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

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Plenary Oral Presentations

PL01

Multicentre before-after implementation study of the Ottawa subarachnoid hemorrhage strategy

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Introduction: The Ottawa SAH Rule was developed to identify patients at high-risk for subarachnoid hemorrhage (SAH) who require investigations and the 6-Hour CT Rule found that computed tomography (CT) was 100% sensitive for SAH 6 hours of headache onset. Together, they form the Ottawa SAH Strategy. Our objectives were to assess: 1) Safety of the Ottawa SAH Strategy and its 2) Impact on: a) CTs, b) LPs, c) ED length of stay, and d) CT angiography (CTA). **Methods:** We conducted a multicentre prospective before/after study at 6 tertiary-care EDs January 2010 to December 2016 (implementation July 2013). Consecutive alert, neurologically intact adults with a headache peaking within one hour were included. SAH was defined by subarachnoid blood on head CT (radiologists final report); xanthochromia in the cerebrospinal fluid (CSF); >1 x 106/L red blood cells in the final tube of CSF with an aneurysm on CTA. **Results:** We enrolled 3,669 patients, 1,743 before and 1,926 after implementation, including 185 with SAH. The investigation rate before implementation was 89.0% (range 82.9 to 95.6%) versus 88.4% (range 85.2 to 92.3%) after implementation. The proportion who had CT remained stable (88.0% versus 87.4%; $p = 0.60$), while the proportion who had LP decreased from 38.9% to 25.9% ($p < 0.001$), and the proportion investigated with CTA increased from 18.8% to 21.6% ($p = 0.036$). The additional testing rate (i.e. LP or CTA) diminishedfrom 50.1% to 40.8% ($p < 0.001$). The proportion admitted declined from 9.8% to 7.3% ($p = 0.008$), while the mean length of ED stay was stable (6.2 +/– 4.0 to 6.4 +/– 4.1 hours; $p = 0.45$). For the 1,201 patients with CT 6 hours, there was an absolute decrease in additional testing (i.e. LP or CTA) of 15.0% (46.6% versus 31.6%; $p < 0.001$). The sensitivity of the Ottawa SAH Rule was 100% (95%CI: 98-100%), and the 6-Hour CT Rule was 95.3% (95%CI: 88.9-98.3) for SAH. Five patients with early CT had SAH with CT reported as normal: 2 unruptured aneuryms on CTA and presumed traumatic LP (determined by treating neurosurgeon); 1 missed by the radiologist on the initial interpretation; 1 dural vein fistula (i.e. non-aneuyrsmal); and 1 profoundly anemic (Hgb 63g/L). **Conclusion:** The Ottawa SAH Strategy is highly sensitive and can be used routinely when SAH is being considered in alert and neurologically intact headache patients. Its implementation was associated with a decrease in LPs and admissions to hospital.

Keywords: subarachnoid hemorrhage

PL02

Probiotic regimen for outpatient gastroenteritis utility of treatment (PROGUT) study: a multicenter randomized controlled trial

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Introduction: Gastroenteritis accounts for 1.7 million emergency department visits by children annually in the United States. We conducted a double-blind trial to determine whether twice daily probiotic administration for 5 days, improves outcomes. **Methods:** 886 children aged 348 months with gastroenteritis were enrolled in six Canadian pediatric emergency departments. Participants were randomly assigned to twice daily Lactobacillus rhamnosus R0011 and Lactobacillus helveticus R0052, 4.0 x 109 CFU, in a 95:5 ratio or placebo. Primary outcome was development of moderate-severe disease within 14 days of randomization defined by a Modified Vesikari Scale score 9. Secondary outcomes included duration of diarrhea and vomiting, subsequent physician visits and adverse events. **Results:** Moderate-severe disease occurred in 108 (26.1%) participants administered probiotics and 102 (24.7%) participants allocated to placebo (OR 1.06; 95% CI: 0.77, 1.46; $P = 0.72$). After adjustment for site, age, and frequency of vomiting and diarrhea, treatment assignment did not predict moderate-severe disease (OR, 1.11, 95% CI, 0.80 to 1.56; $P = 0.53$). In the probiotic versus placebo groups, there were no differences in the median duration of diarrhea [52.5 (18.3, 95.8) vs. 55.5 (20.2, 102.3) hours; $P = 0.31$], vomiting [17.7 (0, 58.6) vs. 18.7 (0, 51.6) hours; $P = 0.18$], physician visits (30.2% vs. 26.6%; OR 1.19; 95% CI0.87. 1.62; $P = 0.27$), or adverse events (32.9% vs. 36.8%; OR 0.83; 95% CI 0.62. 1.11; $P = 0.21$). **Conclusion:** In children presenting to an emergency department with gastroenteritis, twice daily administration of 4.0 x 109 CFU of a Lactobacillus rhamnosus/helveticus probiotic does not prevent development of moderate-severe disease or improvements in other outcomes measured.

Keywords: probiotic, diarrhea, pediatrics

PL03

Prophylactic administration of diphenhydramine to reduce neuroleptic side-effects in the acute care setting: a systematic review and meta-analysis

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Introduction: Neuroleptics are commonly used drugs to treat different conditions (e.g. psychosis, migraines) in the acute care setting and the emergency department. Their side effects can be disabling or, worse, fatal. The use of diphenhydramine to prevent those side-effects is widespread, but remains controversial. We performed a systematic review to determine if prophylactic administration of diphenhydramine (PAD) reduces the incidence of neuroleptic side-effects. **Methods:** Data sources: Medline, Embase, Cochrane Library, PsycInfo and Web of Science were searched. References from reviews that were identified in the search and from included studied were also reviewed for inclusion. Study selection: Randomized controlled trials evaluating any neuroleptic with PAD versus the same neuroleptic alone or with any inactive agent. Primary outcome was incidence of any extra-pyramidal side-effect. Secondary outcomes were akathisia, usage of rescue medication, subjective restlessness, neuroleptic malignant syndrome, sedation and sedation intensity. Data extraction: Independent reviewers scanned identified citations, extracted data and assessed for risk of bias. Data analysis: Meta-analysis was performed using random effect models. Heterogeneity and quality of evidence were assessed using, respectively, I2 and the GRADE approach. **Results:** Results: Of 1566 identified citations, nine studies (n = 1436) met all eligibility criteria. Four studies

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were specifically designed to assess for neuroleptic side-effects. Four studies were at high risk of bias. In primary analysis, PAD had no effect on the incidence of extra-pyramidal symptoms (7 studies, n = 1393 patients, RR 0.70 [0.40-1.22]), akathisia (5 studies, n = 1094 patients, RR 0.81 [0.36-1.82]) and sedation (5 studies; n = 1079, RR 1,48 [0.90-2.42]). Higher dosage of diphenhydramine was not associated with a greater reduction of extra-pyramidal side-effects. In a sensitivity analysis excluding an outlier study (n = 120, RR 6.63 [1.55-28,35]), PAD was associated with a significant decrease in extra-pyramidal side-effects (6 studies, n = 1273, RR 0.56 [0,38-0.82]), but not with any of the secondary outcome measures. **Conclusion:** Conclusion: When excluding an outlier study, PAD was associated with a significant reduction of extra-pyramidal side-effects. However, PAD did not significantly influence the incidence of akathisia. Overall quality of evidence is low. Further studies are warranted. PAD represents an interesting treatment option against neuroleptic side-effects, but its widespread usage whitout strong evidence to support it raises concerns.
Keywords: neuroleptic side-effects, diphenhydramine, systematic review

PL04

Effectiveness of hospital avoidance interventions among elderly patients: a systematic review

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Introduction: Overuse of acute care services, particularly emergency department (ED) use, is an important topic for healthcare providers and policy makers within Canada and abroad. Prior work has shown that frail elderly patients with complex medical needs and limited personal and social resources are heavy users of ED services and are often admitted when they present to the ED. Updated information on the most effective strategies to avert ED presentation and hospital admission focused specifically on elderly patients is needed. **Methods:** This systematic review addressed the question: what interventions have demonstrated effectiveness in decreasing ED use and hospital admissions in elderly patients? Comprehensive literature searches were conducted in databases including Ovid Medline, EMBASE, CINAHL, and the Cochrane Central Register of Controlled Trials with no language or date restrictions. Citations were limited to interventional studies. Grey literature and reference list searches, as well as communication with experts in the field were performed. Consensus or a third reviewer resolved any disagreements. Original research regarding interventions conducted in populations 65 years or older with acute illness, either living in community or facility-living were included. Primary outcomes were ED visits and hospital admissions. Secondary outcomes included: mortality, cost, and patient-reported outcomes such as health-related quality of life and functional status. **Results:** Forty-three relevant studies were identified including 22 randomized controlled trials (RCT), 2 cluster-RCT, 2 trials with non-random allocation, 4 before-after studies, 6 quasi-experimental studies, and 7 cohort studies. Intervention settings included: home visits (22), long-term care (7), outpatient or primary care clinics (8), and ED (3) or inpatient (3). Data characterization revealed that home-based, outpatient and/or primary care-based strategies reduced ED visits and hospitalizations, particularly those which included comprehensive geriatric assessments, home visits or regular face-to-face contact and interdisciplinary teams. Hospital-based models generally showed no difference in ED or inpatient service utilization. There was, however, considerable variability across individual studies with respect to reporting of outcomes, statistical analyses performed, and overall risk of bias. **Conclusion:** Various interventional strategies have been studied to avert ED presentation and hospital admission for frail elderly patients. More rigorous methodology and standardization of outcome measures is needed to quantitatively assess the effects of these programs.
Keywords: elderly, emergency department avoidance, systematic review

Oral Presentations

LO01

Analysis of bystander CPR quality during out-of-hospital cardiac arrest using data derived from automated external defibrillators

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Introduction: Out-of-hospital cardiac arrest (OHCA) is associated with high mortality, and CPR quality is one of the few modifiable factors associated with improved outcomes. Particularly, bystander CPR has been shown to improve survival and neurological outcomes in OHCA. However, the quality of CPR performed by bystanders in OHCA is unknown. We evaluated bystander CPR quality during OHCA, utilizing data stored within Automated External Defibrillators (AEDs), and matched with cases enrolled in the Resuscitation Outcomes Consortium (ROC) database. **Methods:** This cohort study included adult OHCA cases from the Ottawa ROC site between 2011-2016, which were of presumed cardiac etiology, not witnessed by EMS, and where an AED was utilized by a bystander with >1 minute of CPR process data available. AED data from Ottawa Paramedic Services was matched to each case identified by the ROC database. AED data was analyzed using manufacturer software to determine overall measures of bystander CPR quality, changes in bystander CPR quality over time, and bystander adherence to existing 2010 Resuscitation Guidelines. **Results:** 100 cases met all inclusion criteria. 75.0% of patients were male, with a mean age of 62.3 years. 58.0% of arrests occurred in the home setting, and 24.0% were witnessed arrests. Initial rhythm was ventricular fibrillation/ventricular tachycardia in 36.0% of cases. Overall survival rate was 42.0%, with a modified Rankin Score of 3.7 (95% CI: 2.9-4.5). Bystanders demonstrated high-quality CPR over the course of resuscitation, with a chest compression fraction (CCF) of 75.9% (73.6-78.1), a compression depth of 5.26 cm (5.03-5.49), and a compression rate of 111.2/min (107.7-114.7). Mean peri-shock pause was 26.8 seconds (24.6-29.1). Adherence rates to 2010 Resuscitation Guidelines for compression rate and depth were 66.0% (60.9-71.1) and 54.9% (48.6-61.3), respectively. CPR quality was lowest in the first minute of resuscitation, during which rhythm analysis took place (mean 40.5 sec). In cases involving a shockable rhythm, overall latency from initiation of AED to shock delivery was 59.2 sec (45.5-72.8). **Conclusion:** We found that bystanders perform high-quality CPR, with strong adherence rates to existing Resuscitation Guidelines. Our findings provide evidence of the quality of bystander CPR performed during OHCA.
Keywords: cardiac arrest, cardiopulmonary resuscitation, bystander cardiopulmonary resuscitation

LO02

Characteristics and predictors of pediatric emergency department use in Manitoba: a population based study

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Introduction: Within Manitoba, little is known about the current state of pediatric emergency department (ED) use or the state of provincial

data collection. This study sought to gain a baseline understanding of pediatric ED use in Manitoba, including child demographics, visit characteristics, variation across the province, drivers of ED use, and data completeness. **Methods:** A retrospective cohort study was conducted using administrative data from the Manitoba Centre for Health Policy, and included all children aged 0-17 who presented to a Manitoba ED between 2011/12 and 2015/16, as identified from the Emergency Department Information System (EDIS), the National Ambulatory Care Reporting System (NACRS) and physician billing claims. Frequency of use was defined as single, intermediate (2-6 visits) and frequent (7+) and regional trends in child characteristics, ED use, acuity, presenting complaints, and discharge dispositions were observed. Ordinal logistic regression will be used to identify predictors of ED use. **Results:** Overall, we were able to capture 250,620 ED visits made by 172,306 children; data sources and completeness varied by year. Provincially, children under 5 years of age were the most frequent users of the ED, and use <1 year of age was highest in the North. We observed higher use among low-income children, particularly in rural mid and north, and few differences by sex. By year, the majority of children made single-use of the ED (64.48%), while fewer were classified as intermediate (34.40%) or frequent users (1.11%). Overall, the top presenting complaints were for fever (10.27%), limb complaint/trauma (7.48%), abdominal pain (5.75%), nausea and/or vomiting (4.53%) and shortness of breath (3.68%), with variation by triage level. In rural but not urban areas, mental health assessments were a top presenting complaint and primary reason for transfer to larger centres. Results of predictors of ED use are pending. **Conclusion:** Results from this study will provide important information about the predictors and variation of ED use by region and top causes for visit, enabling us to better tailor knowledge mobilization efforts and tool development to the local context. Identified gaps in data collection are important to address to advance our knowledge and delivery of pediatric emergency care at the provincial level.

Keywords: pediatric emergency care, regional variation, knowledge mobilization

LO03

Impact of the conversion to a shockable rhythm from a non-shockable rhythm for patients suffering from out-of-hospital cardiac arrest

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Introduction: Patients suffering from out-of-hospital cardiac arrest (OHCA) with an initial shockable rhythm (ventricular tachycardia or ventricular fibrillation) have higher odds of survival than those suffering from non-shockable rhythm (asystole or pulseless electrical activity). Because of that prognostic significance, patients with an initial non-shockable rhythm are often not considered for advanced resuscitation therapies such as extracorporeal resuscitation. However, the prognostic significance of the conversion to a shockable rhythm from an initially non-shockable rhythm remains uncertain. This study aimed to determine the degree of association between the conversion (or not) of a non-shockable rhythm to a shockable rhythm and resuscitation outcomes in patients with OHCA. It was hypothesized that such a conversion would be associated with a higher survival to discharge. **Methods:** The present study used a registry of adult OHCA between 2010 and 2015 in Montreal, Canada. Adult patients with non-traumatic OHCA and an initial non-shockable rhythm were included. The primary outcome measure was survival to hospital discharge, and the secondary outcome measure was prehospital return of spontaneous circulation (ROSC). The associations of interest were evaluated with univariate logistic regressions and multivariate models controlling for demographic and clinical variables (e.g. age, gender, type of initial non-shockable rhythm, witnessed arrest, bystander cardiopulmonary resuscitation). Assuming a survival rate of 3% and 25% of the variability explained by the control variables, including more than 4580 patients would allow to detect an absolute difference of 4% in survival between both groups with a power of more than 90%. **Results:** A total of 4893 patients (2869 men and 2024 women) with a mean age of 70 years (standard deviation 17) were included, of whom 450 (9.2%) experienced a conversion to a shockable rhythm during the course of their prehospital resuscitation. Among all patients, 146 patients (3.0%) survived to discharge and 633 (12.9%) experienced prehospital ROSC. In the univariate models, there was no association between the conversion to a shockable rhythm and survival (odds ratio [OR] 1.14 [95% confidence interval {CI} 0.66-1.95]), but a significant assocation was observed with ROSC (OR 2.00 [95% CI 1.57-2.55], $p < 0.001$). However, there was no independent association between the conversion to a shockable rhythm and survival (adjusted OR [AOR] 0.92 [95% CI 0.51-1.66], $p = 0.78$) and prehospital ROSC (AOR 1.30 [95% CI 0.98-1.72], $p = 0.073$). **Conclusion:** There is no clinically significant association between the conversion to a shockable rhythm and resuscitation outcomes in patients suffering from OHCA. The initial rhythm remains a much better outcome predictor than subsequent rhythms and should be preferred when evaluating the eligibility for advanced resuscitation procedures.

Keywords: out-of-hospital cardiac arrest, initial rhythm

LO04

Health effects of training laypeople to deliver emergency care in underserviced populations: preliminary results of a systematic review

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Introduction: The World Health Organization recommends emergency care training for laypeople in low-resource settings, but the effects of these programs on patient outcomes and community health have not been systematically reviewed. Our objective was to identify the individual and community health effects of educating laypeople to deliver emergency care in low-resource settings. **Methods:** We conducted a systematic review to address this question: in low-resource populations (P), does emergency care education for laypeople (I) confer any measurable effect on patient morbidity and mortality, or community capacity and resilience for emergency health conditions (O), in comparison with no training or other education(C)? We searched 12 electronic databases and grey literature for quantitative studies. We conducted duplicate and independent title and abstract screening, methodological and outcomes extraction, and study quality assessment using the Effective Public Health Practice Tool. We developed a narrative summary of findings. (PROSPERO: CRD42014009685) **Results:** We reviewed 16,017 abstracts and 372 full-text papers. 38 met inclusion criteria. Most topically relevant papers were excluded because they assessed educational outcomes. Cardiopulmonary resuscitation training (6 papers) improved cardiac arrest survival and enhanced capacity to respond to cardiac arrest in rural Norway, Denmark and

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commercial aircraft operations. A public education campaign in remote Denmark improved absolute cardiac arrest survival by 5.4% (95% CI 2-12). Lay trauma training (12 papers) reduced absolute injury mortality and improved community capacity in Iraq, Cambodia, Iran and Indigenous New Zealand communities. A trauma care program in Iraq and Cambodia reduced absolute mortality by 25% (95% CI 17.2-33). Education for mothers on paediatric fevers in Ethiopia was associated with 40% relative reductions in under-5 mortality (95% CI 29.2-50.6). Similar training improved access to care for paediatric malnutrition, malaria, pneumonia, and gastrointestinal disease in Nigeria, Kenya, Senegal, Burkina Faso, Mali, and India (13 papers). Overdose education and naloxone distribution was associated with reductions in opioid overdose deaths (3 papers), including in Massachusetts where high-uptake communities for overdose education had significantly lower overdose fatality rates than no-uptake communities (rate ratio 0.54, 95% CI 0.39-0.76). Community education improved measures of access to emergency care for remote Indigenous populations in Canada, Alaska and Nepal (3 papers) and adolescent mental health capacity in Australia (1 paper). Studies were of low or medium quality. **Conclusion:** In addition to established interventions for injury and cardiac arrest, emergency care training can improve community capacity in underserviced populations, and save lives in opioid overdose, paediatric infectious disease and malnutrition.
Keywords: task shifting, first aid, low-resource settings

LO05

A statistical analysis to estimate the spatial dynamics of opioid-related emergency medical services responses in the city of Calgary 2017

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Introduction: Understanding the spatial distribution of opioid abuse at the local level may facilitate community intervention strategies. The purpose of this analysis was to apply spatial analytical methods to determine clustering of opioid-related emergency medical services (EMS) responses in the City of Calgary. **Methods:** Using opioid-related EMS responses in the City of Calgary between January 1st through October 31st, 2017, we estimated the dissemination area (DA) specific spatial randomness effects by incorporating the spatial autocorrelation using intrinsic Gaussian conditional autoregressive model and generalized linear mixed models (GLMM). Global spatial autocorrelation was evaluated by Morans I index. Both Getis-Ord Gi and the LISA function in Geoda were used to estimate the local spatial autocorrelation. Two models were applied: 1) Poisson regression with DA-specific non-spatial random effects; 2) Poisson regression with DA-specific G-side spatial random effects. A pseudolikelihood approach was used for model comparison. Two types of cluster analysis were used to identify the spatial clustering. **Results:** There were 1488 opioid-related EMS responses available for analysis. Of the responses, 74% of the individuals were males. The median age was 33 years (IQR: 26-42 years) with 65% of individuals between 20 and 39 years, and 27% between 40 and 64 years. In 62% of EMS responses, poisoning/overdose was the chief complaint. The global Morans Index implied the presence of global spatial autocorrelation. Comparing the two models applied suggested that the spatial model provided a better fit for the adjusted opioid-related EMS response rate. Calgary Center and East were identified as hot spots by both types of cluster analysis. **Conclusion:** Spatial modeling has a better predictability to assess potential high risk areas and identify locations for community intervention strategies. The clusters identified in Calgarys Center and East may have implications for future response strategies.
Keywords: spatial analysis, autocorrelation, opioid crisis

