quantitative findings were not found, yet valuable qualitative data show there is a need for such training in high-intensity medicine, likely following initial training.
Keywords: air ambulance, teamwork

P102
Forecasting future patient visits to the emergency department and evaluating the effects on patient flow using computer simulation modelling
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Introduction: Capacity planning is a process for determining the appropriate amount of resources to make available given patient service demands. In an emergency department (ED), this process might look at the number of required treatment areas, physicians, diagnostic imaging or laboratory processing capacity. In Thunder Bay, Ontario the number of patient visits to the ED has increased from 1.5 to 6% per year over the past 8 years. Capacity planning is one method for evaluating the ability of existing resources to meet future demand. We used computer simulation modelling in the context of capacity planning to evaluate the effect of increased patient demand on ED services. **Methods:** We first used linear regression and the total number of patient visits for 10 years of data (i.e., all of the existing data for a relatively new ED) to forecast the number of patient visits in 2019 and 2024. Physician staffing levels were predicted for those years according to the hours of coverage model used in Ontario. We then developed a computer model that simulates patient flow through the major ED processes including: triage, physician initial assessment, laboratory and/or diagnostic imaging, specialist consultation and final disposition. The model focuses on acute patients (i.e., primarily CTAS 1, 2, and 3). We then compared the current number of patient visits with forecasted future visit volumes and evaluated the wait times and length of stay in the current ED. Finally, resource levels were increased for future forecasted demand and new wait times and length of stay determined. **Results:** The forecasted patient visits to the ED increased from 2014 by 16.4% and 32.5% for the years 2019 and 2024, respectively. Preliminary results show that treatment areas and the number of physicians will be affected more than other resources with increased demand in the future. **Conclusion:** Capacity planning is an important tool for assessing ED resources that may be required in the future. The likely increase in patient visits in the future will require continued evaluation and planning to ensure that ED service levels are maintained with this increased demand.
Keywords: capacity planning, computer simulation, forecasting

P103
Treatment decision for skin and soft tissue infections in the emergency department
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Introduction: We conducted a systematic review to identify studies regarding the optimal route of antimicrobial therapy for skin and soft tissue infections (SSTI; cellulitis or erysipelas). We also surveyed Canadian emergency physicians and infectious disease consultants to determine how SSTIs are managed and which risk factors were felt to be important in predicting failure with oral antibiotics **Methods:** For the systematic review, an electronic search of three databases was conducted with two independent reviewers. Using the modified Dillman method, we performed an electronic survey of physician members of the Canadian Association of Emergency Physicians (CAEP) and the Association of Medical Microbiology and Infectious disease (AMMI), with three and two reminders, respectively. We conducted descriptive statistics with 95% CIs. **Results:** The systematic review identified two studies: a guideline based on expert opinion and a cohort study that did not differentiate the route of therapy when determining risk factors for treatment failure. The survey response rate was 36.9% (n = 391) and 15.4% (n = 72) amongst CAEP and AMMI members, respectively. There was a lack of consensus regarding management of SSTIs, including optimal time to clinical reassessment, duration of oral therapy, and the time at which treatment failure with oral therapy should be considered. CAEP and AMMI respondents identified 14 risk factors for predicting treatment failure with oral antibiotics, including hypotension, tachypnea and pain rated >8/10. AMMI respondents endorsed 3 further risk factors (morbid obesity, patient already on oral antibiotics, SSTI over an area with hardware) as high risk. Among CAEP respondents, 94.4% indicated they would consider employing a clinical decision rule to predict failure with oral antibiotics for SSTIs, with the consensus that a 10% or 5% miss rate would be acceptable. **Conclusion:** Our systematic review of the literature highlights a paucity of evidence regarding the optimal route of antimicrobial delivery for SSTIs. For physician approach to SSTIs, the survey demonstrates significant variability concerning important management decisions amongst CAEP and AMMI respondents. Furthermore, we have identified several perceived risk factors for treatment failure with oral antibiotics, which highlights the need for future studies to determine which factors truly predict treatment failure with oral antibiotic therapy.
Keywords: cellulitis, skin and soft tissue infection, antibiotics

P104
TASK defusing: teaching emergency residents to facilitate defusing sessions in the emergency department
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Introduction / Innovation Concept: In the emergency department (ED) critical incidences are common. Following a national survey to Canadian emergency medicine (EM) programs a large gap was found between the perceived importance of necessary skills and the level of training and comfort with facilitating a defusing session. Only 3% of respondents had formal training in defusing. Other defusing/debriefing models have been developed but are unfortunately not applicable to the unique environment of the ED. This identified gap led to the development of a workshop to teach EM residents the skills required to facilitate a defusing session within the ED. **Curriculum, Tool,**

or Material: A 3-hour workshop was developed for the EM residents. The introduction consisted of a didactic lecture with background information then details of the steps of TASK defusing. This was followed by a large group simulation where a scenario was given to a selected group of residents who acted in character following a critical stress incident. This allowed the participants and observers to follow the TASK defusing process. This large group simulation was stopped at certain points to allow for discussion, explanation, and problem solving. Then small group sessions were held in which each participant played a character-role following a critical stress incident. This was played in real time allowing for the participants to get a better feel of how this would be conducted in the ED environment. TASK Defusing Summary: Introductions: simple introductions with setting ground rules of confidentiality, no judgment, no blame, and no note taking; Management phase: facilitator briefly summarizes the case and allows for questions regarding the case and management of the case; Reaction phase: allowing for participants to voice their reactions or concerns regarding the case; Teaching phase: normalize reactions and discuss possible future symptoms. Discuss basic strategies for coping and give resource information for further follow-up. **Conclusion:** Formal evaluation forms were given to the 16 participants. The lecture was thought to increase their understanding of defusing with a mean score of 4.5/5 (CI 95% ±0.27). Mean overall usefulness of the scenarios was rated as 4.7/5 (CI 95% ±0.28). Overall, the workshop was well received with participants ranking the usefulness of an annual refresher as 4.1 (CI 95% ±0.38). The development of this workshop may be one method to close the gap between the skill level and the comfort level of facilitating a defusing workshop within the ED.

Keywords: innovations in EM education, defusing, debriefing

P105

Learning how to debrief critical incidents in the emergency department: a national survey

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Introduction: Physicians are repeatedly exposed to critical incidents throughout training and practice, which potentially leads to increased burnout, decreased empathy and negatively impacts patient care. Physicians are often asked to facilitate informal debriefing sessions after critical incidents in the clinical setting, but little is known about their training in debriefing or what methods are effective. **Methods:** A national survey was distributed by email to all emergency residents and program directors. **Results:** Of the 97 responses, 77 were from residents with the remaining being from staff physicians in various positions. 62% of respondents have participated in a debriefing session and 25% have led one or more debriefing sessions. Using a Likert scale of 1-10 (1 = "not at all" and 10 = "very much") participants scored the usefulness of debriefing sessions to the team and the individual as 7.3/10 (CI 95% ±0.42) and 6.5/10 (CI 95% ±0.57) respectively. Respondents scored a mean score of 7.6 (CI 95% ± 0.45) for the importance of skills to lead a session in contrast to a mean of 4.2 (CI 95% ± 0.53) in level of preparedness. **Conclusion:** Although many resident physicians have participated in a debriefing session, most have not facilitated and would not feel prepared if asked to do so. Debriefing sessions are considered helpful to both the team and the individual. A large gap between training provided and the perceived importance of training was found. There is a need to broaden this aspect of training within emergency medicine.

Keywords: debriefing, defusing, critical incident