LO06

Effects of emergency department system transformation (EDST) on patient experience of emergency department visits

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Introduction: Emergency Department Systems Transformation (EDST) is a bundle of Toyota Production System based interventions partially implemented in two Canadian tertiary care Emergency Departments (ED) between June 2014- July 2016 with the goal to improve patient care by increasing value and reducing waste. Some of the 17 primary interventions included computerized physician order entry optimization, staff schedule realignment, physician scorecards and a novel initial assessment process. Some interventions have only been partially implemented due to persistent access block. This project was designed to examine the effect of partial EDST implementation on patient experience of emergency department visits. Patient satisfaction has been linked to improved patient outcomes, improved adherence to physician instruction, and improved provider satisfaction. **Methods:** Semi structured interviews were conducted over three distinct time periods (summer 2015, 2016 and 2017) to encompass progressive levels of EDST implementation. The interviews focused on the patients perceptions in each of 4 stages of their ED visit - Check-in, assessment, reassessment, and disposition. Patients were asked a list of positive (respected, listened to, supported, safe) and negative (in pain, worried, confused, frustrated) emotions frequently experienced and asked if they felt any of these emotions during their ED stay. Open ended questions were also asked about their overall visit. Descriptive statistics were calculated as differences in the proportion of patients feeling each emotion across timeframes. The open-ended question was coded by two reviewers as positive, negative or mixed. A kappa score was calculated to determine reviewer agreement. **Results:** 987 interviews were completed. In general, the proportion of patients feeling negative emotions remained consistent while positive emotions increased as EDST implementation progressed. For open-ended responses, the percentage of overtly positive experiences increased significantly from 2015 to 2017 ($p = 0.006$), while overtly negative experiences did not significantly change. Reviewers agreed in the coding of the open-ended responses in 97.6% of surveys. The kappa score for reviewer agreement was 0.96 (95% CI 0.94-0.98) indicating almost perfect agreement. **Conclusion:** Partial implementation of EDST positively impacted patients experience of emergency department visits.
Keywords: emergency department, patient satisfaction

LO07

Developing a culture of quality across Ontario's emergency departments: the return visit quality program

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Introduction: In 2016, the Emergency Department (ED) Return Visit Quality Program (RVQP) was developed to promote a culture of quality in Ontario EDs, by mandating large-volume EDs to audit charts of patients who had a return visit leading to hospital admission (RV). This program provides an opportunity to identify possible adverse events (AEs) and quality issues, which can then be addressed to improve patient care. **Methods:** The RVQP requires EDs to audit a set number of 72-hour RVs for potential AEs/quality issues, as well as all 7-day RVs for one of three key paired sentinel diagnoses (acute myocardial

infarction, subarachnoid hemorrhage, and pediatric sepsis). Submitted audits and their AEs/quality issues were analyzed by a team of emergency physicians with quality improvement (QI) expertise, and qualitative metrics were derived. Using the general inductive method, we conducted a qualitative analysis with Health Quality Ontario (HQO), and HQO completed an independent analysis of the submitted narrative reports. Our objective is to report on the qualitative and quantitative metrics of the program, and to explore emerging themes from the AEs/quality issues identified. **Results:** There were 36,304 72-hour RVs flagged, which represent 0.99% of all 3,672,708 ED visits in the province of Ontario for the 86 EDs participating in the first year of the program. Overall, 2,584 audits were conducted. For the audits involving all-cause 72-hour RVs, 571 (24%) of cases had AEs/quality issues identified. Of the 219 audits involving sentinel diagnoses, 107 (49%) audits identified AEs/quality issues. The qualitative analysis revealed 11 themes, which were classified into three groups : issues related to patient characteristics or actions (elder care, patient risk profile, left without being seen); issues related to actions or processes of the ED team (physician cognitive lapses, handover/communication, high risk medications, documentation, radiology, vital signs); and healthcare system issues (imaging/test availability, discharge planning). Over one hundred local QI projects were completed or planned as a result of the audits performed. **Conclusion:** The RVQP promotes a culture of quality by highlighting potential AEs and quality themes that can then be targeted to increase patient safety and quality of care in Ontario EDs. Numerous QI projects were undertaken in the first year of the program, and future efforts will monitor the completion and success of these. The program can be easily adapted in other jurisdictions.

Keywords: return visits, healthcare quality

LO08

PROM-ED: the development and testing of a patient-reported outcome measure for use with emergency department patients who are discharged home

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Introduction: Patient-reported outcome measures (PROM) are questionnaires that can be used to elicit care outcome information from patients. We sought to develop and validate the first PROM for adult patients without a primary mental health or addictions presentation receiving emergency department (ED) care and who were not hospitalized. **Methods:** PROM development used a multi-phase process based on national and international guidance (FDA, NQF, ISPOR). Phase 1: ED outcome conceptual framework qualitative interviews with ED patients post-discharge informed four core domains (previously published). Phase 2: Item generation scoping review of the literature and existing instruments identified candidate questions relevant for each domain for inclusion in tool. Phase 3: Cognitive debriefing existing and newly written questions were tested with ED patients post-discharge for comprehension and wording preference. Phase 4: Field and validity testing revised tool pilot tested on a national online survey panel and then again at 2 weeks (test-retest). Phase 5: Final item reduction using a Delphi process involving ED clinicians, researchers, patients and system administrators. Phase 6: Validation - psychometric testing of PROM-ED 1.0. **Results:** Four core outcome domains were defined in Phase 1: (1) understanding; (2) symptom relief; (3) reassurance and (4) having a plan. The domains informed a review of existing relevant questionnaires and instruments and the writing of additional questions creating an initial long-form questionnaire. Eight patients participated in cognitive debriefing of the long-form questionnaire. Expert clinicians, researchers and patient partners provided input on item refinement and reduction. Four hundred forty-four patients completed a second version of the long-form questionnaire (add in retest numbers) which informed the final item reduction process by a modified Delphi method involving 21 diverse contributors. The questionnaire was validated and underwent final revisions to create the 21 questions that constitute PROM-ED 1.0. **Conclusion:** Using accepted PROM instrument development methodology, we developed the first outcome questionnaire for use with adult ED patients who are not hospitalized. This questionnaire can be used to systematically gather patient-reported outcome information that could support and inform improvement work in ED care.

Keywords: health outcomes, patient-centred care, quality measurement

LO09

Population-based analysis of the effect of a comprehensive, systematic change in an emergency medical services resource allocation plan on 24 hour mortality

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Introduction: Resource allocation planning (RAP) for emergency medical services (EMS) systems determines optimal resources for patient needs in order to minimize morbidity and mortality. The British Columbia Emergency Health Services developed a new RAP using an evidenced informed methodology, statistical analysis of outcomes and with further clinical input from EMS physicians, paramedics and allied EMS providers. The revised RAP was implemented on a pan provincial basis in fall of 2013. It is unknown how the modifications will affect outcomes of EMS cases. Population-based analysis was used to determine the effect of a comprehensive RAP changes by comparing 24-hour mortality before and after province-wide implementation of the revised RAP. **Methods:** The primary outcome, 24-hour mortality, was obtained through linked provincial health administrative data. All adult cases with evaluable outcome data were included in the analysis. A pre and post methodology was used to evaluate the effect of post-RAP revision (post-RAP-revision) on 24-hour mortality compared to pre-RAP revision (pre-RAP-revision). Multivariable logistic regression was used to adjust for variations in other significant factors associated with 24-hour mortality. The interrupted time series (ITS) estimated any immediate changes in the level or trend of outcome after the start of the revised RAP implementation (fall of 2013), while simultaneously controlling for pre-existing trends. **Results:** The cohort is comprised of 562,546 cases (April 2012 March 2015). In the multivariate model, adjusted for age, sex, urban/metro region, season, day hour, and MPDS determinant, the probability of dying within 24 hours of EMS call was 7% lower in the post-RAP-revision cohort (OR = 0.936; 95% CI: 0.886-0.989; P = 0.018). A sub-group analysis of immediately life-threatening cases demonstrated similar effect (OR = 0.890; 95% CI: 0.808-0.981; P = 0.019) **Conclusion:** Our results demonstrate that a comprehensive, evidence informed reconstruction of a provincial EMS RAP is feasible. Despite considerable change in crew level response and resource allocation, there was significant decrease in 24 hour mortality in a large pan-provincial population based patient cohort.

Keywords: emergency medical services, resource allocation, mortality

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LO10

Faculty sim: a simulation-based continuing professional development curriculum for academic emergency physicians

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Introduction: Maintaining and enhancing competence in the breadth of Emergency Medicine (EM) is an ongoing challenge for all clinicians. In particular, resuscitative care in EM involves high-stakes clinical encounters that demand strong procedural skills, effective leadership, and up-to-date knowledge. However, Canadian emergency physicians are not required to complete any specific ongoing training for these encounters beyond general CPD requirements of professional colleges. Simulation-based medical education (SBME) is an effective modality for enhancing technical (e.g. procedural) and non-technical (i.e. Crisis Resource Management) skills in crisis situations, and has been embedded in undergraduate and postgraduate medical curricula worldwide. We present a novel comprehensive curriculum of simulation-based CPD designed specifically for academic emergency physicians (AEPs) at our centre. **Methods:** The curriculum development involved a departmental needs assessment survey, focus groups with AEPs, data from safety metrics and critical incidents, and consultations with senior departmental leadership. Institutional support was provided in the form of a $25,000 grant to fund a physician Program Lead, monthly session instructors, and simulation centre operating costs. Based on the results of the needs assessment, a two-year curriculum was mapped out and tailored to the available resources. **Results:** CPD simulation commenced in January 2017 and occurs monthly for three hours, immediately following departmental Grand Rounds to provide convenient scheduling. Our needs assessment identified two key types of educational needs: (1) Crisis Resource Management skills and (2) frequent practice of high-stakes critical care procedures (e.g. central lines). The first six months of implementation was dedicated to low-fidelity skills labs to facilitate the transition to SBME. After this, the program transitioned to a hybrid model involving two high-fidelity simulated resuscitations and one skills lab per session. **Conclusion:** We have introduced a comprehensive curriculum of ongoing simulation-based CPD in our department based on the educational needs of our AEPs. Key to our successful implementation has been support from educational and administrative leadership within our department. Ongoing challenges include securing adequate protected time from clinical duties for program facilitators and participants. Future work will include establishing permanent funding, CPD accreditation, and a formal program evaluation.

Keywords: innovations in emergency medicine education, simulation, continuing professional development

LO11

Improving patient access, care and transportation by paramedics (IMPACT): a novel curriculum toward redefining paramedic services in Ontario

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Introduction: A proportion of Emergency Department (ED) visits may be treated in out-of-hospital settings. The objective of this curriculum was to expand paramedic competencies to safely risk stratify patients and divert low risk, low acuity patients from EDs with and without physician oversight. **Methods:** We followed Kerns 6-step Curriculum Development Framework . (a) We identified a problem, and (b) completed a needs assessment by retrospectively reviewing the clinical pathways of 3000 patients were cared for and transported by paramedics and received care at an EDs. We used this data to identify competencies (e.g., diagnostics, interventions, reasoning needs) and targeted patient types that would result in the most significant advancements to paramedic services. These were translated to (c) goals and objectives. **Results:** Our (d) educational strategies involved a 14-week intensive patient-type and case-based curriculum. (e) Implementation involved 3 days/wk of clinical rotations supplemented with 2 days/wk of a mixed curriculum (i.e., fixed instruction using blended didactic small and large group sessions; flexible/individualized curriculum based on identified needs; formative assessments; self and peer-directed learning; simulations). (f) Assessment involved knowledge and application tests, clinical placement and simulation assessments; case development, assignments, and OSCE. Evaluation outcomes included student performance scores across 7-dimensions, clinical placement and student feedback. Thirteen Advanced Care Paramedics from York Region Paramedic Services completed the program. Challenges included provincial stakeholder consensus, and formally addressing clinical suspicion in a protocol based field within a limited time frame. **Conclusion:** A curriculum for expanded paramedic practice to risk stratify and divert targeted low risk patients from EDs resulted in new paramedic competencies and scope of practice. It received high evaluations from clinical staff and students. Successful candidates will undergo a 1-year study for validation and safety.

Keywords: innovations in emergency medicine education, emergency medical services, curriculum

LO12

Implementation of an editorial internship at the Canadian Journal of Emergency Medicine to foster education and participation in academic emergency medicine

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Introduction: Medical journals are an essential venue for knowledge translation. Skilled reviewers and editors are required to ensure quality standards in research publications and yet postgraduate programs rarely include this training in their curricula. Imparting appropriate skills and developing capacity in journalship has thus proved challenging. The Canadian Journal of Emergency Medicine (CJEM) is the national journal for Emergency Medicine (EM) in Canada. The CJEM editorial board recently decided to provide longitudinal mentorship for junior academic faculty members and trainees through an editorial internship. The internship had three goals for participants: (1) introduce and develop the responsibilities and skills of a good editor; (2) enhance a career in academic EM; and, (3) galvanize future participation as a reviewer or editor in scientific publications. **Methods:** The senior editorial board of CJEM and the inaugural intern developed a one-year Editorial Internship that was launched in June 2017. The curricular framework was designed by current and prior CJEM senior editors from four Canadian universities, and was informed by similar programs in the United States. The curriculum was refined iteratively based on feedback and discussion between the senior editors and intern. The internship was designed for a single individual in the Canadian EM community, including residents, pediatric fellows and practicing emergency physicians. **Results:** To develop the responsibilities and skills of being a good editor, the intern performed six mentored reviews of manuscripts either under current review at CJEM or previous submissions identified as

difficult peer review decisions. In addition, the intern learned about CJEM values and norms by participating in monthly videoconference meetings and quarterly editorial board meetings. To enhance an academic career, the intern was assigned two writing projects under the guidance of senior editors for publication in CJEM, and completed an online critical appraisal course. **Conclusion:** The inaugural editorial intern gained experience as an editor and produced scholarly work. We feel the internship met its first two goals, and CJEM has committed to continue the internship annually. The ultimate determination of whether the internship achieved its third goal will only be known after longitudinal tracking of participants career involvement in academic publishing and editing.

Keywords: innovations in emergency medicine education, knowledge translation, medical writing

LO13

Eye care in the emergency department: what proportion of patients presenting to the emergency department with isolated eye related complaints could alternatively be seen by an optometrist?

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Introduction: Approximately 2-3 percent of emergency department (ED) visits are due to eye-related complaints, adding to the ED workload. Many of these could be seen instead by an optometrist who specializes in the examination, diagnosis and treatment of eye-related disorders. We sought to determine the proportion of ED patients with isolated eye-related complaints that could be managed by an optometrist. **Methods:** We performed an administrative database study and descriptive analysis of all patients presenting to Calgary EDs with eye-related complaints during a one-year period. We determined optometry eligibility by reviewing discharge diagnoses and assessing whether that condition was within the Alberta Association of Optometrys (AAO) defined scope of practice. Patients were considered ineligible if their condition was related to bites, stings, thermal burns, assault, MVA or operative complications; if they required hospitalization or referral to a non-eye specialist (e.g. neurology); if they had associated headache, dizziness, syncope, hypertension, neurologic abnormality (e.g. diplopia); if they had facial cellulitis, orbital infections, adverse drug effects, or if they underwent observation in the ED because of concerns about a cardiac or neurological condition. **Results:** In 2015, 7686 patients were seen in Calgarys 5 EDs with eye related complaints. Of these, 76.2% were optometry-eligible and 75% of optometry-eligible patients arrived during day or evening hours (0800-2100). The most common presenting complaints were visual disturbance (24.8%), redness (22.1%), and pain or photophobia (16.4%). Optometry-eligible patients waited an average of 110 min and had an ED LOS of 149 min. **Conclusion:** Approximately 3 in every 4 patients seen in the ED for eye related complaints could alternatively be seen by an optometrist. Further research is required to establish the feasibility of diversion to an optometrist from the ED for eye-related complaints.

Keywords: quality improvement and patient safety, eye care, emergency department

LO14

In emergency department, do serum biomarkers are useful to screen independent frail seniors exposed to functional or mobility impairments after a minor injury?

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Introduction: Frailty is a geriatric syndrome conferring a high risk of declining functional capacities. Some serum biomarkers were associated with frailty, but no study has investigated this possible association among community-dwelling seniors with minor injuries in the emergency department (ED). The aim was to determine if ED serum biomarker assay combined with frailty status improve the prediction of 3-months functional or mobility impairments in this population, beyond frailty status alone. **Methods:** This prospective sub-study of the CETI cohort includes 190 participants (age 65 years, ED consultation within 2 weeks of a minor injury, independent in daily activities 4 weeks prior to injury, and discharged home from EDs). Biomarkers were obtained from blood samples at baseline (ED visit). Normal vs. at risk physiological states were defined according to clinical threshold values. Also, the patients were screened for frailty at baseline) while their functional (OARS scale) and mobility characteristics were assessed at the ED visit and 3 months later. Patients were classified as robust or pre-frail/frail according of the CHSA-CFS and SOF scales. Simple generalized linear models with a binomial distribution and a log link function were used to explore the differences in functional and mobility outcomes at three months across sub-groups (RR). **Results:** When compared to robust ones, ED pre-frail/frail patients were less functional in their instrumental activities of day living ($p = 0.004$), slower walkers ($p = 0.02$), more frequent users of walking aids ($p = 0.03$), more fearful of falling ($p = 0.006$), went outside their home less often weekly ($p = 0.004$) and had higher abnormal creatinine levels ($p = 0.02$). We observed an overall 3-month functional decline in around 10% of patients combined with worsened mobility characteristics. We found that vitamin D [RR: 0.51 (0.07-3.9)], glucose (RR: 0.27 [(0.03-2.16)]) and creatinine (RR: [1.10 [(0.40-2.97]) modulate the prediction of 3-months mobility impairments. However, ED frailty status with CHSA-CFS and SOF scales clearly remained the stronger predictor of mobility impairments [vitamin DRR: 2.93 (1.12-7.65); glucoseRR: 2.36 (0.85-6.55); creatinine: RR2.06 (1.21-3.53)]. **Conclusion:** Since they do not improve the prediction of 3-months functional or mobility impairments associated with frailty status, ED biomarker assays are not useful in adequately screening for frailty among independent seniors with minor injuries.

Keywords: emergency department, geriatrics, frailty

LO15

Treatment of asymptomatic bacteriuria in elderly patients with delirium: a systematic review

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Introduction: It is typical to look for UTI in delirious elderly patients, despite a high prevalence of asymptomatic bacteriuria (ASB) in this population. A common presentation of infection is delirium, which often has a non-specific and multifactorial etiology. Therefore, when bacteriuria is present with delirium in the absence of urinary symptoms, physicians prescribe antibiotics for the suspected UTI-induced delirium. We set to determine whether antibiotic treatment in the elderly presenting with delirium in the presence of ASB resulted in resolution of delirium. **Methods:** Literature searches were performed in MEDLINE, EMBASE, CINAHL and Cochrane Library. Abstracts were independently reviewed by two authors for decision to include for full-text review. Inclusion criteria included female gender, >65 years of age, presenting in an acute care setting with delirium and ASB. The primary outcome was resolution of delirium. The secondary outcomes were mortality, frequency of side effects from antibiotics, length of hospital stay and readmission for delirium. **Results:** 930 abstracts published from 1946-2017 were screened, and 42 were included for full text

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review. No studies were eligible for inclusion in the systematic review, as none addressed the primary outcome. One study addressed the outcomes of poor functional recovery after delirium and the rate of improvement of delirium symptoms after presentation of delirium with ASB. **Conclusion:** Even though current guidelines recommend against treatment of ASB, no guideline states whether ASB should be treated in elderly patients with delirium. Little evidence exists to elucidate whether treating delirious patients with ASB results in improvement in outcomes. Future studies should focus on demonstrating the relationship between resolution of delirium with antibiotic treatment. This will clarify whether delirium is a true symptom of ASB and whether treatment results in faster resolution of delirium.

Keywords: bacteriuria, asymptomatic, delirium

LO16

Showing your work: experiences with mind maps and faculty teaching

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Introduction: Cognitive processing theories postulate that decision making depends on both fast and slow thinking. Experienced physicians (EPs) make diagnoses quickly and with less effort by using fast, intuitive thinking, whereas inexperienced medical students rely on slow, analytical thinking. This study used a cognitive task analysis to examine EPs cognitive processes and ability to provide knowledge translation to learners. **Methods:** A novel mind mapping approach was used to examine how EPs translate their clinical reasoning to learners, when evaluating a patient for a possible venous thromboembolism (VTE). Nine EPs were interviewed and shown two different videos of a medical student patient interview (randomized from six possible videos). **Results:** EPs were asked to demonstrate their clinical approach to the scenario using a mind map, assuming they were teaching a learner in the Emergency Department. EPs were later re-interviewed to examine response stability, and given the opportunity to make clarifying or substantive mind map modifications. Maps were broken into component pieces and analyzed using mixed-methods techniques. A mean of 15.7 component pieces were identified within each mind map (standard deviation (SD) 7.8). Maps were qualitatively coded, with a mean of 2.8 clarifying amendments (e.g. adding a time course caveat) (SD 1.5-5.75) and 4.4 substantive modifications (e.g. changing the flow of the map) (SD 2-5). **Conclusion:** Resulting mind maps displayed significant heterogeneity in teaching points and the degree to which EPs used slow thinking. EPs frequently made fast thinking jumps, although learners could prompt slow thinking by questioning unclear points. This is particularly important as learners engage in cognitive apprenticeship throughout their training. An improved understanding of EPs cognitive processes through mind mapping will allow learners to improve their own clinical reasoning (Merrit et al., 2017). Educating EPs on these processes will allow modification of their teaching styles to better suit learners.

Keywords: innovations in emergency medicine education, mind mapping, fast thinking

LO17

Examining publication bias among randomized controlled trials in child health research: a follow-up study

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Introduction: Non-publication of trial findings results in research waste and compromises medical evidence and the safety of interventions in child health. The objectives of this study were to replicate, compare and contrast findings of a previous study (Klassen et al., 2002) to determine the impact of ethical and editorial mandates to register and publish findings. **Methods:** Abstracts accepted to the Pediatric Academic Societies meetings (2008-2011) were screened in duplicate to identify Phase-III RCTs enrolling pediatric populations. Subsequent publication was ascertained through a search of electronic databases. Study internal validity was measured using Cochrane Risk of Bias and Jadad Scale, and key variables (e.g., trial design, study stage) were extracted. Pearson X2, t-tests and Wilcoxon rank sum tests were used to examine association between variables and publication status. Logistic regression, log-rank tests, rank correlation and Egger regression were used to assess predictors of publication, time to publication and publication bias, respectively. **Results:** Compared to our previous study, fewer studies remained unpublished (27.9% vs. 40.9%, $p = .007$). Abstracts with higher sample sizes ($p = 0.01$) and those registered in ClinicalTrials.gov were more likely to be published ($p < .0001$). There were no differences in quality measures/risk of bias or in preference for positive results ($p = 0.36$) between published and unpublished studies. Mean time to publication was 26.5 months and published manuscripts appeared most frequently in Pediatrics, the Journal of Pediatrics, and Pediatric Emergency Care. The funnel plot ($p = 0.04$) suggests a reduced but ongoing existence of publication bias among published studies. Overall, we observed a reduction in publication bias and in preference for positive findings, and an increase in study size and publication rates over time. **Conclusion:** Despite heightened safeguards and editorial policy changes in recent decades, publication bias remains commonplace and presents a threat to assessing the efficacy and effectiveness of interventions in child health. Our results suggest a promising trend towards a reduction in publication bias over time and positive impacts of trial registration. Further efforts are needed to ensure the entirety of evidence can be accessed when assessing treatment effectiveness.

Keywords: randomized controlled trials, publication bias, trial registration

LO18

Access to Take Home Naloxone in the Royal Alexandra Hospital's emergency department for patients at risk of an opioid overdose

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Introduction: Take Home Naloxone (THN) programs prevent death from opioid poisoning by training laypersons to recognize an overdose and administer naloxone. Dispensing THN through the emergency department (ED) is particularly critical because an ED visit for opioid poisoning strongly predicts future mortality. Many EDs have implemented THN programs, yet almost no literature examines the reach of such initiatives. To address this gap, we conducted a chart review of all patients presenting for opioid poisoning to an urban tertiary hospital, with a large ED-based THN program. This exploratory study hypothesized that more than 50% of ED patients presenting for opioid poisoning would be offered a THN kit. **Methods:** Data on demographics, clinical characteristics, and THN kit dispensing were extracted and analyzed from the charts of all ED patients presenting with a primary diagnosis of opioid poisoning between April 1 2016 and April 30 2017. Logistic regression analyzed predictors of being offered a THN kit. **Results:** A total of 347 ED visits for 301 unique patients occurred during the study period. The mean age $\pm$ SD of patients was 38 ± 14 years, and 69% were male. In 49% of ED visits, a THN kit was offered; 73% of these episodes had a THN kit dispensation. Patients who were

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male (AOR = 1.94; 95% CI 1.11 - 3.40), and reported that their overdose was unintentional (AOR = 2.95; 95% CI 1.04 8.35) and caused by illegal opioids (AOR = 4.73; 95% CI 2.63 8.52) were significantly more likely to be offered a THN kit. **Conclusion:** ED-based THN programs have the potential to reach significant proportions of patients at high risk of mortality. However, these programs may have differential reach within the target population. Further research is needed to examine barriers and facilitators to offering all eligible ED patients a THN kit.
Keywords: Take Home Naloxone, opioids, overdose

LO19

Understanding discharge communication behaviours in a pediatric emergency care context: a mixed methods study

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Introduction: Optimal discharge communication between healthcare providers and parents who present to the emergency department (ED) with their children is not well understood. Current research regarding discharge communication is equivocal and predominantly focused on evaluating different delivery formats or strategies with little attention given to communication behaviours or the context in which the communication occurs. The objective of this study was to characterize the process and structure of discharge communication in a pediatric ED context. **Methods:** Real-time video observation and follow-up surveys were used in two academic pediatric EDs in Canada. Parents who presented with their child to the ED with one of six illness presentations, a Canadian Triage Acuity Score of 3-5 were eligible to participate. All ED physicians, learners, and staff members were also eligible. Provider-parent communication was analyzed using the Roter Interaction Analysis System (RIAS) to code each utterance. Parent health literacy and anxiety were measured upon admission to the ED. Parent recall of important discharge information and satisfaction with communication was assessed within 72 hours of discharge. **Results:** A total of 107 ED patient visits were video recorded and a total of 70,000 utterances were coded across six illness presentations: abdominal pain (n = 23), asthma (n = 7), bronchiolitis (n = 4), diarrhea/vomiting (n = 20), fever (n = 27), and minor head injury (n = 26). The average length of stay for participants was 3 hours, with an average of three provider interactions per visit. Interactions ranged in time from less than one minute up to 29 minutes, with an average of six minutes per interaction. The majority of visits were first episodes for the presenting illness (63.2%). Physician utterances coded most commonly involved giving medical information (22.9%), whereas nurses most commonly gave orientation instructions (20.9%). Learners were most likely to employ active listening techniques (14.2%). Communication that provided post-discharge instructions for parents comprised 8.5% of all utterances. Overall, providers infrequently assessed parental understanding of information (2.0%). Only 26% of parents recalled receiving important discharge information deemed relevant to their childs disposition. Yet, parent satisfaction with the amount of information communicated during the ED visit was generally high (89.6% agreed or strongly agreed). **Conclusion:** This is the first study of ED discharge communication to be conducted in a pediatric setting using video observation methods. Provider-parent communication was predominantly characterized by giving medical information, with little time devoted to preparing families to care for their child at home. Greater assessment of parent comprehension of discharge communication is needed to ensure that parents understand important instructions and know when to seek further care.
Keywords: discharge communication, pediatric emergency care, mixed methods

LO20

Emergency department initiated drug therapy and patient compliance in acute renal colic

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Introduction: NSAIDS offer more effective analgesia than opioids, require less rescue medication, and decrease the incidence of nausea and vomiting in renal colic patients. Alpha blockers and Opioids are also prescribed frequently, but doses used and treatment durations are not well described. Our objective was to investigate ED prescribing decisions and medication compliance by patients with acute renal colic. **Methods:** In this prospective two-city cohort study, we invited patients with a first ED visit for image-confirmed 2-10 mm ureteric stones to consent to a telephone survey 10 days after their ED visit. During follow-up interviews, patients were asked what drugs they were prescribed and how many doses they required. This study was REB approved. **Results:** A convenience sample of 224 patients, including 152 males (67.9%) and 72 females (median age = 52.4 years) completed 10-day surveys. NSAIDS were prescribed for 48.7%, tamsulosin for 65.2% and opioids for 81.7%. One-third received a tamsulosin-NSAID combination, 40% an opioid-NSAID combination and 28% a tamsulosin-NSAID-opioid combination. Of 109 patients prescribed an NSAID, only 70 (64.2%) took 1 dose/day; however an additional 28 who were not prescribed NSAIDs took 1 NSAID dose/day. Mean (sd) NSAID intake in the overall study group was 1.1 (1.5) doses/day from day 1-5 and 0.6 (1.1) doses/day on days 6-10, with 90% ile values of 3.0 and 2.0 doses/day. NSAID compliance was more common in patients who stated they received high quality discharge instructions (63.8% vs. 32.6%; RR = 1.95; 95% CI 1.47-2.60). Mean opioid intake in the overall study group was 1.2 (1.7) doses/day from day 1-5 and 0.5 (1.3) doses/day on days 6-10, with 90%ile values of 4.0 and 2.0 doses/day. Among patients prescribed tamsulosin, the average was 4.0 days of compliance (sd = 4.3), with a 90%ile value of 10 days. **Conclusion:** This study provides estimates for the amount of drug actually used by renal colic patients during the 10-days after their ED visit. Patients used fewer opioid doses than expected, and NSAID and tamsulosin compliance appears relatively poor. NSAID compliance was better in patients who perceived high quality discharge instructions. This study suggests there is room for improvement in medication prescribing and discharge instructions for ED patients with an acute episode of ureteral colic.
Keywords: renal colic, nonsteroidal anti-inflammatory drug, pharmacology

LO21

Ability of single negative ultrasound to rule out deep vein thrombosis in pregnant women: A systematic review and meta analysis

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Introduction: The accuracy of ultrasound (US) for diagnosing lower extremity deep vein thrombosis (DVT) in non-pregnant patients has been well validated. However, in pregnant women with suspected DVT and an initial negative US (with imaging of the iliac veins), serial US is recommended. We aimed to determine the ability of single negative US to exclude DVT in symptomatic pregnant women. **Methods:** Two authors independently reviewed the following databases: MEDLINE,

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PubMed and EMBase from inception until May 2017. Three authors reviewed all full text papers and data were extracted from included studies by four authors. An overlap among study populations was identified in 4 of the manuscripts, all from one multicentre Canadian study. Two authors performed data re-extraction from the hard copy research charts from this study. We assessed the risk of bias using the CLARITY group tool for prognostic studies. **Results:** Of 109 potentially relevant articles, 8 studies (7 prospective studies and 1 retrospective) were included. Risk of bias was low for the included populations, and low or moderate for method of measurement and for completeness of follow up. A total of 635 pregnant patients with symptoms of DVT had an initial negative US examination. Of those, 6 had positive DVT during serial US (0.94%) and 3 developed DVT during 3-month follow-up after serial ultrasound (0.47%). Using random-effects model, the pooled false negative rate of a single ultrasound was 1.27% (95% confidence interval, 0.42 to 2.56), $I2 = 27\%$. **Conclusion:** The false negative rate of a single ultrasound with iliac vein imaging for DVT in pregnancy is low. Our results will help inform shared decision making around planning repeat ultrasound scans in these patients.

Keywords: deep vein thrombosis, ultrasound, pregnancy

LO22

Improving the pain experience for children with limb injury: a city-wide quality improvement collaborative

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Introduction: Undertreated pain is known to cause short and long-term harm in children. Limb injuries are a common painful condition in emergency department (ED) patients, accounting for 12% of ED visits by children. Our city has one pediatric ED in a freestanding children's hospital and 3 general ED's that treat both adults and children. 68% of pediatric limb injuries in our city are treated in the pediatric ED and 32% are treated in a general ED. A quality improvement (QI) initiative was developed at the children's hospital ED in April 2015 focusing on "Commitment to Comfort." After achieving aims at the childrens hospital, a QI collaborative was formed among the pediatric ED and the 3 general ED's to 1) improve the proportion of children citywide receiving analgesia for limb injuries from 27% to 40% and 2) reduce the median time to analgesia from 37 minutes to 15 minutes, during the time period of April-September, 2016. **Methods:** Data were obtained from computerized order entry records for children 0-17.99 years visiting any participating ED with a chief complaint of limb injury. Project teams from each site met monthly to discuss aims, develop key driver diagrams, plan tests of change, and share learnings. Implementation strategies were based on the Model for Improvement with PDSA cycles. Patient and family consultation was obtained. Process measures included the proportion of children treated with analgesic medication and time to analgesia; balancing measures were duration of triage and length of stay for limb injury and all patients. Site-specific run charts were used to detect special cause variation. Data from all sites were combined at study end to measure city-wide impact using 2 and interrupted time series analysis. **Results:** During the 3.5-year time period studied (April 1, 2014-September 30, 2017), there were 45,567 visits to the participating ED's by children 0-17.99 years with limb injury. All visits were included in analysis. Special cause was detected in run charts of all process measures. Interrupted time series analysis comparing the year prior to implementation at the childrens hospital in April 2015 to the year following completion of implementation at the 3 general hospitals in October 2016 demonstrated that the proportion of patients with limb injury receiving analgesia increased from 27% to 40% ($p < 0.01$), and the median time from arrival to analgesia decreased from 37 to 11 minutes ($p < 0.01$). Balancing measure analysis is in progress. **Conclusion:** This multisite initiative emphasizing "Commitment to Comfort" was successful in improving pain outcomes for all children with limb injuries seen in city-wide ED's, and was sustained for one year following implementation. A QI collaborative can be an effective method for spreading improvement. The project team is now spreading the Commitment to Comfort initiative to over 30 rural and regional EDs throughout the province through establishment of a provincial QI collaborative.

Keywords: quality improvement and patient safety, quality improvement collaborative, pediatric pain

LO23

Reducing time to disposition for treat & release patients in the emergency department

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Introduction: Treat and Release (T&R) patients are seen and discharged home from the emergency department (ED), and asked to return within 12-72 hours for follow-up care (e.g., ultrasound, repeat blood work). Our two academic teaching hospitals see approximately 2,000 T&R patients per year. Handover of care for T&R patientsdone through charting only and therefore dependent on the charts adequacy and completenessis crucial to the safety and quality of care they receive. An 18-month retrospective chart audit at our sites identified quality gaps, including suboptimal documentation that ultimately impedes patient disposition. Our projects aim was to reduce the time-to-disposition (TTD; time spent by patients between provider initial assessment and discharge from the ED) by a third (from 70min) in 6-months time (March 2017), a target felt to be both meaningful and realistic by our stakeholder team. **Methods:** Our primary outcome measure was the TTD (in minutes). Our process measure was the quality of documentation, using a modified version of QNOTE, a validated tool used to assess the quality of health-care documentation. PDSA cycles included: 1) Involvement of stakeholders for the creation and refinement of an improved T&R handover tool to cue more specific documentation; 2) Education of health-care providers (HCPs) about T&R patients; 3) Replacement of the previous T&R handover tool with a newly designed and mandatory tool (i.e. a forcing function); 4) Refinement of the process for T&R patients and chart hold-over. **Results:** Run charts for both the median TTD and median modified QNOTE scores over time demonstrate a shift (i.e., run chart rule) associated with the second and third clustered PDSA cycles. After the first three clusters of PDSA cycles (i.e., before-and-after), mean TTD was reduced by 40% (70min to 42min, $p = 0.005$). The quality of documentation (mean modified QNOTE scores) was also significantly improved (all results $p < 0.0001$): patient assessment from 81% to 92%, plan of care from 58% to 85% and follow-up plan from 67% to 90%. **Conclusion:** We reduced the time-to-disposition for T&R patients by identifying gaps in the quality of documentation of their chart. Using iterative PDSA cycles, we improved their time-to-disposition through improved communication between health-care providers and a new T&R handover tool working as a forcing function. Other centers could use similar assessment methods and interventions to improve the care of T&R patients.

Keywords: quality improvement and patient safety, emergency department, documentation

LO24

The checklist for head injury management evaluation study (CHIMES): a cQI initiative to reduce imaging utilization for head injuries in the emergency department

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Introduction: Over 1 million patients with head injuries (HIs) are seen every year at emergency departments (EDs) in North America, with over 90% being minor HIs. Over-utilization of computed tomography (CT) scans in these patients results in unnecessary exposure to radiation and increases health-care resource utilization. Using recommendations from the Choosing Wisely Campaign (CWC) and quality improvement (QI) methodology, we developed a local initiative targeting this issue. Our aim was to reduce the CT scan rate for patients presenting with HIs by 10% over a 6-month period at two academic EDs. This was considered both achievable and meaningful by our stakeholders. **Methods:** Baseline CT scan rates for patients with HIs were determined through a 10-month retrospective cohort review. We used stakeholder engagement and provider surveys to develop our driver diagram and PDSA cycles, which included: 1) Assessing and improving provider knowledge about the CWC recommendations; 2) Testing, refining and implementing a modified Canadian CT Head Rule checklist in the ED; 3) Developing and giving patients CWC-themed handouts pertaining to HI best practice; 4) Bimonthly reporting of CT scan rates to providers. Our primary outcome measure was the number of CT scans performed for patients with HIs. Process measures included the number of checklists completed and ED length of stay (LOS). Our balance measure was return ED visits within 72 hours. **Results:** Baseline rate of CT scans prior to our interventions was 47.9%. Our QI initiative resulted in a significant shift in the run chart of the weekly CT scan rates, associated with the second PDSA cycle cluster. We observed a 16% relative decrease in CT scans at 3 months (47.9% to 40.5%, $P = 0.005$) and 10.4% at 8 months (47.9% to 43.1%, $P = 0.02$). Non-sustained trends and shifts were seen in the run chart of median ED LOS for HI patients, but overall before-and-after median times were not significantly different (237min to 225min, $P = 0.18$). 33% of total checklists were completed. 72-hr return visits did not change during the 8-month study period (4.0% to 4.16%, $P = 0.85$). **Conclusion:** Our local QI initiative was successful in decreasing CT rates for patients presenting with a HI. The decrease in effect at 8 months suggests the need for continued feedback and reminders to ensure long-term sustainability. Other centres could use similar QI methods, as well as the materials we developed, to achieve similar results of improved evidence-based utilization of diagnostic tests.

Keywords: quality improvement and patient safety, Choosing Wisely campaign, emergency department

LO25

The development and implementation of a standardized emergency department handover tool

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Introduction: There is a high risk for communication breakdown, discontinuity of clinical care, and medical errors during ED physician handover. Locally, there is no standardized handover process to ensure adequate communication of critical information. Our aim was to use a locally developed handover tool to increase frequency of adequate physician handover during overnight shift change by 50% in 4 months. **Methods:** Using published best practices, local observational data, and stakeholder input, we determined critical components of ED handovers. We developed a structured communication tool for two unique populations in our ED: ED-VITAL for patients receiving active ED care; ED-VSA for patients who are admitted/referred. Strategies used to implement the tool included: engagement of staff physicians to introduce & modify the tool; formal education and training to ED residents; and provision of cognitive aids. A QI coordinator conducted direct observations of handovers using convenience sampling. We provided feedback to staff and resident physicians, and used their input to continuously modify the tool. The main outcome measure was adequate patient handover, defined as verbal communication of 50% of critical handover components, or documentation of key information on an electronic note. Process measures included tool utilization characteristics. Balance measures included time metrics such as handover duration. We present run charts and qualitative statistics. **Results:** We assessed 368 individual patient handovers (93 pre- & 275 post-implementation). The median proportion of patients in active ED care who were verbally handed over increased from 75% to 100%. The median proportion of adequate handovers improved from 50% to 72%. The time to deliver handover increased by 13 seconds per patient. Qualitative feedback from end users was positive overall, particularly for communication quality and resident educational value. **Conclusion:** Use of a standardized handover tool improved both verbal and documented communication during shift change. A customized approach, sensitive to local context, was important to successful implementation. Residents play a large role in handovers; strategies to improve handover processes that emphasize medical education appear to enhance success. Future PDSA cycles will focus on interventions to further enhance the utilization of the tool, and to measure direct impact on clinical outcomes.

Keywords: quality improvement and patient safety, handovers

LO26

Reduction of CT scan use in emergency department patients with recurrent renal colic

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Introduction: CT scan is the most common imaging modality for suspected renal colic and is used for about 80% of presentations. Cumulative ionizing radiation exposure from repeat CT scans increases long-term cancer risk. Despite a 10-fold increase in CT use to detect kidney stones in the ED in just over a decade, there has been no increase in the proportion of kidney stones diagnosed, number of significant alternate diagnoses or admissions to hospital. Choosing Wisely recommends to avoid ordering CT of the abdomen/pelvis in otherwise healthy patients < age 50 presenting to the ED with known history of kidney stones and with symptoms consistent with uncomplicated renal colic. The aim is that >90% of patients < age 50 with a history of renal stones arriving in Sunnybrook ED with symptoms consistent with renal colic will be managed without a CT abdomen/pelvis. **Methods:** Emergency physicians were engaged in the process at various stages, including a brainstorming session to perform a root cause analysis. A Driver diagram was created to generate change ideas. Outcome Measure Number of CT scans ordered for target population (Results: Results to date indicate that there is a non-sustained decrease in the number of CT scans performed on ED patients < age 50 with recurrent renal colic. The STONE score was infrequently used, thus making it

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difficult to standardize CT ordering for presumed renal colic. **Conclusion:** As a result of this QI initiative, there is awareness amongst emergency physicians of a patient population that is over imaged with CT scan, often with no change in management. Introduction of a low dose CT scan order was the greatest gain from this QI initiative. In order to decrease CT utilization, physicians need to be shown the lack of benefit of CT use and a safe alternative diagnostic approach.
Keywords: quality improvement and patient safety, renal colic, computerized tomography

LO27

Improving emergency department management of acute opioid withdrawal

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Introduction: With the current opioid crisis in Canada, presentations of acute opioid withdrawal (AOW) to emergency departments (ED) are increasing. Undertreated symptoms may result in relapse, overdose and death. Buprenorphine/naloxone (bup/nal) is a partial opioid agonist/antagonist used to mitigate symptoms of AOW, approved by Health Canad in 2007 for opioid use disorder. It is superior to clonidine, and increases follow up with addiction treatment programs when initiated in the ED. Nevertheless, in our inner-city ED in 2014, bup/nal was rarely prescribed. We aimed to increase ED physician prescribing of bup/nal for AOW by 50% over a 26-month period. **Methods:** Commencing in 2014, an interprofessional team of ED physicians, nurses (RN), pharmacists and QI specialists collaborated to improve the care of patients with AOW. PDSA cycles included: (1) needs assessment of emergency physicians knowledge and practices in 2014; (2) Grand Rounds and a web based information sheet in 2015; (3) ED stocking of bup/nal; (4) convenience order set to standardize AOW management; (5) Grand Rounds in 2016 and (6) peer-coaching for RNs, including case-based discussions and pocket card cognitive aids. The outcome was the number of times bup/nal was prescribed per month by ED physicians between Sept, 2015 and Oct, 2017. Data included the prescriber and use of order set as the process measure. The balancing measure was the number of patients referred to the Addiction Medicine Team who subsequently received bup/nal. **Results:** Bup/nal was prescribed by ED physicians 70 times, and 14 times by the Addiction Medicine Team. With each PDSA cycle, there was an increase in prescribing, with no significant shifts or trends. By all physicians, the median number of prescriptions per month was 3, and increased from 2 to 4 prescriptions/month after nursing education. There was a smaller increase in the median from 2 to 3 prescriptions/month by ED physicians alone. The order set was used 97% of the time. **Conclusion:** Bup/nal is safe, effective, and increases follow up with addiction programs for comprehensive assessment and treatment planning. We met our goal of increasing bup/nal prescribing in the ED for AOW by 50%. Moreover, prescribing increased by 100% with the addition of patients who received bup/nal after a referral to the Addiction Medicine Team. The intervention with the greatest impact was RN education, demonstrating that peer-coaching and teaching by an interprofessional team is key to changing practice. Unfortunately, overall prescribing remains low, and ED physicians may still be hesitant to prescribe bup/nal and defer to the specialists. It is unclear if this is due to a low number of patients presenting with AOW, patients with contraindications to bup/nal, or ED physician factors. The next step is an audit of all patients with AOW to see what percentage of those eligible are treated with bup/nal. A follow up survey to determine ongoing barriers will inform further PDSA cycles.
Keywords: quality improvement and patient safety, acute opioid withdrawal, buprenorphine/naloxone

LO28

Utilité diagnostique des D-dimères pour le diagnostic du syndrome aortique aigu: une revue systématique et méta-analyse

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Introduction: Le syndrome aortique aigu (SAA) est une condition potentiellement létale et nécessitant une prise en charge immédiate et fréquemment chirurgicale. Lutilisation dun test de D-dimère a été proposé afin dexclure ce diagnostic suite à de nombreuses études récentes sur le sujet. Dans ce contexte, lobjectif de la présente revue systématique et méta-analyse était dévaluer et de synthétiser lévidence disponible quant à la valeur diagnostique dun dosage de D-dimères pour le SAA. **Methods:** Les bases de données Medline, Cochrane, ACP Journal Club, DARE, Health technology assessment, NHS Economic evaluation et Embase ont été fouillées en utilisant les mots clés «D-Dimers» et «Acute aortic». Les bibliographies des articles retenus ont également été consultées. Les résultats des études incluses ont été regroupés pour calculer la sensibilité, la spécificité, le rapport de vraisemblance positif (RV+) et négatif (LR-) du test de D-dimères aux seuils choisis par les auteurs. Les sensibilités et spécificités sont présentées avec leurs intervalles de confiance (IC) à 95% et les RV + et RV- sont donnés à titre indicatif. **Results:** À partir des 6942 articles initialement identifiés, 34 études portant sur lutilité diagnostique des D-dimères en SAA, incluant un total de 7938 patients, ont été retenues. La prévalence globale de SAA était de 27,1%, mais variait considérablement dune étude à lautre (médiane = 38,5%; intervalle interquartile = 29%; prévalence minimale = 0.7% ; prévalence maximale = 100%). Les seuils de positivité des tests de D-dimères variaient également selon lentreprise les fabriquant. La sensibilité dun test de D-dimères selon le seuil proposé par leur fabriquant était de 91% (IC 95% 86-96) et la spécificité 46% (IC 95% 39-54). Le RV + était de 1,69 et le VR- était de 0,2. **Conclusion:** La prévalence très variable du SAA dans la population regroupée par ces études laisse présager une différence entre ces populations et celles rencontrées en médecine durgence. Un test de D-dimères a sensibilité acceptable, mais imparfaite, qui ne semble pas permettre dexclure une pathologie aussi grave que le SAA.
Keywords: syndrome aortique aigu, D-dimère, revue systématique et méta-analyse

LO29

Création d'une règle de décision clinique pour le diagnostic d'un syndrome aortique aigu avec les outils dintelligence artificielle : phase initiale de définition des attributs communs aux patients sans syndrome aortique aigu chez une population à risque

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Introduction: Les outils de prédiction disponibles (score clinique, ratio des neutrophiles sur lymphocytes et dosage des D-dimères) dans le diagnostic du syndrome aortique aigu (SAA) demeurent imparfaits. Dans ce contexte, avec lobjectif de développer une règle de décision

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clinique pour le diagnostic du SAA, la présente étude visait à définir un ensemble de variables discriminantes chez les patients souffrant ou non dun SAA en utilisant les outils dintelligence artificielle. **Methods:** À partir de lensemble des données cliniques disponibles chez les patients investigués pour douleur thoracique au département durgence avec une angiographie par tomodensitométrie (angioCT) visant à éliminer un SAA entre 2008 et 2014, un programme dapprentissage a été chargé de construire un arbre de décision (Clustering And Regression Tree) identifiant les patients ne souffrant pas dun SAA. La variable dintérêt était labsence de SAA et 23 attributs ont été testés. Le diagnostic de SAA était établi avec les résultats de langioCT. Des échantillons aléatoires de 70% de la population étudiée ont été testés de façon récursive (maximum de 100 itérations) pour construire larbre de décision. Six algorithmes dapprentissage (Reg Tree, LR, KNN, Naive B, Random Forest et CN2) ont été comparés et loptimisation du gain dinformation a été mesurée par les techniques de Gain Ratio et de Gini. **Results:** Un total de 198 patients (99 hommes et 99 femmes) dun âge moyen de 63 ans (±16) ont été inclus dans létude, parmi lesquels 26 (13%) souffraient dun SAA. Trois attributs ou regroupements dattributs ont permis de construire un arbre de décision permettant didentifier 114 patients sur 198 (57,6%) ayant une très faible probabilité de SAA (sensibilité visée de 100%). La sensibilité et spécificité de larbre de décision clinique était respectivement de 100% (intervalle de confiance [IC] 95% 86,7-100,0) et 70,4% (IC 95% 62,7-77,3). Les attributs en question étaient labsence de tout facteur de risque (e.g. syndrome de Marfan, chirurgie aortique ou valvulaire, histoire familiale), les signes vitaux (tension artérielle systolique, pouls et choc index) et les D-dimères. Le seuil de D-dimères utilisé pouvait varier entre 1114 et 1211 mcg/L selon lhémodynamie et la présence de facteur de risque. Les attributs suivants nétaient pas discriminants : le sexe, un antécédent de diabète, dhypertension artérielle ou de dyslipidémie, le tabagisme, avoir un déficit de perfusion, une différence de tension artérielle entre les deux bras ou un souffle dinsuffisance aortique et la formule sanguine. **Conclusion:** Les attributs les plus discriminants pour le SAA sont les facteurs à risque, lhémodynamie et les D-dimères. Une étude prospective multicentrique devrait être réalisé afin de développer une règle de décision clinique afin didentifier les patients à très bas risque de SAA à partir de ces attributs.
Keywords: syndrome aortique aigu, algorithme d'investig

LO30

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

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Introduction: The prevalence of pulmonary embolism (PE) among patients with syncope is understudied. Based on a recent study with an exceptionally high PE prevalence, some advocate investigating all syncope patients for PE, including those with another clear cause for their syncope. We sought to evaluate the PE prevalence among emergency department (ED) patients with syncope. **Methods:** We combined data from two large prospective studies enrolling adults with syncope from 17 EDs in Canada and the United States. Each study collected the results of investigations related to PE (i.e. D-dimer or ventilation-perfusion (VQ) scan, or computed tomography pulmonary angiogram (CTPA)), and 30-day adjudicated outcomes including diagnosis of PE, arrhythmia, myocardial infarction, serious hemorrhage and/or death. **Results:** Of the 9,091 patients (median age 66 years, 51.9% females, 39.1% hospitalized) with 30-day follow-up, 546 (6.0%) were investigated for PE: 278 (3.1%) had D-dimer, 39 (0.4%) had VQ and 347 (3.8%) patients had CTPA performed. 30-day outcomes included: 874 (9.6%) patients with any serious outcome; 0.9% deaths; and 818 (9.0%) patients with non-PE serious outcomes. Overall, 56 patients (prevalence 0.6%; 95% CI 0.5% 0.8%) were diagnosed with PE, including 8 (0.1%) of those admitted to hospital at the index presentation. Only 11 patients (0.1%) with a non-PE serious condition had a concomitant underlying PE identified. **Conclusion:** The prevalence of PE is very low among ED patients with syncope, including those hospitalized following syncope. While acknowledging syncope may be caused by an underlying PE, clinicians should be cautious against indiscriminate over-investigations for PE.
Keywords: syncope, pulmonary embolism, prevalence

LO31

Une valeur de D-dimères de moins de 500 permet-elle d'éliminer un syndrome aortique aigu: une étude de cohorte

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Introduction: Le syndrome aortique aigu (SAA) comprend les dissections aortiques, les hématomes intramuraux et les ulcères de lintima, trois conditions difficiles à diagnostiquer, potentiellement létales et nécessitant une prise en charge immédiate et fréquemment chirurgicale. Lutilisation dun test de D-dimère a été proposé afin dexclure ces diagnostics et éviter une investigation plus poussée par angiographie par tomodensitométrie (angioCT). Cependant, il est peu plausible que les patients souffrant dhématomes intramuraux aient une valeur de D-dimères très élevée. Dans ce contexte, lobjectif primaire de la présente étude est de déterminer la valeur diagnostique (sensibilité et spécificité et rapport de vraisemblance négatif [RV-]) dun test de D-dimères chez les patients suspectés de SAA au département durgence. **Methods:** Les patients ayant subi une angiographie par tomodensitométrie (angioCT) à la recherche dune dissection aortique entre 2008 et 2014 à lurgence dun hôpital tertiaire montréalais ont été inclus dans cette étude de cohorte rétrospective. Les patients nayant pas eu de dosage de D-dimères en ont par la suite été exclus. La valeur diagnostique dun test de D-dimères de plus de 500 mcg/L a été comparée à celle du test de référence (angioCT) afin de calculer la sensibilité, la spécificité et le rapport de vraisemblance négatif et leurs intervalles de confiance (IC). **Results:** Un total de 139 patients ont été inclus dans létude, parmi lesquels 12 (8,6%) souffraient dun SAA. La sensibilité dun test de D-dimères avec un seuil de positivité de 500 mcg/L était de 83,3% (IC 95% 51,6-97,9), la spécificité de 52,8% (IC 95% 47,8-66,4) et le VR- de 0,32 (IC 95% 0,09-1,13). Les deux patients pour qui le résultat du test de D-dimère était un faux négatif souffraient dun hématome intramural. Les sept patients avec un D-Dimères de plus de 4000 mcg/L semblaient souffrir dun diagnostic grave (dissection aortique : n = 5, liquide libre intra-abdominal avec état de choc : n = 1 et tamponnade cardiaque : n = 1). **Conclusion:** Avoir un test de D-dimères inférieur à 500 mcg/L ne permet pas déliminer un SAA, particulièrement un hématome intramural.
Keywords: syndrome aortique aigu, D-dimère, diagnostique

LO32

A RAPID bedside approach to ruling out acute aortic dissection

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Introduction: Acute aortic dissection (AAD) is a rare but fatal condition where over-investigation and missed diagnosis are common. Our objectives were to derive a highly sensitive clinical risk score for AAD and perform pilot validation. **Methods:** We started with two independent systemic reviews to firstly identify clinical variables associated with AAD and secondly to determine reasons for missed diagnosis. We searched Medline, Embase and the Cochrane database (1968-July 2016). Two reviewers screened articles and extracted data. Agreement was measured by Kappa and study quality by the QUADAS-2 tool. Bivariate random-effects meta-analyses (Revman 5 and SAS 9.3) were performed. Due to sampling bias found in the systematic reviews a matched case control study confirming the strength and direction of predictor variables was performed. The cases (2002-2014) included new emergency department (ED) or in-hospital diagnosis of non-traumatic AAD confirmed by computed tomography (CT). The controls (2010-2011) were a random age/sex matched sample of patients triaged with undifferentiated acute truncal pain (<14 days). Finally, we used the beta coefficients derived from multivariate logistic regression of our case control study to assign a numerical strength of association to predictor variables. To mitigate the bias inherent in case control studies we adjusted the beta coefficient for each variable by the diagnostic odds ratio calculated from each systematic review. Pilot validation was performed on a retrospective sample of all those undergoing CTA to rule out AAD at two tertiary care ED over 12 months. Two abstractors were blinded to the final diagnosis. **Results:** We derived a two-step risk score based on the derivation sample which included 4960 patients(Clinical variables systematic review -9 studies, N = 2400, low risk of bias, Kappa 0.9 & Reasons for missed diagnosis systematic review - 11 studies, N = 800, low-moderate risk of bias, Kappa 0.89 & Case control study -194 AAD, 776 Controls). Step one is a RAPID assessment for AAD 1) Risk factors 2) Alternative diagnosis in the differential that mimics AAD- ACS, PE, Stroke 3) Physical exam- hypotension, pulse deficit 4) Impression- clinical suspicion of AAD and 5) Discomfort-migrating, tearing, pleuritic, thunderclap, severe pain. If any of the above factors are present proceed to step two. Step two stratifies patients based on history (low, moderate, high suspicion), physical exam (hypotension/pulse deficit) and risk factors. In the pilot validation (N = 375,AAD = 16) sensitivity was 100% (95% CI 79.4-100) and specificity 36.5% (95% CI 31.5-41.7%). Patients were successfully stratified into low (<2, 0% AAD), moderate (2, 2.2% AAD), high (>2, 19.6% AAD) and critical probability (>3, 62.5% AAD), with up to 36% reduction in imaging. **Conclusion:** We derived a highly sensitive new clinical risk score with the potential to reduce missed cases of AAD, reduce unnecessary imaging and expedite care.

Keywords: aortic dissection, clinical decision rules

LO33

Do electrocardiogram rhythm findings predict cardiac activity during cardiac arrest? A SHoC series study

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Introduction: Electrocardiographic (ECG) rhythms are used during resuscitation (ACLS) to guide resuscitation, and often to determine futility. Survival rates to hospital discharge have been reported to be higher for patients with PEA than asystole in out-of-hospital cardiac arrest. This study examines how well the initial ECG cardiac rhythm represents actual cardiac activity as determined by point of care ultrasound (PoCUS). **Methods:** A database review was completed for patients arriving to a tertiary ED in asystole or PEA arrest, from 2010 to 2014. Patients under 19y or with a previous DNR were excluded. Patients were grouped into those with cardiac activity (PEA) and asystole on ECG; as well as whether cardiac activity was seen on PoCUS during the arrest. Data was analyzed for visualized cardiac activity on PoCUS. **Results:** 186 patients met the study criteria. Those with asystole on ECG were more likely to have no cardiac activity than those with PEA (Odds 7.21 for initial PoCUS; 5.45 for any PoCUS). The sensitivity of ECG rhythm was 80.49% and 82.12%, specificity was 77.91% and 54.28%, positive predictive value was 94.28% and 88.57%, and negative predictive value was 30.43% and 41.30% for cardiac activity on initial PoCUS and on any PoCUS respectively. The positive and negative likelihood ratios for ECG were 3.47 and 0.25 for activity on initial PoCUS. The positive and negative likelihood ratios for activity on any PoCUS were 1.78 and 0.33. **Conclusion:** Our results suggest that although most patients with asystole on ECG demonstrate no cardiac activity, a small number actually had activity on PoCUS. This supports the use of PoCUS during cardiac arrest, in addition to ECG, to identify patients with ongoing mechanical cardiac activity.

Keywords: cardiac arrest, resuscitation outcomes, electrocardiogram

LO34

Does utilization of an intubation safety checklist reduce dangerous omissions during simulated resuscitation scenarios?

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Introduction: One of the most high-risk tasks regularly performed by emergency medicine (EM) physicians is airway management. Many studies identify an increase in adverse events associated with airway management outside of the operating theatre. Errors of omission are the single most common human error type. To address this risk, the checklist is becoming a common pre-intubation tool. Simulation is a safe setting in which to study the implementation of a new airway checklist. The purpose of this study was to determine if a novel airway checklist decreases practitioners rates of omission of important tasks during simulated resuscitation scenarios. **Methods:** This was a dual-centre, randomized controlled trial of a novel airway checklist utilized by EM practitioners in a simulated environment. The 29-item peri-intubation checklist was derived by experienced EM practitioners following a review of airway checklists in published and gray literature. Participants were EM residents or EM physicians who work more than 20 hours/month in an emergency department. Volunteers were recruited from two academic health centres to complete three simulated scenarios (two requiring intubation, one cricothyroidotomy), and were randomized to either regular care or checklist use. A minimum of two assessors documented the number of omitted tasks deemed important in airway management and the time until definitive airway management. Discrepancies between assessors were resolved by single-assessor video review. **Results:** Fifty-four EM practitioners participated. There was no significant difference in baseline characteristics between the two study groups. The average percentage of omitted tasks over the three scenarios was 45.7% in the control group (n = 25) and 13.5% in the checklist group (n = 29) an absolute difference of 32.2% (95% CI: 27.8%, 36.6%). Time to intubation (normally distributed) was significantly longer in the checklist group for the first two scenarios (mean difference 114.10s, 95% CI: 48.21s, 179.98s and 76.34s, 95% CI:31.35s ,121.33s), but there was no statistical difference in the third scenario where cricothyroidotomy was required (mean difference 33.75s, 95% CI: -28.14s, 95.65s). **Conclusion:** In a simulated setting, use of an airway

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checklist significantly decreased the omission rate of important airway management tasks, however it increased the time to definitive airway management. Further study is required to determine if these findings are consistent in a clinical setting and how they impact the rate of adverse events.
Keywords: checklist, airway, simulation

LO35

Improving the precision of emergency physicians diagnosis of stroke and TIA

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Introduction: Studies suggest that there is a significant discrepancy between emergency physicians diagnosis of TIA and confirmation by neurologists. The objectives of our study were to identify factors associated with neurologists confirmation of TIA in patients referred from the emergency department. **Methods:** Data were obtained from a prospective cohort study across more than 8 university-affiliated Canadian hospitals from 2006-2017 of adult patients diagnosed with a TIA or non-disabling stroke in the ED. Patients presenting after 1 week of symptom onset, receiving TPA as part of a stroke code, with a GCS < 15 at baseline, and without a neurology assessment within 90 days were excluded. Univariate analyses were performed with t-tests or chi-square tests as indicated. Multivariate analysis with backward elimination was performed to identify unique predictors of TIA confirmation. **Results:** Of 8,669 patients diagnosed with TIA in the ED, 7,836 (90%) were assessed by neurology. The mean age of patients was 68.2 years and 71.1% presented with their first ever TIA. The rate of confirmation of TIA by neurology was 56%. The most common alternate diagnoses included migraines (26%), peripheral vertigo (10%), syncope (6%), and seizure (4%). The 3 strongest predictors of confirmation of TIA were infarct on imaging (OR 2.31, 2.03-2.63), history of weakness (OR 2.19, 1.95-2.48), and history of language disturbance (OR 2.05, 1.79-2.34). The 3 strongest predictors of an alternate diagnosis were syncope (OR 0.51, 0.39-0.67), history of bilateral weakness (or 0.51, 0.31-0.84), and confusion (OR 0.57, 0.48-0.67). **Conclusion:** The rate of TIA confirmation by neurology in our study was 56%. Emergency physicians should have a high index of suspicion of TIA in patients with history of weakness and language disturbance, and should resist referring to a stroke prevention clinic, patients with syncope, bilateral findings, or confusion.
Keywords: transient ischemic attack, stroke, diagnosis

LO36

The state of advocacy in postgraduate medical education: a literature review

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Introduction: Health advocacy training is an important part of emergency medicine practice and education. There is little agreement, however, about how advocacy should be taught and evaluated in the postgraduate context, and there is no consolidated evidence-base to guide the design and implementation of post-graduate health advocacy curricula. This literature review aims to identify existing models used for teaching and evaluating advocacy training, and to integrate these findings with current best-practices in medical education to develop practical, generalizable recommendations for those involved in the design of postgraduate advocacy training programs. **Methods:** Ovid MEDLINE and PubMed searches combined both MeSH and non-MeSH variations on advocacy and internship and residency. Forward snowballing that incorporated grey literature searches from accreditation agencies, residency websites and reports were included. Articles were excluded if unrelated to advocacy and postgraduate medical education. **Results:** 507 articles were identified in the search. A total of 108 peer reviewed articles and 38 grey literature resources were included in the final analysis. Results show that many regulatory bodies and residency programs integrate advocacy training into their mission statements and curricula, but they are not prescriptive about training methods or assessment strategies. Barriers to advocacy training were identified, most notably confusion about the definition of the advocate role and a lower value placed on advocacy by trainees and educators. Common training methods included didactic modules, standardized patient encounters, and clinical exposure to vulnerable populations. Longitudinal exposure was less common but appeared the most promising, often linked to scholarly or policy objectives. **Conclusion:** This review indicates that postgraduate medical education advocacy curricula are largely designed in an ad-hoc fashion with little consistency across programs even within a given discipline. Longitudinal curriculum design appears to engage residents and allows for achievement of stated outcomes. Residency program directors from emergency medicine and other specialties may benefit from promising models in pediatrics, and a shared portal with access to advocacy curricula and the opportunity to exchange ideas related to curriculum design and implementation.
Keywords: advocacy, education

LO37

Barriers and enablers to direct observation of clinical performance a qualitative study using the theoretical domains framework

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Introduction: Direct observation is essential to assess medical trainees and provide them with feedback to support their progression from novice to competent physicians. However, learners consistently report infrequent observations, and calls to increase direct observation in medical training abound. In this study, a theory-driven approach using the Theoretical Domains Framework (TDF) was applied to systematically investigate factors that serve as barriers and enablers to direct observation in residency training. **Methods:** Semi-structured interviews of faculty and residents from various specialties at two large tertiary-care teaching hospitals were conducted. An interview guide based on the TDF was used to capture 14 theoretical domains that may influence direct observation. Interview transcripts were independently coded using direct content analysis by two researchers, and specific beliefs were generated by grouping similar responses. Relevant domains were identified based on the frequencies of beliefs reported, presence of conflicting beliefs, and perceived influence on direct observation practices. **Results:** Data saturation was achieved after 12 resident and 13 faculty interviews, with a total of 10 different specialties represented. Median postgraduate year among residents was 4 (range 1-6), and mean years of independent practice among faculty was 10.3 (SD = 8.6). Ten TDF domains were identified as influencing direct observation: knowledge, skills, beliefs about consequences, social professional role and identity, intention, goals, memory/attention/decision-making, environmental context and resources, social influences, and behavioural regulation. Discord between faculty and resident intentions to engage in

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direct observation, coupled with the social expectation that residents should be responsible for ensuring observations occur, was identified as a key barrier. Additionally, competing demands identified across multiple TDF domains emerged as an important and pervasive theme. **Conclusion:** This study identified key barriers and enablers to direct observation. The influencing factors identified in this study provide a basis for the development of potential strategies aimed at embedding direct observation as a routine pedagogical practice in residency training.
Keywords: direct observation, residency education, assessment

LO38

Does spaced instructional design result in improved retention of pediatric resuscitation skills? A randomized education study

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Introduction: Survival from cardiac arrest has been linked to the quality of resuscitation care. Unfortunately, healthcare providers frequently underperform in these critical scenarios, with a well-documented deterioration in skills weeks to months following advanced life support courses. Improving initial training and preventing decay in knowledge and skills are a priority in resuscitation education. The spacing effect has repeatedly been shown to have an impact on learning and retention. Despite its potential advantages, the spacing effect has seldom been applied to organized education training or complex motor skill learning where it has the potential to make a significant impact. The purpose of this study was to determine if a resuscitation course taught in a spaced format compared to the usual massed instruction results in improved retention of procedural skills. **Methods:** EMS providers (Paramedics and Emergency Medical Technicians (EMT)) were block randomized to receive a Pediatric Advanced Life Support (PALS) course in either a spaced format (four 210-minute weekly sessions) or a massed format (two sequential 7-hour days). Blinded observers used expert-developed 4-point global rating scales to assess video recordings of each learner performing various resuscitation skills before, after and 3-months following course completion. Primary outcomes were performance on infant bag-valve-mask ventilation (BVMV), intraosseous (IO) insertion, infant intubation, infant and adult chest compressions. **Results:** Forty-eight of 50 participants completed the study protocol (26 spaced and 22 massed). There was no significant difference between the two groups on testing before and immediately after the course. 3-months following course completion participants in the spaced cohort scored higher overall for BVMV (2.2 ± 0.13 versus 1.8 ± 0.14, $p = 0.012$) without statistically significant difference in scores for IO insertion (3.0 ± 0.13 versus 2.7 ± 0.13, $p = 0.052$), intubation (2.7 ± 0.13 versus 2.5 ± 0.14, $p = 0.249$), infant compressions (2.5 ± 0.28 versus 2.5 ± 0.31, $p = 0.831$) and adult compressions (2.3 ± 0.24 versus 2.2 ± 0.26, $p = 0.728$) **Conclusion:** Procedural skills taught in a spaced format result in at least as good learning as the traditional massed format; more complex skills taught in a spaced format may result in better long term retention when compared to traditional massed training as there was a clear difference in BVMV and trend toward a difference in IO insertion.
Keywords: education, resuscitation

LO39

Stress inoculation training: a critical review for emergency medicine

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Introduction: In high stakes, performance-oriented professions, the ability to execute in stressful situations is both a prerequisite and an intense focus of training. Stress Inoculation Training (SIT) is a three-step cognitive-behavioural intervention aimed at reducing stress that may play a role in helping EM teams prepare for high acuity events. We conducted a systematic review of literature in medicine and performance-oriented professions to inform the development of an EM-focused SIT curriculum. **Methods:** An electronic search of Ovid MEDLINE, Web of Science Core Collection, PsychINFO, ProQuest and Scopus was conducted. Inclusion criteria were studies investigating the impact of stress inoculation training on performance and anxiety reduction. Data extraction included recording of performance and anxiety domains measured in each study and the details of how the stress inoculation training was delivered. Screening of articles, data extraction, and summarization were conducted by two independent reviewers using a standardized data extraction tool. **Results:** Our search yielded 431 studies; 40 were screened for full-text review and 10 met inclusion criteria. A total of 930 trainees throughout the 10 studies were enrolled. Four studies consisted of students in varying disciplines, including law, technology, education, and general undergraduate students, and 4 studies were composed of military personnel. No papers directly examined the effect of stress inoculation training on performance in healthcare. A change in performance and a reduction in anxiety and/or stress was noted in 90% of studies. Training length, experience of trainer, or group size did not appear to impact outcomes. Notably, heart rate variability (HRV) did not appear to be affected throughout the studies included, while cortisol and subjective stress were consistently reduced. **Conclusion:** SIT is an effective tool for enhancing performance and reducing stress and anxiety in high intensity environments. Studies examining the effect of EM-focused SIT on individual, team and patient-orient outcomes are needed.
Keywords: human factors, patient safety, stress

LO40

Describing CCFP(EM) programs in Canada: a national survey of program directors

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Introduction: Enhanced skills training in emergency medicine (EM) for family physicians (CCFP(EM)) has existed since the 1970s. Accreditation standards define what every program must and should have, yet little is known on what is currently done across Canada. Our objectives were to: 1) describe major components of CCFP(EM) programs; and 2) determine how programs incorporate these components into their curriculum. **Methods:** A rigorous development process included expert content development and in-person pilot testing using Royal College Emergency Medicine Program Directors. An electronic survey questionnaire comprised of 63 questions was administered to all 17 CCFP (EM) program directors using a modified Dillman technique. Non-responders were sent a reminder email every 2 weeks over a 6-week period and an in-person reminder was given to non-responders at a face to face meeting 4 weeks after the initial survey was sent in June 2016. **Results:** All 17/17 (100%) program directors responded. There was considerable variation in administrative structure and financial support for each program. All programs provided ultrasound courses for basic skills (trauma, abdominal aortic aneurysm, intrauterine pregnancy). Variation exists for offering independent ultrasound certification (77%), advanced scanning (18%) and protected academic time for scanning (53%). All programs utilize high fidelity simulation. Some programs

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use in situ simulation (18%) and hold a simulation boot camp (41%). Most centres required an academic project, most commonly a quality assurance project (53%) and/or a critical appraisal of the literature (59%). Publication or national conference presentations were required by 12% of programs. Competency based assessments use simulation (88%) and direct observations (53%). Only 24% of programs have a transition to practice curriculum. All programs maintain strong connections to family medicine. **Conclusion:** This study demonstrates diverse structures of CCFP(EM) programs across Canada. Programs are similar regarding the provision of ultrasound, simulation and protected teaching time. Variation exists in administrative structure and financial resources of each program, academic project requirements, and how programs perform competency based assessments.

Keywords: emergency medicine program, certification in the College of Family Physicians – emergency medicine, survey

LO41

Competency-based learning of pediatric musculoskeletal radiographs

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Introduction: Pediatric musculoskeletal (MSK) image interpretation has been identified as a knowledge gap among emergency medicine trainees. The main objective of this study was to implement a validated on-line pediatric MSK radiograph interpretation system with a performance-based competency endpoint into pediatric emergency fellowship programs and examine the number of cases needed to achieve a competency threshold of 80% accuracy, sensitivity and specificity. We further determined proportion who successfully achieved competency in a given module and the change in accuracy from baseline to competency. **Methods:** This was a prospective cohort multi-centre study. There were seven MSK radiograph modules, each containing 200-400 cases (demo-https://imagesim.com/course-information/demo/). Thirty-seven pediatric emergency medicine fellows participated for 12 months. Participants did cases until they reached competency, defined as at least 80% accuracy, sensitivity and specificity. We calculated the overall and per module median number of cases required to achieve competency, proportion of participants who achieved competency, median time on case, and the mean change in accuracy from baseline to competency. **Results:** Overall, the median number of cases required to achieve competency was 76 (min 54, max 756). Between different body parts, there was a significant difference in the median number of cases needed to achieve competency, $p < 0.0001$, with ankle and knee being among the most challenging modules. Proportions of those who started a module and completed it to competency varied significantly, and ranged from 32.4% in the ankle module to 97.1% in the forearm/hand, $p < 0.0001$. The overall median time on each case was 34.1 (min 7.6, max 89.5) seconds. The overall change in accuracy from baseline to 80% competency was 13.5% (95% CI 12.1, 14.8), with the respective Cohens effect size of 1.98. The change in accuracy was different between modules, $p = 0.001$, with post-hoc analyses demonstrating that the ankle/foot radiograph module had a greater increase in accuracy relative to elbow ($p = 0.009$) and pelvis/femur ($p = 0.006$). **Conclusion:** It was feasible for pediatric emergency medicine fellows to complete each learning pediatric MSK learning module to competency within approximately one hour, with the exception of the ankle module. Learners who completed the modules to competency demonstrated very significant increases in interpretation skill.

Keywords: pediatrics, competency, education

LO42

How I stay healthy in emergency medicine: a qualitative analysis of a blog-based survey of expert emergency physicians and their methods to maintain and improve their wellness

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Introduction: Emergency medicine (EM) is a demanding specialty with high rates of physician burnout. As emergency physicians, we must stay healthy to promote healthy living, optimize our ability to care for our patients, extend our careers, and be there for our families. While we all desire a healthy lifestyle, maintaining one in practice can be difficult. We sought to investigate the strategies emergency physician employ to maintain and improve health and wellness while mitigating the professions stressors. **Methods:** From April 2015 to July 2017, forty-three wellness champions from Canada, the USA, and Australia were identified using a snowball sampling technique. Each participant answered 5 introductory questions and 8 productivity questions pertaining to health and wellness. These were transcribed and loaded to a publicly accessible blog, ALiEM.com, as part of the Healthy in EM series. Two investigators reviewed the transcripts using inductive methods and a grounded theory approach to generate themes and subthemes using coding software, NVivo (Burlington, Massachusetts), until saturation was achieved. Consensus between investigators (JC, ZP) established the master code and audit trail. An external audit by investigators (TC, BT) not involved with the initial analysis was performed to ensure reliability. **Results:** Major themes including diet, sleep, exercise and social activities were coded and further subcategorized along with perspectives, habits, personal philosophies, and career diversity. These themes translated across both professional and personal aspects of participants lives. For example, the pre-shift and post-shift strategies often included some form of regimented activities-of-daily-living that required discipline to adhere to at work and home. **Conclusion:** Our findings show the importance of homeostasis in the professional and personal realm among expert emergency medicine physicians. Among healthy emergency physicians, diet, sleep, and exercise patterns intertwined with perspectives, habits, personal philosophies, and social activities contributed to maintenance of wellness.

Keywords: wellness, burnout, job satisfaction

LO43

Perceptions of airway checklists and the utility of simulation in their implementation emergency medicine practitioner perspectives

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Introduction: Checklists used during intubation have been associated with improved patient safety. Since simulation provides an effective and safe learning environment, it is an ideal modality for training practitioners to effectively employ an airway checklist. However, physician attitudes surrounding the utility of both checklists and simulation may impede the implementation process of airway checklists into clinical practice. This study sought to characterize attitudinal factors that may impact the implementation of airway checklists, including perceptions of checklist utility and simulation training. **Methods:** Emergency medicine (EM) residents and physicians working more than 20 hours/month in an emergency department from two academic centres were invited to participate in a simulated, randomized controlled trial (RCT) featuring three scenarios performed with or without the use of an airway

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checklist. Following participation in the scenarios, participants completed either a 26-item (control group), or 35-item (checklist group) paper-based survey comprised of multiple-choice, Likert-type, rank-list and open-ended questions exploring their perceptions of the airway checklist (checklist group only) and simulation as a learning modality (all participants). **Results:** Fifty-four EM practitioners completed the questionnaire. Most control group participants (n = 24/25, 96.0%) believed an airway checklist would have been helpful (scored 5/7 or greater) for the scenarios. The majority of checklist group participants (n = 29) believed that the checklist was helpful for equipment (27, 93.1%) and patient (26, 89.6%) preparation, and post-intubation care (21, 82.8%), but that the checklist delayed definitive airway management and was not helpful for airway assessment, medication selection, or choosing to perform a surgical airway. This group also believed that using the airway checklist would reduce errors during intubation (27, 93.1%) and that the simulated scenarios were beneficial for adopting the use of the checklist (28, 96.6%). Fifty-three participants (98.1%) believed that simulation is beneficial for continuing medical education and 51 respondents (94.4%) thought that skills learned in this simulation were transferable. **Conclusion:** EM practitioners participating in a simulation-based RCT of an airway checklist had positive attitudes towards both the utility of airway checklists and simulation as a learning modality. Thus, simulation may be an effective process to train practitioners to use airway checklists prior to clinical implementation.
Keywords: checklist, airway, simulation

LO44

Optimizing skill retention in radiograph interpretation: a multicentre randomized control trial

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Introduction: Simulation-based education systems have increased physician skill in radiograph interpretation. However, the degree of skill retention and the factors that influence it are relatively unknown. The main objective of this research was to determine the rate and quantity of skill decay in post-graduate trainee physicians who completed a simulation-based learning intervention of radiograph interpretation. The impact of testing and refresher education on skill decay was also examined. **Methods:** This was a prospective, multicenter, analysis-blinded, four arm randomized control trial conducted from November 2014 to June 2016. Study interventions were administered using an on-line learning and measurement platform. Pediatric and emergency medicine residents in the United States and Canada were eligible for study participation. Participants were randomized to one of four groups. All participants completed an 80-case deliberately practiced learning set of pediatric elbow radiographs followed by an immediate 20-case post-test. Following this, Group 1 had no testing until 12 months; Groups 2, 3, and 4 had testing (20 cases without feedback) every 2 months until 12 months, but Group 3 also had refresher education (20 cases with feedback) at six months while Group 4 had refresher education at two, six, and ten months. The main outcome measure was accuracy at 12 months, adjusted for immediate post-test score, days to completion of 12 month test, and time on case. Based on prior data, we assumed the smallest important difference between groups in learning decay is 10%, a between-participant/within-group standard deviation of 17%, a type I error probability of 5%, a power of 80% and adjusted for three tests with a Bonferroni correction. For the primary analysis of Group 1 versus 2, 3, 4, this resulted in a minimal total sample size of 56, with 14 participants per group. **Results:** We enrolled 106 participants that completed all study interventions. The sample sizes in Groups 1, 2, 3, and 4 were 42, 22, 22, and 20 respectively. Overall, accuracy increased by 11.8% (95% CI 9.8, 13.8) with the 80-case learning set and then decreased by 5.5% (95% CI 2.5, 8.5) at 12 months. The difference in learning decay in Group 1 vs. Groups 2, 3, 4 was -8.1% (95% CI 2.5, 13.5), p = 0.005. For Group 2 vs. Group 3 and 4, it was +0.8% (95% CI -7.2, 7.3), p = 0.8, and between Group 3 vs. Group 4 it was +0.8% (95% CI -7.3, 10.1), p = 0.8. **Conclusion:** Skill decay was significantly reduced by testing with 20 cases every two months. Refresher education had no additional effect to testing on reducing learning decay.
Keywords: retention, radiographs, experience curves

LO45

Incidence of delayed intracranial hemorrhage following a mild traumatic brain injury in patients taking anticoagulants or anti-platelets therapies: systematic review and meta-analysis

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Introduction: Head injury is a common presentation to all emergency departments. Previous research has shown that such injuries may be complicated by delayed intracranial hemorrhage (D-ICH) after the initial scan is negative. Exposure to anticoagulant or anti-platelet medications (ACAP) may be a risk factor for D-ICH. We have conducted a systematic review and meta-analysis to determine the incidence of delayed traumatic intracranial hemorrhage in patients taking anticoagulants, anti-platelets or both. **Methods:** The literature search was conducted in March 2017 with an update in April 2017. Keyword and MeSH terms were used to search OVID Medline, Embase and the Cochrane database as well as grey literature sources. All cohort and experimental studies were eligible for selection. Inclusion criteria included pre-injury exposure to oral anticoagulant and / or anti-platelet medication and a negative initial CT scan of the brain (CT1). The primary outcome was delayed intracranial hemorrhage present on repeat CT scan (CT2) within 48 hours of the presentation. Only patients who were rescanned or observed minimally were included. Clinically significant D-ICH were those that required neurosurgery, caused death or necessitated a change in management strategy, such as admission. **Results:** Fifteen primary studies were ultimately identified, comprising a total of 3801 patients. Of this number, 2111 had a control CT scan. 39 cases of D-ICH were identified, with the incidence of D-ICH calculated to be 1.31% (95% CI [0.56, 2.27]). No more than 12 of these patients had a clinically significant D-ICH representing 0.09% (95% CI [0.00, 0.31]). 10 of them were on warfarin and two on aspirin. There were three deaths recorded and three patients needed neurosurgery. **Conclusion:** The relatively low incidence suggests that repeat CT should not be mandatory for patients without ICH on first CT. This is further supported by the negligibly low rate of clinically significant D-ICH. Evidence-based assessments should be utilised to indicate the appropriate discharge plan, with further research required to guide the balance between clinical observation and repeat CT.
Keywords: traumatic brain injury, anticoagulation, delayed intracranial hemorrhage

LO46

Sex-based differences in concussion symptom reporting and self-reported outcomes in a general adult ED population

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Introduction: Patients with concussion frequently present to the emergency department (ED). Studies of athletes and children indicate that concussion symptoms are often more severe and prolonged in females compared with males. To-date, study of sex-based concussion differences in general adult populations have been limited. This study examined sex-based differences in concussion outcomes. **Methods:** Adult (>17 years) patients presenting to one of three urban EDs in Edmonton, Alberta with Glasgow coma scale score 13 within 72 hours of a concussive event were recruited by on-site research assistants. Follow-up calls at 30 and 90 days post ED discharge captured extent of PCS using the Rivermead Post-Concussion questionnaire (RPQ), effect on daily living activities measured by the Rivermead Head Injury Questionnaire (RHIQ), and overall health-related quality of life using the 12-item Short Form Health Survey (SF-12). Dichotomous and categorical variables were compared using Fishers exact test; continuous variables were compared using t-tests or Mann-Whitney tests, as appropriate. **Results:** Overall, 130/250 enrolled patients were female. The median age was 35 years; men trended towards being younger (median = 32 years; IQR: 23, 45) than women (median = 40 years; IQR: 22, 52). Compared to women, more men were single (56% vs. 38% ($p = 0.007$) and employed (82% vs. 71% ($p = 0.055$). Men and women experienced different injury mechanisms ($p = 0.007$) with more women reporting injury due to a fall (44% vs. 26%), while more men were injured at work (16% vs. 7%) or due to an assault (11% vs. 3%). Men had a higher return to ED rate (13% vs. 5%; $p = 0.015$). Women had higher RPQ scores at baseline ($p < 0.001$) and 30-day follow-up ($p = 0.001$); this difference was not significant by 90 days ($p = 0.099$). While women reported on the RHIQ at 30 days that their injury affected their usual activities significantly more than men (Median = 5, IQR: 0, 11 vs. median = 0.5, IQR: 0.5, 7; $p = 0.004$), both groups had similar scores on the SF-12 physical composite and mental composite scales at all three measurement points. **Conclusion:** In a general ED concussion population, demographic differences exist between men and women. Based on self-reported and objective outcomes, womens usual activities may be more affected by concussion and PCS than men. Further analysis of these differences is required in order to identify different treatment options and ensure adequate care and treatment of injury.
Keywords: concussion, sex-based differences, injury

LO47

Incidence of intracranial bleeding in anticoagulated emergency patients with minor head injury: a meta-analysis

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Introduction: The proportion of Canadians receiving anticoagulation medication is increasing. Falls in the elderly are the most common cause of minor head injury and an increasing proportion of these patients are prescribed anticoagulation. Emergency department (ED) guidelines advise performing a CT head scan for all anticoagulated head injured patients, but the risk of intracranial hemorrhage (ICH) after a minor head injury (patients who have a Glasgow comma score (GSC) of 15) is unclear. We conducted a systematic review and meta-analysis to determine the point incidence of ICH in anticoagulated ED patients presenting with a minor head injury. **Methods:** We systematically searched Pubmed, EMBASE, Cochrane database, DARE, google scholar and conference abstracts (May 2017). Experts were contacted. Meta-Analyses and Systematic Reviews of Observational Studies (MOOSE) guidelines were followed with two authors reviewing titles, four authors reviewing full text and four authors performing data extraction. We included all prospective studies recruiting consecutive anticoagulated ED patients presenting with a head injury. We obtained additional data from the authors of the included studies on the subset of GCS 15 patients. We performed a meta-analysis to estimate the point incidence of ICH among patients with a GCS score of 15 using a random effects model. **Results:** A total of five studies (and 4,080 GCS 15, anticoagulated patients) from the Netherlands, Italy, France, USA and UK were included in the analysis. One study contributed 2,871 patients. Direct oral anticoagulants were prescribed in only 60 (1.5%) patients. There was significant heterogeneity between studies with regards to mechanism of injury, CT scanning and follow up method ($I2 = 93\%$). The random effects pooled incidence of ICH was 8.9% (95% CI 5.0-13.8%). **Conclusion:** We found little data to reflect contemporary anticoagulant prescribing practice. Around 9% of warfarinized patients with a minor head injury develop ICH. Future studies should evaluate the safety of selective CT head scanning in this population.
Keywords: head injury, computed tomography scan, anticoagulation

LO48

Does FAST change management of blunt trauma patients?

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Introduction: Despite widespread use of FAST in trauma, there is a lack of data supporting its usefulness. We sought to identify the impact of FAST on clinical management of blunt trauma patients. **Methods:** This health records review was conducted at a single large academic Level 1 trauma center emergency department. Patients with a suspicion of acute blunt traumatic abdominal injury were identified from our health records database. Data were collected regarding FAST utilization, CT scan utilization and timing, need for definitive management, disposition, and length of stay (LOS). **Results:** 285 patients were included, 152 (53.3%) received a FAST examination, with 33 (22%) having a direct impact on clinical management. CT was performed in 112 (73.6%) of the FAST group, with mean time to imaging of 147.4 minutes, time to trauma team assessment of 21.5 minutes, and ED-LOS of 8.6 hours. In the non-FAST group, 33 (24.8%) received a CT, with time to imaging of 133 minutes, time to trauma team assessment of 133 minutes, and ED-LOS of 13.8 hours. 75.6% of the FAST group required admission and 9.2% required definitive management; admission was needed for 38.3% of the non-FAST group and 2.2% required definitive management. **Conclusion:** This is the first study to assess patient outcomes with respect to FAST in the era of early whole body CT in trauma. Although FAST does not directly impact care for the majority of blunt trauma patients, it demonstrates usefulness in some patients by directing CT utilization and expediting disposition from the ED.
Keywords: focused assessment with sonography for trauma (FAST), blunt abdominal trauma, point of care ultrasound

LO49

Achieving just outcomes: forensic evidence collection in sexual assault cases

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Introduction: Achieving just outcomes in sexual assault cases is one of the most serious and complex problems facing the health care and justice systems. The objectives of this analysis were to determine the

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prevalence and correlates of Sexual Assault Evidence Kit (SAEK) completion and release to police among sexual assault cases presenting at the hospital emergency department. **Methods:** Data for this cross-sectional study come from the Sexual Assault and Partner Abuse Care Program (SAPACP) case registry (Jan1-Dec31, 2015) at The Ottawa Hospital, a unique medical-forensic access point and the only facility offering SAEK collection in Ottawa. Bivariable and multivariable logistic regression models were conducted using odds ratios (OR), adjusted ORs, and 95% confidence intervals (CI). **Results:** In 2015 406 patients were seen by the SAPACP and 202 (77.10%) were eligible for a SAEK. Among eligible cases, 129 (63.86%) completed a SAEK and only 60 (29.70%) released the SAEK to police for investigation. Youth cases below 24 years of age (AOR:2.23, 95% CI: 1.18-4.23) and presenting within 24h (AOR:0.93-3.40) were the strongest independent factors contributing to SAEK completion. Cases who were uncertain of the assailant (AOR:3.62, 95% CI:1.23-10.67) and assaults that occurred outdoors (AOR:3.14, 95% CI:1.08-9.09) were the cases most likely to release the SAEK to police. **Conclusion:** Our study has shown high attrition levels along the continuum of care and justice for sexual assault case. Even with access to specialized forensic evidence collection, many do not complete a SAEK and even fewer release the evidence to police for legal investigation.
Keywords: sexual assault, forensics

LO50

Necrotizing soft tissue infection: diagnostic accuracy of physical examination, imaging and LRINEC score a systematic review and meta-analysis

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Introduction: Necrotizing soft tissue infection (NSTI), a potentially life-threatening diagnosis, is often not immediately recognized by clinicians. Delays in diagnosis are associated with increased morbidity and mortality. We sought to summarize and compare the accuracy of physical exam, imaging, and Laboratory Risk Indicator of Necrotizing Fasciitis (LRINEC) Score used to confirm suspected NSTI in adult patients with skin and soft tissue infections. **Methods:** We searched Medline, Embase and 4 other databases from inception through November 2017. We included only English studies (randomized controlled trials, cohort and case-control studies) that reported the diagnostic accuracy of testing or LRINEC Score. Outcome was NSTI confirmed by surgery or histopathology. Two reviewers independently screened studies and extracted data. We assessed risk of bias using the Quality Assessment of Diagnostic Accuracy Studies 2 criteria. Diagnostic accuracy summary estimates were obtained from the Hierarchical Summary Receiver Operating Characteristic model. **Results:** We included 21 studies (n = 6,044) in the meta-analysis. Of physical exam signs, pooled sensitivity and specificity for fever (49.4% [95% CI: 41.4-57.5], 78.0% [95% CI: 52.2-92.0]), hemorrhagic bullae (30.8% [95% CI: 16.2-50.6], 94.2% [95% CI: 82.9-98.2]) and hypotension (20.8% [95% CI: 7.7-45.2], 97.9% [95% CI: 89.1-99.6]) were generated. Computed tomography (CT) had 88.5% [95% CI: 55.5-97.9] sensitivity and 93.3% [95% CI: 80.8-97.9] specificity, while plain radiography had 48.9% [95% CI: 24.9-73.4] sensitivity and 94.0% [95% CI: 63.8-99.3] specificity. Finally, LRINEC 6 (traditional threshold) had 67.5% [95% CI: 48.3-82.3] sensitivity and 86.7% [95% CI: 77.6-92.5] specificity, while a LRINEC 8 had 94.9% [95% CI: 89.4-97.6] specificity but 40.8% [95% CI: 28.6-54.2] sensitivity. **Conclusion:** The absence of any one physical exam feature (e.g. fever or hypotension) is not sufficient to rule-out NSTI. CT is superior to plain radiography. The LRINEC Score had poor sensitivity, suggesting that a low score is not sufficient to rule-out NSTI. For patients with suspected NSTI, further evaluation is warranted. While no single test is sensitive, patients with high-risk features should receive early surgical consultation for definitive diagnosis and management.
Keywords: necrotizing soft tissue infection, computed tomography, laboratory risk indicator for necrotizing fascitis

LO51

Increased mortality and costs in emergency department sepsis patients with delayed intensive care unit admission

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Introduction: Sepsis remains a major cause of mortality. In the Emergency Department (ED), rapid identification and management of sepsis have been associated with improved outcomes. Following ED assessment, patients with infection may be directly admitted to the Intensive Care Unit (ICU), or alternatively admitted to hospital wards or sent home, with risk of future deterioration necessitating ICU admission. Little is known regarding outcomes and costs of ICU sepsis patients who are initially admitted to a ward or discharged home (delayed ICU admission), as compared to those with direct ICU admission from the ED. **Methods:** We analyzed a prospectively collected registry (2011-2014) of patients admitted to the ICU with a diagnosis of sepsis at two academic hospitals. We included all adult patients with an index ED visit within 72 hours of ICU admission. Patients were categorized into 3 groups: 1) Admitted directly to ICU; 2) Admitted to wards, with ICU admission within 72 hours; and 3) Sent home, with ICU admission within 72 hours. ICU length of stay (LOS) and total costs (both direct and indirect) were recorded. The primary outcome, in-hospital mortality, was analyzed using a multivariable logistic regression model, controlling for confounding variables (including patient sex, comorbidities, and illness severity). **Results:** 657 ICU patients were included. Of these, 338 (51.4%) were admitted directly from ED to ICU, 246 (37.4%) were initially admitted to the wards, and 73 (11.1%) were initially sent home. In-hospital mortality was lowest amongst patients admitted directly to the ICU (29.5%), as compared to patients admitted to ICU from wards (42.7%), or home (61.6%). Delayed ICU admission was associated with increased odds of mortality (adjusted odds ratio 1.85 [1.24-2.76], $P < 0.01$) and increased median ICU LOS (11 days vs. 4 days, $P < 0.001$). Median total costs were lowest among patients directly admitted to the ICU ($19,924, [Interquartile range [IQR], 10,333-32,387]), as compared to those admitted from wards ($72,155 [IQR, $42,771-122,749]) and those initially sent home ($45,121 [IQR, $19,930-86,843]). **Conclusion:** Only half of ED sepsis patients ultimately requiring ICU admission within 72 hours of ED arrival are directly admitted to the ICU. Delayed ICU admission is associated with higher mortality, LOS, and costs.
Keywords: sepsis, shock, critical care

LO52

Predictors of oral antibiotic treatment failure for non-purulent skin and soft tissue infections in the emergency department

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Introduction: Current guideline recommendations for optimal management of non-purulent skin and soft tissue infections (SSTIs) are based on expert consensus. There is currently a lack of evidence to guide emergency physicians on when to select oral versus intravenous antibiotic therapy. The primary objective was to identify risk factors associated with oral antibiotic treatment failure. A secondary objective was to describe the epidemiology of adult emergency department (ED) patients with non-purulent SSTIs. **Methods:** We performed a health records review of adults (age 18 years) with non-purulent SSTIs treated at two tertiary care EDs. Patients were excluded if they had a purulent infection or infected ulcers without surrounding cellulitis. Treatment failure was defined any of the following after a minimum of 48 hours of oral therapy: (i) hospitalization for SSTI; (ii) change in class of oral antibiotic owing to infection progression; or (iii) change to intravenous therapy owing to infection progression. Multivariable logistic regression was used to identify predictors independently associated with the primary outcome of oral antibiotic treatment failure after a minimum of 48 hours of oral therapy. **Results:** We enrolled 500 patients (mean age 64 years, 279 male (55.8%) and 126 (25.2%) with diabetes) and the hospital admission rate was 29.6%. The majority of patients (70.8%) received at least one intravenous antibiotic dose in the ED. Of 288 patients who had received a minimum of 48 hours of oral antibiotics, there were 85 oral antibiotic treatment failures (29.5%). Tachypnea at triage (odds ratio [OR] = 6.31, 95% CI = 1.80 to 22.08), chronic ulcers (OR = 4.90, 95% CI = 1.68 to 14.27), history of MRSA colonization or infection (OR = 4.83, 95% CI = 1.51 to 15.44), and cellulitis in the past 12 months (OR = 2.23, 95% CI = 1.01 to 4.96) were independently associated with oral antibiotic treatment failure. **Conclusion:** This is the first study to evaluate potential predictors of oral antibiotic treatment failure for non-purulent SSTIs in the ED. We observed a high rate of treatment failure and hospitalization. Tachypnea at triage, chronic ulcers, history of MRSA colonization or infection and cellulitis within the past year were independently associated with oral antibiotic treatment failure. Emergency physicians should consider these risk factors when deciding on oral versus intravenous antimicrobial therapy for non-purulent SSTIs being managed as outpatients.

Keywords: cellulitis, antibiotics, treatment failure

LO53

Intravenous cefazolin plus oral probenecid vs. oral cephalexin for the treatment of skin and soft tissue infections: a randomized controlled trial

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Introduction: Skin and soft tissue infections (SSTIs) are a common reason for presentation to an emergency department (ED). Although many patients with mild SSTI are managed with oral antibiotics, those with mild-moderate infections are often treated with parenteral antibiotics, managed in EDs as outpatients using once daily intravenous cefazolin combined with oral probenecid. The purpose of our study was to determine if cephalexin 500 mg orally four times daily was non-inferior to cefazolin 2 g intravenously daily plus probenecid 1 g orally daily in the management of uncomplicated mild-moderate SSTIs patients presenting to the ED.. **Methods:** This was a prospective, multicenter, double dummy-blind, randomized controlled non-inferiority trial conducted at two tertiary care teaching hospitals in Canada. Patients were enrolled if they presented to the ED with an uncomplicated SSTI, in a 1:1 fashion to oral cephalexin or intravenous cefazolin plus oral probenecid for up to 7 days. The primary outcome was failure of therapy at 72 hours. Clinical cure at 7 days, intravenous to oral step-down, admission to hospital and adverse events were also evaluated. **Results:** 206 patients were randomized with 104 patients in the cephalexin group and 102 in the cefazolin and probenecid group. The proportion of patients failing therapy at 72 hours was similar between the treatment groups (4.2% and 6.1%, risk difference 1.9%, 95% CI (-3.3% to 7.1%), p-value for non-inferiority = 0.001). Clinical cure at seven days was not significantly different (100% and 97.7%, risk difference -2.3%, 95% CI (-4.9% to 0.3%), p-value for non-inferiority = 0.008). **Conclusion:** Cephalexin at appropriate doses appears to be a safe and effective alternative to outpatient parenteral cefazolin and probenecid in the treatment of uncomplicated mild to moderate SSTIs who present to the ED.

Keywords: skin and soft tissue infection, antimicrobial therapy, emergency department

LO54

Prospective mulitcenter validation of the Canadian syncope risk score

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Introduction: The Canadian Syncope Risk Score (CSRS) was developed to identify patients at risk for serious adverse events (SAE) within 30 days of an Emergency Department (ED) visit for syncope. We sought to validate the score in a new cohort of ED patients. **Methods:** We conducted a multicenter prospective cohort study at 8 large academic tertiary-care EDs across Canada from March 2014 to Dec 2016. We enrolled adults (age 16 years) who presented within 24 hours of syncope, after excluding those with persistent altered mentation, witnessed seizure, intoxication, and major trauma requiring hospitalization. Treating ED physicians collected the nine CSRS predictors at the index visit. Adjudicated SAE included death, arrhythmias and non-arrhythmic SAE (myocardial infarction, serious structural heart disease, pulmonary embolism, severe hemorrhage and procedural interventions within 30-days). We assessed area under the Receiver Operating Characteristic (ROC) curve, score calibration, and the classification performance for the various risk categories. **Results:** Of the 2547 patients enrolled, 146 (5.7%) were lost to follow-up and 111 (4.3%) had serious condition during the index ED visit and were excluded. Among the 2290 analyzed, 79 patients (3.4%; 0.4% death, 1.4% arrhythmia) suffered 30-day serious outcomes after ED disposition. The accuracy of the CSRS remained high with area under the ROC curve at 0.87 (95% CI 0.82-0.92), similar to the derivation phase (0.87; 95% CI 0.84-0.89). The score showed excellent calibration at the prespecified risk strata. For the very-low risk category (0.3% SAE of which 0.2% were arrhythmia and no deaths) the sensitivity was 97.5% and negative predictive value was 99.7% (95% CI 98.7-99.9). For the very high-risk category (61.5% SAE of which 26.9% were arrhythmia and 11.5% death) the specificity was 99.4% and positive predictive value was 61.5% (95% CI 43.0-77.2). **Conclusion:** In this multicenter validation study, the CSRS accurately risk stratified ED patients with syncope for short-term serious outcomes after ED disposition. The score should aid in minimizing investigation and observation of very-low risk patients, and prioritization of inpatient vs outpatient investigations or following of the rest. The CSRS is ready for implementation studies examining ED management decisions, patient safety and health care resource utilization.

Keywords: syncope, risk stratification, validation

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LO55

Role of n-terminal pro brain natriuretic peptide (NT Pro-BNP) in emergency department syncope risk stratification: a multicenter study

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Introduction: Two published studies reported natriuretic peptides can aid in risk-stratification of Emergency Department (ED) syncope. We sought to assess the role of N-Terminal pro Brain Natriuretic Peptide (NT pro-BNP) to identify syncope patients at risk for serious adverse events (SAE) within 30 days of the ED visit, and its value above that of the Canadian Syncope Risk Score (CSRS). **Methods:** We conducted a multicenter prospective cohort study at 6 large Canadian EDs from Nov 2011 to Feb 2015. We enrolled adults who presented within 24-hours of syncope and excluded those with persistent altered mentation, obvious seizure, and intoxication. We collected patient characteristics, nine CSRS predictors (includes troponin), ED management and NT pro-BNP levels. Adjudicated serious adverse events (SAE) included death, cardiac SAE (arrhythmias, myocardial infarction, serious structural heart disease) and non-cardiac SAE (pulmonary embolism, severe hemorrhage and procedural interventions within 30-days). We used two tailed t-test and logistic regression analysis. **Results:** Of the 1359 patients (mean age 57.2 years, 54.7% females, 13.3% hospitalized) enrolled, 148 patients (10.9%; 0.7% deaths, 7.9% cardiac SAE including 6.1% arrhythmia) suffered SAE within 30-days. The mean NT pro-BNP values, when compared to the patients with no SAE (499.8ng/L) was significantly higher among the 56 patients who suffered SAE after ED disposition (3147ng/L, $p = 0.001$), and among the 35 patients with cardiac SAE after ED disposition (2016.2ng/L, $p = 0.02$). While there was a trend to higher levels among patients who suffered arrhythmia after the ED visit, it was not statistically significant (1776.4ng/L, $p = 0.07$). In a model with CSRS predictors, the adjusted odds ratio for NT pro-BNP was 8.0 (95% CI 1.8, 35.9) and troponin was 3.8 (95% CI 1.7, 8.8). The addition of NT pro-BNP did not significantly improve the classification performance ($p = 0.76$) with areas under the curves for CSRS was 0.91 (95% CI 0.88, 0.95) and CSRS with NT pro-BNP was 0.92 (95% CI 0.88, 0.95). **Conclusion:** In this multicenter study, mean NT pro-BNP levels were significantly higher among ED syncope patients who suffered SAE including cardiac SAE after ED disposition. Though NT pro-BNP was a significant independent predictor of SAE after ED disposition, it did not improve accuracy in ED syncope risk-stratification when compared to CSRS. Hence, we do not recommend NT pro-BNP measurement for ED syncope management.

Keywords: syncope, risk stratification, n-terminal pro brain natriuretic peptide

LO56

External validation of a 1-hour rapid diagnostic algorithm for ruling out acute myocardial infarction in emergency department patients with chest pain using a high-sensitivity troponin-T assay

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Introduction: Ruling out acute myocardial infarction (AMI) using serial troponin testing is central to the care of many emergency department (ED) patients with chest pain. While diagnostic strategies using conventional troponin assays require repeat sampling over many hours to avoid missed diagnoses, serial high-sensitivity troponin (hs-cTn) assays may be able to exclude AMI in most patients within 1 or 2 hours. However, many of the initial studies deriving and validating these rapid diagnostic algorithms had all hs-cTn samples analyzed in a central core lab likely representing optimal assay performance. This objective of this study is to validate a 1-hour rapid diagnostic algorithm to exclude AMI in ED chest pain patients using an hs-cTn assay in real world practice. **Methods:** This prospective cohort study was conducted at a single urban tertiary center and regional percutaneous coronary intervention site in Calgary, Alberta. Patients were eligible for enrolment if they presented to the ED with chest pain, were 25-years or older and required biomarker testing to rule out AMI at the discretion of the attending emergency physician. Patients were excluded if they had clear acute ischemic ECG changes, new arrhythmia or renal failure requiring hemodialysis. A high-sensitivity troponin result (Roche Elecsys hs-cTnT) was obtained in all patients at ED presentation and 1-hour later. The primary outcome was AMI on the index visit. Secondary outcomes included 30-day AMI and 30-day major adverse cardiac events (MACE - including AMI, revascularization or cardiac death). Electronic medical records were reviewed and telephone follow-up was obtained for all patients at 30-days to ensure relevant events were captured. Two physician adjudication (board-certified emergency physician and cardiologist) was obtained for all outcomes. The study was REB approved. **Results:** A total of 350 patients were enrolled from August 2014 September 2016 with 1-hour serial hs-cTnT results, of which 219 (62.6%) met the 1-hour rapid diagnostic algorithm low risk criteria (time 0h hs-cTnT <12ng/L and delta 1h <3ng/L). The sensitivity of the 1-hour low risk criteria for index AMI was 97.2% (95% CI 85.5%-99.9%) and for 30-day AMI was 97.3% (95% CI 85.8-99.9%). The sensitivity of the low risk criteria for 30-day MACE was lower 80.9% (95% CI 66.7-90.9%) but maintained a high negative predictive value, 95.9% (95% CI 92.3-98.1%). **Conclusion:** A 1-hour rapid diagnostic algorithm using an hs-cTnT assay was highly sensitive for AMI on the index visit and successfully identified patients at low risk of 30-day AMI; however, sensitivity for 30-day MACE was much lower. Of note, the 1-hour algorithm appears to be less sensitive for both AMI and 30-day MACE than a 2-hour algorithm validated in the same population.

Keywords: high-sensitivity troponin, myocardial infarction, rapid diagnostic algorithm

LO57

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

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Introduction: Chest pain is one of the most common presenting complaints to emergency departments (EDs) across the world, and the exclusion of acute myocardial infarction (AMI) using troponin testing is central to the care of many of these patients. While testing strategies using conventional troponin assays require repeat testing over many hours to avoid missed diagnoses, high-sensitivity troponin (hs-cTn) assays may be able to exclude AMI in a large proportion of patients with a single result at presentation. This objective of this study is to validate the ability of very low concentrations of hs-cTn at presentation to exclude AMI in ED chest pain patients. **Methods:** This prospective cohort study was conducted at a single urban tertiary center and regional

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percutaneous coronary intervention site in Calgary, Alberta. Patients were eligible for enrolment if they presented to the ED with chest pain, were 25-years or older and required biomarker testing to rule out AMI at the discretion of the attending emergency physician. Patients were excluded if they had clear acute ischemic ECG changes, new arrhythmia or renal failure requiring hemodialysis. A high-sensitivity troponin result (Roche Elecsys hs-cTnT) was obtained in all patients at presentation. The primary outcome was AMI on the index visit. Secondary outcomes included 30-day AMI and major adverse cardiac events (MACE - including AMI, revascularization or cardiac death). Electronic medical records were reviewed and telephone follow-up was obtained for all patients at 30-days to ensure relevant events were captured. Two physician adjudication (board-certified emergency physician and cardiologist) was obtained for all outcomes. This study was REB approved. **Results:** A total of 1,167 patients were enrolled from August 2014 September 2016, of which 191 (16.3%) patients had an initial troponin below the limit of blank (LoB, <3 ng/L) and 416 (32.8%) were below the limit of detection (LoD, <5 ng/L). The sensitivity of a single troponin below the LoB (<3 ng/L) for index AMI was 100% (95% CI 96.2%-100%) and for 30-day AMI was 100% (95% CI 96.4-100%). The sensitivity of a troponin below the LoD (<5 ng/L) for index AMI was 97.9% (95% CI 92.7%-99.8%) and for 30-day AMI was 98.0% (95% CI 93.0-99.8%). Sensitivity for 30-day MACE at both cutoffs was lower: 98.4% (95% CI 94.3-99.8%) for <3 ng/L, and 94.4% (95% CI 88.8-97.7%) for <5 ng/L, respectively; however, negative predictive values remained high at both cutoffs: <3 ng/L, 99.0% (95% CI 96.3-99.9%) and <5 ng/L, 98.3% (95% CI 96.6-99.3%). **Conclusion:** A high sensitivity troponin T result below the LoB (<3 ng/L) is highly sensitive for excluding AMI and identifies patients at low risk of 30-day MACE. A result below the LoB (<5 ng/L) will identify a larger population of patients as low risk but has a greater risk of missed AMI and MACE.
Keywords: high-sensitivity troponin, acute myocardial infarction, chest pain

LO58

Long-term outcomes among emergency department syncope patients: a systematic review

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Introduction: Approximately 50% of patients discharged from the Emergency Department (ED) after syncope have no cause found. Long-term outcomes among syncope patients are not well studied, to guide physicians regarding outpatient testing and follow-up. The objective of this study was to conduct a systematic review for long-term (one year) outcomes among ED patients with syncope. We aim to use the results of this review to guide us in prospective analysis of one year outcomes with our large database of syncope patients. **Methods:** We searched Cochrane Central Register of Controlled Trials, Medline and Medline in Process, PubMed, Embase, and the Cumulative Index to Nursing and Allied Health Literature (CINAHL) from the inception to June, 2017. We included studies that reported long-term outcomes among adult ED patients (16 years or older) with syncope. We excluded studies on pediatric patients, and studies that included syncope mimickers: pre-syncope, seizure, intoxication, loss of consciousness after head trauma. We also excluded case reports, letters to the editor and review articles. Outcomes included death, syncope recurrence requiring hospitalization, arrhythmias and procedural interventions for arrhythmias. We selected articles based on title and abstract review during phase-1 and conducted full article review during phase-2. Meta-analysis was performed by pooling the outcomes using random effects model (RevMan v.5.3; Cochrane Collaboration). **Results:** Initial literature search generated 2094 articles after duplicate removal. 50 articles remained after phase-1 (=0.85) and 16 articles were included in the systematic review after phase-2 (=0.86). The 16 included studies enrolled a total of 44,755 patients. Pooled analysis at 1-year follow-up showed the following outcomes: 7% mortality; 14% recurrence of syncope requiring hospitalization; one study reported that 0.6% of patients had a pacemaker inserted; and two studies reported 0.8 11.5% of patients suffered new arrhythmias. **Conclusion:** An important proportion of ED patients with syncope suffer outcomes at 1-year. Appropriate follow-up is needed to prevent long-term adverse outcomes. Further prospective research to identify patients at risk for long-term important cardiac outcomes and death is needed.
Keywords: syncope, long-term outcomes, mortality

LO59

External validation of a 2-hour rapid diagnostic algorithm for ruling out acute myocardial infarction in emergency department patients with chest pain using a high-sensitivity troponin-T assay

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Introduction: Ruling out acute myocardial infarction (AMI) using serial troponin testing is central to the care of many emergency department (ED) patients with chest pain. While diagnostic strategies using conventional troponin assays require repeat sampling over many hours to avoid missed diagnoses, serial high-sensitivity troponin (hs-cTn) assays may be able to exclude AMI in most patients within 1 or 2 hours. However, many of the initial studies deriving and validating these rapid diagnostic algorithms had all hs-cTn samples analyzed in a central core lab likely representing optimal assay performance. This objective of this study is to validate a 2-hour rapid diagnostic algorithm to exclude AMI in ED chest pain patients using an hs-cTn assay in real world practice. **Methods:** This prospective cohort study was conducted at a single urban tertiary center and regional percutaneous coronary intervention site in Calgary, Alberta. Patients were eligible for enrolment if they presented to the ED with chest pain, were 25-years or older and required biomarker testing to rule out AMI at the discretion of the attending emergency physician. Patients were excluded if they had clear acute ischemic ECG changes, new arrhythmia or renal failure requiring hemodialysis. A high-sensitivity troponin result (Roche Elecsys hs-cTnT) was obtained in all patients at ED presentation and 2-hours later. The primary outcome was AMI on the index visit. Secondary outcomes included 30-day AMI and 30-day major adverse cardiac events (MACE - including AMI, revascularization or cardiac death). Electronic medical records were reviewed and telephone follow-up was obtained for all patients at 30-days to ensure relevant events were captured. Two physician adjudication (board-certified emergency physician and cardiologist) was obtained for all outcomes. This study was REB approved. **Results:** A total of 549 patients were enrolled from August 2014 September 2016 with 2-hour serial hs-cTnT results, of which 349 (63.6%) met the 2-hour rapid diagnostic algorithm low risk criteria (time 0 h/2 h hs-cTnT <14 ng/L and delta 2 h <4 ng/L). The sensitivity of the 2-hour low risk criteria for index AMI was 98.4% (95% CI 91.3%-100%) and for 30-day AMI was 98.4% (95% CI 91.6-100%). The sensitivity for 30day MACE was lower 84.4% (95% CI 74.4-91.7%) but maintained a high negative predictive value, 96.6% (95% CI 94.1-98.2%). **Conclusion:** A 2-hour rapid diagnostic algorithm using an hs-cTnT assay was highly sensitive for AMI on the index visit and successfully

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identified patients at low risk of 30-day AMI. Sensitivity for MACE was lower, reminding us that while biomarker-only rapid diagnostic algorithms excel at ruling out AMI, careful clinical risk stratification is needed to avoid missed MACE events.
Keywords: high-sensitivity troponin, myocardial infarction, rapid diagnostic algorithm

LO60

Diagnostic utility of creatine kinase in the diagnosis and management of non-ST elevation myocardial infarction

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Introduction: Creatine kinase (CK) measurement, despite not being recommended for the diagnosis of a Non-ST Elevation Myocardial Infarction (NSTEMI) is still routinely performed in the emergency department (ED) for the workup of NSTEMI. The diagnostic utility of CK among ED patients with suspected NSTEMI is still not well understood. The objectives of this study were to assess: the additional value of CK in NSTEMI diagnosis and the correlation between the highest CK/TNI values and ejection fraction (EF) on follow-up echocardiography among patients with suspected NSTEMI. **Methods:** This was a prospective cohort study conducted at the Civic and General Campuses of The Ottawa Hospital from March 2014 to March 2016. We enrolled adults (18 years) for whom troponin (TNI) and CK were ordered for chest pain or non-chest pain symptoms within the past 24 hours concerning for NSTEMI and excluded those with suspected ST-Elevation Myocardial Infarction (STEMI). Primary outcome was a 30-day NSTEMI adjudicated by two blinded physicians. Demographics, medical history, and ED CK/TNI values were collected. We used descriptive statistics and report test diagnostic characteristics. **Results:** Of the 1,663 patients enrolled, 84 patients (5.1%) suffered NSTEMI. The sensitivity and specificity of CK was 30.9% (95% CI 21.1, 40.8) and 91.4% (95% CI 90.0, 92.8) respectively. The sensitivity and specificity of troponin was 96.4% (95% CI 92.4, 100) and 88.1% (95% CI 86.5, 89.7) respectively. Among 3 (0.2%) patients with missed NSTEMI diagnosis with TNI, CK measurements did not add value. The mean CK values were not significantly different between those with normal and abnormal EF on follow-up (132.4 U/L and 146.3 U/L respectively; $p = 0.44$), whereas the mean TNI values were significantly different (0.5 µg/L and 1.3 µg/L respectively; $p = 0.046$). **Conclusion:** CK measurements neither provide any additional value in the work-up of NSTEMI in the ED nor correlate with EF on follow-up. Discontinuing routine CK measurements would reduce overall costs and improve resource utilization in the ED, and streamline the management of patients in the ED with chest pain.
Keywords: chest pain, creatine kinase, non-ST elevated myocardial infarction

LO61

Test characteristics of high sensitivity troponin T performed at emergency department arrival for acute myocardial infarction in patients with reduced kidney function

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Introduction: Patients with chronic kidney disease (CKD) are at high risk of cardiovascular events, and have worse outcomes following acute myocardial infarction (AMI). Cardiac troponin is often elevated in CKD, making the diagnosis of AMI challenging in this population. We sought to quantify test characteristics for AMI of a high-sensitivity troponin T (hsTnT) assay performed at emergency department (ED) arrival in CKD patients with chest pain, and to derive rule-out cutoffs specific to patient subgroups stratified by estimated glomerular filtration rate (eGFR). We also quantified the sensitivity and classification performance of the assays limit of detection (5 ng/L) and the FDA-approved limit of quantitation (6 ng/L) for ruling out AMI at ED arrival. **Methods:** Consecutive patients in four urban EDs from the 2013 calendar year with suspected cardiac chest pain who had a Roche Elecsys hsTnT assay performed on arrival were included f. This analysis was restricted to patients with an eGFR <60 ml/min/1.73m2. The primary outcome was 7-day AMI. Secondary outcomes included major adverse cardiac events (death, AMI and revascularization). Test characteristics were calculated and ROC curves were generated for eGFR subgroups. **Results:** 1416 patients were included. 7-day AMI incidence was 10.1%. 73% of patients had an initial hsTnT concentration greater than the assays 99th percentile (14 ng/L). TCurrently accepted cutoffs to rule out MI at ED arrival (5 ng/L and 6 ng/L) had 100% sensitivity for AMI, but no patients with an eGFR less than 30 ml/min/1.73M had hsTnT concentrations below these thresholds. We derived eGFR-adjusted cutoffs to rule out MI with sensitivity >98% at ED arrival, which were able to rule out 6-42% of patients, depending on eGFR category. The proportion of patients able to be accurately ruled-in with a single hsTnT assay was substantially lower among patients with an eGFR <30 ml/min/1.73m2 (6-20% vs. 25-43%). We also derived eGFR-adjusted cutoffs to rule-in AMI with specificity >90%, which accurately ruled-in up to 18% of patients. **Conclusion:** Cutoffs achieving acceptable diagnostic performance for AMI using single hsTnT sampling on ED arrival may have limited clinical utility, particularly among patients with very low eGFR. The ideal diagnostic strategy for AMI in patients with CKD likely involves serial high-sensitivity troponin testing with diagnostic thresholds customized to different eGFR categories.
Keywords: myocardial infarction, troponin, kidney disease

LO62

Variability in triage performance for chest pain patients in two Canadian cities

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Introduction: CTAS triage acuity determinations are used to prioritize patients, describe illness acuity, and compare casemix across institutions. The latter functions assume reliable application in diverse settings, but no studies have evaluated this using actual triage data. **Methods:** This administrative database study included all patients with a triage complaint of chest pain (CP) in Vancouver (2012-16) and Calgary (2016). We stratified patients into high vs. non-high severity groups based on discharge diagnoses. High severity diagnoses included all patients with aortic pathology, ACS, shock or arrest states, as well as patients requiring admission because of pulmonary embolism, dysrhythmias, CHF, neurologic or respiratory conditions. We dichotomized patient triage assignments to high (CTAS 1,2) vs. low (3,4,5) acuity, then constructed 2x2 tables correlating CTAS acuity with disease severity. Main outcomes included the proportion of CP patients triaged to high acuity categories and CTAS sensitivity for high severity conditions. **Results:** We studied 97,277 Vancouver and 18,622 Calgary patients. Age (mean, 54.8 years), sex (53.5% male) and casemix

distributions were similar between cities, although Calgary had more high severity conditions (15.0% v. 10.5%) and a higher admission rate (22.5% v. 21.4%). Calgary triage nurses placed more patients in high acuity triage categories (85.1% vs. 45.2%) and achieved higher sensitivity for severe illness (96.2% vs. 76.2%); however, they were less accurate (28.7% vs. 60.3%) and less specific (16.8% vs. 58.4%). The proportion of CP patients triaged into high acuity categories ranged from 79% to 87% across four Calgary hospitals and from 28% to 62% at five Vancouver hospitals. **Conclusion:** This study shows profoundly different triage categorization at different sites seeing similar patient populations. Triage nurses are taught to strive for high sensitivity, but there may be operational consequences if specificity drops too low and large numbers of non-severe patients are triaged into high acuity categories. It is not clear which approach is better but these data suggest CTAS should not be used to compare patient acuity or complexity across different hospitals or regions.

Keywords: quality improvement and patient safety, Canadian Triage and Acuity Scale, chest pain

LO63

Decision fatigue in the emergency department: how does emergency physician decision making change over an eight-hour shift?

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Introduction: Decision fatigue is a well-characterized phenomenon that has rarely been studied in the medical field. Emergency department (ED) physicians make many clinical decisions every shift. In this study, we examined ED physician decisions in computed tomography (CT) ordering, consultations, and discharges over time in an eight-hour shift. **Methods:** We performed a cohort study of adult patients presenting to two EDs of an academic, tertiary care hospital over a two-year period using the hospital administrative database. Patients triaged to the Urgent Care (minor acuity) area of the ED were excluded. Patients were analyzed based on the hour of the shift that they were initially assessed by an ED physician. For each hour, we evaluated the proportion of patients who had CTs, consultations, discharges, consultations not resulting in admission, returns within 72 hours of discharge, and median ED length of stay (LOS). Patients under the care of more than one ED physician (i.e. handovers) were analyzed as the time seen by the initial physician. Statistical significance of outcomes over time was assessed using random effects logistic regression. **Results:** 87,752 patients were included in the study period. 42,146 patients (48.0%) received consultations, of which, 29,347 (69.6%) were admitted. 45,470 patients (51.8%) were discharged without consultation, of which, 4102 (9.0%) returned within 72 hours. The median ED LOS for all non-consulted discharged patients was 4.9 hours. There was a statistically significant decline in the hourly rates of CT head and CT abdomen ordering as the shift progressed. CT head ordering declined significantly from 15.8% in the first hour to 12.2% in the last hour ($p < 0.0001$) while CT abdomen declined significantly from 9.6% to 7.6% ($p < 0.0001$). There were no significant differences in the hourly rates of consultations, consultations not resulting in admission, discharges, discharges returning within 72 hours, or ED LOS. **Conclusion:** ED physician decisions about patient disposition did not change in relation to hours into the shift. Interestingly, the rates of CT head and CT abdomen declined as the shift progressed. The lower CT ordering rates do not seem to be associated with any differences in patient disposition or ED LOS. In this large patient sample, we did not find evidence of decision fatigue among ED physicians.

Keywords: decision fatigue, computed tomography ordering

LO64

Variation in Alberta emergency department patient populations

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Introduction: Increasing pressures on the health care system, particularly in emergency departments (EDs), make it critical to understand changing ED case-mix, patient demographics and care needs, and resource utilization. Our objective is to assess Alberta (AB) ED volumes, utilization and case mix, stratified by ED type. This knowledge will help identify opportunities for system change and quality improvement. **Methods:** Data from Alberta Health Services administrative databases, including the National Ambulatory Care Reporting System, ED Admission/Discharge/Transfer data, and Comprehensive Ambulatory Care Classification System codes, were linked for all ED visits from 2010-17. Data were stratified by seven facility categories: tertiary referral (TR), regional referral (RR), community $< 5{,}000$ inpatient discharges (CL), community > 600 inpatient discharges (CM), community < 600 inpatient discharges (CS), community ambulatory care (CA), and free-standing EDs (FS). **Results:** We analyzed 11,327,258 adult patient visits: 13% at TR, 34 % at RR, 24% at CL, 16% at CM, 9% at CS, 1% at CA, and 3% at FS sites. Acuity was highest at TR and RR hospitals, with 76%, 63%, 25%, 26%, 22%, 12% and 55% of patients falling into CTAS levels 1-3, for TR, RR, CL, CM, CS, CA, and FS respectively. Admission rates were highest at TR and RR hospitals, (23%, 13%, 5%, 5%, 4%, 0% and 0%), as were left without being seen rates, (5%, 4%, 1%, 2%, 1%, 0% and 5%). The most common ICD-10 diagnoses were chest pain/abdominal pain in TR and RR centres, and IV (antibiotic) therapy in all levels of community and FS EDs. **Conclusion:** Acuity and case-mix are highly variable across ED categories. Acuity, admission rates and LWBS rates are highest in TR and RR centres. Administrative data can reveal opportunities for health system re-engineering, e.g. potentially avoidable IV antibiotic visits. Further investigation will clarify the type of ED care provided, variability in resource utilization by case-mix, and allocation, and will help identify the optimal metrics to describe ED case-mix.

Keywords: case-mix, emergency department, triage

LO65

Safety and satisfaction of a new program redirecting low-acuity emergency department patients to medical clinic: a prospective cohort study

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Introduction: Overcrowding in emergency departments (EDs) is a constant problem. One of the major factors contributing to this situation is the inappropriate ED use by patients with low-acuity problems. In order to reduce overuse, EDs have developed agreements with clinics to reorient low-acuity ambulatory patients toward them. These agreements often leave the burden of decision on the triage personnel as to which patients can be safely redirected. The aim of this study was to evaluate the safety of redirecting patients to nearby medical clinics and to evaluate their satisfaction with this program. **Methods:** In the ED of a tertiary care facility, a computer-based algorithm allowing triage personnel to reorient patients presenting with one of 52 medical complaints, was implemented in 2016. Our prospective cohort study was composed

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of reorientation admissible ED patients between March 2017 and August 2017. Patient safety was evaluated with patient follow-up phone interviews one week after their visit to the ED to identify the number of patients who needed to return to a medical facility after their reorientation. Patient satisfaction with the reorientation program was evaluated during the same follow-ups. **Results:** Of the 980 reoriented patients interviewed, only 57 (5.9%; 95% confidence interval [CI] 4.57.5) had to unexpectedly go back to a health care facility. None of these returns were for severe complications. Over 84% of the reoriented patients were satisfied with their reorientation and 89% say they would use this program again. Having a transportation problem was most common reason mentioned by patients for refusing to be reoriented. **Conclusion:** Reorientation to medical clinics using a new computer-based algorithm was safe and no case of urgent return was seen during the 6-month study period. In addition, patients who were reoriented to medical clinics were satisfied by their treatment experience.
Keywords: reorientation, overcrowding

LO66

The effect of Alberta's new impaired driving legislation on motor vehicle-related trauma

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Introduction: Motor vehicle collisions (MVCs) resulting in injuries and death disproportionately involve impaired drivers. Those under the influence of alcohol also have a higher rate of presentation and admission to hospital for traumatic injuries. In an attempt to decrease impaired driving and alcohol-related MVCs and injuries, the government of Alberta introduced stricter impaired driving legislation in the summer of 2012. It has yet to be determined what impact this new legislation has had on traumatic injuries secondary to MVCs and alcohol impairment. The objective of this study was to assess the relationship between the implementation of the new legislation and the proportion of alcohol-related MVC trauma presenting to the emergency department of a Level I Trauma Centre. **Methods:** A retrospective single centre cross-sectional chart review examining adult patients presenting to the ED of a major trauma centre who: a) require trauma team activation or consultation and b) have a MVC related injury. Of those charts meeting these criteria, the proportion of patients with positive blood alcohol concentration (BAC) was compared between the year before and the four years after implementation of the new legislation. Patients were identified using electronic medical record logs. We compared the proportion of impaired drivers by year using the SPSS software package and conducted an interrupted time series analysis in order to determine whether the implementation of the law directly affected the measured outcomes. **Results:** 1470 total MVC related trauma patients were identified during the study period (468 prior to legislation implementation [2010-2012] and 1002 after [2012-2016]). The proportion of drivers with BAC defined as legally impaired decreased significantly over this time period ($p = 0.003$). Based on preliminary interrupted time series analysis we cannot conclude that the implementation of the new laws led to this significant change ($p = 0.524$). When analyzing drivers between 16 to 25 years old, we noted a non-significant but notable decrease in the proportion of impaired drivers from 45.9% in 2011 to 21.1% in 2016 ($p = 0.173$). **Conclusion:** While an impact was not seen immediately following the implementation of Alberta's new impaired driving legislation, the proportion of impaired drivers requiring trauma team activation has decreased significantly since enactment of the new legislation from 28.9% in 2011 to 16.9% in 2016. However, based on interrupted time series analysis we cannot conclude the new legislation independently influenced this change. The impact of other factors including public education, societal preferences and generational changes cannot be excluded. There continues to be a dramatic decrease in the proportion of impaired drivers presenting with MVC related trauma under 25 years old This has not yet reached statistical significance probably due to small sample size but the trend is most prominent in this age group.
Keywords: impaired driving, motor-vehicle related trauma, Alberta's legislation

LO67

A variation on Triage Liaison Physicians (TLP): a comparative analysis of the Emergency Department Disposition and Care Consultant (EDC) concept

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Introduction: Despite evidence that triage liaison physicians (TLP) effectively reduce emergency department (ED) overcrowding, support for these interventions is patchy. The aim of this study was to evaluate the implementation of a TLP-like ED Disposition and Care Consultant (EDC) shift at an academic tertiary care ED. **Methods:** A 24-week pilot project was conducted 11/16-04/17. Physicians worked 8- hour day (07-15:00) and/or evening (15:00-23:00) EDC shifts and performed immediate triage and patient care when needed, assisted triage RNs, answered all incoming calls, and managed administrative matters. Due to their voluntary nature, not all shifts were filled. This study compared active (EDC) and control (C) shifts on the following ED metrics: length of stay (LOS), proportions of patients who left without being seen (LWBS), and safety (return visits to ED). Descriptive (median and interquartile range {IQR} and proportions) and simple (Wilcoxson-Mann-Whitney, chi-square, z-proportion) tests are presented for continuous and dichotomous outcomes, respectively. Multiple linear regression identified factors associated with LOS. **Results:** Of 112 possible EDC shifts, 58 (52%) were filled involving 4289 patients and compared to 276 C shifts involving 21,358 patients. ED volume, patient age (49; IQR: 31, 66), mode of arrival (~30% EMS), triage levels (~51% level 3), and complaints were similar between the groups. Overall, the EDC group reduced LWBS by 16% (8.7% vs. 10.4%; $p = 0.001$), ED LOS for discharged patients by 30 minutes (5.5 vs. 6.0 hours; $p < 0.001$), and ED LOS for admitted patients by 42 minutes (9.7 vs. 10.4 hours; $p = 0.02$). The EDC increased the proportion discharged <4 hours by 28% (20.1 vs. 15.7%; $p < 0.001$) and increased the proportion admitted <8 hours by 17% (8.2% vs. 9.6%, $p = 0.002$). ED relapses <72 hours were similar (9.3% vs. 8.9%; $p = 0.4$); however, admissions were higher in the EDC shifts (25.3% vs. 23.8%; $p = 0.04$). In addition to EDC coverage status, LOS was influenced by triage level (1.7%, $p < 0.001$), disposition (19.6%, $p < 0.001$), and age (4.8%, $p < 0.001$). **Conclusion:** Our results indicate that an EDC shift, while unpopular with many physicians, provides valuable services to an overcrowded ED and that the implementation of this type of shift could reduce LOS and LWBS statistics in a tertiary care institution. Additional evaluations to examine this and other front-end interventions in other ED centers are indicated.
Keywords: triage liaison physicians, emergency department operations, length of stay

LO68

Patterns and predictors of emergency physician productivity

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Introduction: Emergency Physician (EP) performance comprises both quality of care and quantity of patients seen in a set time. Emergency Department (ED) overcrowding increases the importance of the ability of EPs to see patients as rapidly as is safely possible. Maximizing efficiency requires an understanding of variables that are associated with individual physician performance. While using the incidence of return visits within 48 hours as a quality measure is controversial, repeat visits do consume ED resources. **Methods:** We analysed the practice variables of 85 EPs working at a single academic ED, for the period from June 1, 2013 to May 31, 2017, using data from an emergency department information system (EDIS). Variables analysed included: number of shifts worked, number of patients seen per hour (pt/hr), an adjusted workload measurement (assigning a higher score to CTAS 1-3 patients), percentage of patients whose care involved an ED learner, and the percentage of patients who returned to the ED within 48 hours of ED discharge. Resource utilization was measured by percentage of diagnostic imaging (ultra sound (US), CT scan (CT), x-ray (XR)) ordered and percentage of patients referred to consulting services. We performed principal component analyses to identify bench marks of resource use, demographic (age, EM qualification, gender) and other practice related predictors of performances. **Results:** Mean pt/hr differed significantly by EM Qualification for CTAS 2-4, with 1.71/hr (95% Confidence Interval = 1.63-1.77) by FRCPS physicians, compared to 1.89/hr by CCFP(EM) (CI = 1.81-1.97). There were no differences for CTAS 1 and 5. Other variables associated with a significantly lower pt/hr, included a greater use of imaging, (CT: $p = 0.0003$, XR: $p = 0.0008$) although this was did not reach statistical significance with US ($p = 0.06\%$). Female gender, older age, number of patient consultations for CTAS 3 and more patients seen by a learner were all associated with lower pt/hr. Pt/hr was a better predictor (R2 = 45%) for EP resource utilization than adjusted workload measurement (R2 = 35%). Higher use of CT was associated with fewer return visits in <48 hrs (0.13% lower). Male gender, younger age, number of patient consultation for CTAS 3 and fewer patients seen by a learner were all associated with an increase in return visits. **Conclusion:** We found a significant difference in pt/hr rates and return visits within 48 hours between EPs with different age ranges, gender, and EM certification. Increased use of CT scan and x-ray, and consultation for patients CTAS 3 were associated with lower pt/hr. Return visit rates also varied in association with diagnostic imagine use, age, gender and number of patients seen by a learner. Further research is needed to assess the association with these variables on quality of care.

Keywords: emergency physician productivity, emergency department efficiency

LO69

Factors related to the eventual publication of abstracts presented at the Canadian Association of Emergency Physicians annual meeting from 2013-2017

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Introduction: Much of the research presented at conference meetings never go on to be published in peer-reviewed literature, thereby limiting the dispersion of these findings to a larger audience. We sought to assess if this was true with regard to CAEP meetings, by establishing the publication rate and factors correlated with publication of CAEP abstracts in peer-reviewed journals from 2013-2017. **Methods:** We conducted a scoping review that included all CAEP abstracts from 2013-2017, obtained through the Canadian Journal of Emergency Medicine. Two reviewers screened and extracted data from all abstracts individually, with any conflicts resolved by a third reviewer. Data extracted from abstracts included province of authors, sample size, study design, the presence of statistically positive or negative findings, status of publication, date of acceptance to a journal, and journal of publication. Databases searched for publication status included MEDLINE, EMBASE, The Cochrane Library and Ovid Health Star. A level of evidence (LOE) was assigned using the 2011 Oxford Centre for Evidence-Based Medicine criteria. **Results:** All abstracts (1090) from 2014-2017 have been analyzed thus far. Inter-rater agreement for data extraction was high (value 0.85). 17.1% (186/1090) of abstracts presented at the conference had a corresponding full text publication in the peer-reviewed literature. Articles were published in 102 different journals, with the greatest number of publications in the Canadian Journal of Emergency Medicine (CJEM) (15.1%, 28/186), followed by Academic Emergency Medicine (10.2%, 19/186). The mean time to publication was 51 weeks (95% CI 43,59). 30.6% (57/186) of published abstracts had statistically positive findings, while 10.8% (20/186) had negative findings. A significant difference was present between publication findings and publication status ($p < 0.0001$, chi-squared). 68.8% (128/186) of published articles were of level III evidence. A statistical difference was found between LOE and publication status ($p < 0.0001$, chi-squared). **Conclusion:** A large number of abstracts presented at CAEP are presently unpublished. There may be a publication bias in the literature as a greater number of studies with positive findings have been published. Additionally, two-thirds of studies published are of level III evidence. An increasing emphasis should be placed in publishing studies with higher levels of evidence, and more studies with negative findings.

Keywords: evidence-based medicine, level of evidence, quality of research

LO70

Interrater agreement and time it takes to assign a Canadian Triage and Acuity Scale score pre and post implementation of eCTAS

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Introduction: In addition to its clinical utility, the Canadian Triage and Acuity Scale (CTAS) has become an administrative metric used by governments to estimate patient care requirements, ED funding and workload models. The Electronic Canadian Triage and Acuity Scale (eCTAS) initiative aims to improve patient safety and quality of care by establishing an electronic triage decision support tool that standardizes the application of national triage guidelines (CTAS) across Ontario. The objective of this study was to evaluate the implementation of eCTAS in a variety of ED settings. **Methods:** This was a prospective, observational study conducted in 7 hospital EDs, selected to represent a mix of triage processes (electronic vs. manual), documentation practices (electronic vs. paper), hospital types (rural, community and teaching) and patient volumes (annual ED census ranged from 38,000 to 136,000). An expert CTAS auditor observed on-duty triage nurses in the ED and assigned independent CTAS in real time. Research assistants not involved in the triage process independently recorded the triage time. Interrater agreement was estimated using unweighted and quadratic-weighted kappa statistics with 95% confidence intervals (CIs). **Results:** 1200 (738 pre-eCTAS, 462 post-implementation) individual patient CTAS assessments were audited over 33 (21 pre-eCTAS, 11 post-implementation) seven-hour triage shifts. Exact modal

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agreement was achieved for 554 (75.0%) patients pre-eCTAS, compared to 429 (93.0%) patients triaged with eCTAS. Using the auditors CTAS score as the reference standard, eCTAS significantly reduced the number of patients over-triaged (12.1% vs. 3.2%; 8.9, 95% CI: 5.7, 11.7) and under-triaged (12.9% vs. 3.9%; 9.0, 95% CI: 5.9, 12.0). Interrater agreement was higher with eCTAS (unweighted kappa 0.90 vs. 0.63; quadratic-weighted kappa 0.79 vs. 0.94). Research assistants captured triage time for 4403 patients pre-eCTAS and 1849 post implementation of eCTAS. Median triage time was 304 seconds pre-eCTAS and 329 seconds with eCTAS (25 seconds, 95% CI: 18, 32 seconds). **Conclusion:** A standardized, electronic approach to performing CTAS assessments improves both clinical decision making and administrative data accuracy without substantially increasing triage time.

Keywords: triage, electronic Canadian Triage and Acuity Scale, interrater agreement

LO71

Implementation strategies to promote provider behaviour change in emergency departments

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Introduction: Translating research evidence into routine clinical practice in emergency departments (EDs) often requires changing the behavior(s) of one or more member of the healthcare team. Changing strongly entrenched behavior patterns or occasional behaviors that are impacted by psychological, social or environmental factors can be challenging. We conducted a systematic review of the literature to identify implementation strategies that have been evaluated to change ED provider behavior and promote the uptake of evidence in emergency practice settings. **Methods:** The following databases were systematically searched from inception to 2017 with the support of a library scientist: MEDLINE, CINAHL, Embase and Cochrane CENTRAL. We also manually searched the last 5 years of Annals of Emergency Medicine, Canadian Journal of Emergency Medicine, and Implementation Science. Studies were assessed by two independent reviewers and retained if they included one or more of the implementation strategies listed in the Cochrane Effective Practice and Organization of Care (EPOC) Taxonomy, targeted any health care provider working in any type of emergency department. The Cochrane Risk of Bias tool was used to assess study quality. **Results:** Following review of 13,000 title and abstracts, 33 studies met the inclusion criteria. The majority of included studies were randomized control trials (N = 32) and 50% were published in the last seven years. Although poorly described, interventions targeted either physicians (n = 12), nurses (n = 8), pharmacists (n = 1) or multi-disciplinary teams (n = 12). Common behavioral targets included compliance with practice guidelines, test ordering and prescribing. According to the EPOC Taxonomy most implementation strategies were multi-component and could be categorized as either educational materials/meetings and/or reminders. Only one study author reported using evidence to inform the design of the implementation strategy. Effect sizes varied across relevant study outcomes but the direction of effect was positive in 22/33 included studies. Heterogeneity of study interventions and outcomes precluded meta-analysis. **Conclusion:** To strengthen the evidence base regarding implementation strategies that promote provider behavior change across different ED contexts, there is a critical need to improve both the design and reporting of implementation strategies in ED research.

Keywords: implementation science, healthcare provider behaviours, evidence-based practice

LO72

A randomized controlled trial of electronic clinical decision support to reduce unnecessary CT imaging for patients with mild traumatic brain injury

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Introduction: Utilization of CT imaging has risen dramatically with increases in availability, but without corresponding improvements in patient outcomes for many clinical scenarios. Previous attempts to improve imaging appropriateness have met with limited success, with commonly cited barriers including a lack of confidence in patient outcomes, medicolegal risk, and patient expectations. The objective of this study was to assess the impact of an electronic clinical decision support (CDS) intervention to reduce CT utilization for emergency department (ED) patients with mild traumatic brain injury (MTBI). **Methods:** This was a cluster-randomized, controlled trial with physicians as the unit of randomization. All emergency physicians (EPs) at 4 urban adult EDs and 1 urgent care center were randomly assigned to receive evidence-based imaging CDS (intervention) or no CDS (control) for patients with MTBI over a 1-year study period. CDS was launched in an external web browser whenever an intervention EP ordered a non-enhanced head CT from the computerized physician order entry (CPOE) system for ED patients CTAS 2-5 with a CEDIS chief complaint of head injury; however, interaction with CDS was voluntary. The CDS tool provided detailed information to physicians about the Canadian CT Head Rule, including patient eligibility, exclusion criteria, risk factors and probability of serious injury, as well as an imaging recommendation (yes/no). CDS recommendations could be printed for the medical record as could educational patient handouts to support physician decision making. The primary outcome was CT utilization for patients with MTBI on the index visit. Secondary outcomes included ED length of stay (LOS), and return visits, CT use, hospital admission and traumatic head injury diagnoses over the next 30-days. This study was REB approved. **Results:** Physician demographics and baseline CT utilization for MTBI patients were similar among intervention and control EPs during a 2-year pre-intervention period. In the first 8-months following CDS implementation, 102 intervention EPs saw 2,189 eligible patients while 100 control EPs saw 1,707 patients. Intervention EPs voluntarily interacted with CDS on 36.2% of eligible encounters. Head CT utilization was lower among intervention EPs than controls (38.5% vs. 45.1%, $p < 0.0001$) as was ED LOS (201 vs. 218.5 minutes, $p < 0.001$). There was no difference in 30-day ED return visits, head CT utilization, hospital admission or traumatic head injury diagnoses. **Conclusion:** In one of the largest RCTs of CDS to date, exposure to CDS was associated with decreased head CT utilization and shorter LOS on the index visit, and no difference in 30-day head CT use, return ED visits or hospital admission. These results suggest that a comprehensive CDS implementation may be able to overcome several barriers to use of decision rules and may contribute to improved clinical decision making and decreased CT utilization.

Keywords: clinical decision support, diagnostic imaging, mild traumatic brain injury

LO73

A randomized controlled trial of electronic clinical decision support to reduce unnecessary CT imaging for patients with suspected pulmonary embolism

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Introduction: Utilization of CT pulmonary angiography (CTPA) to rule out pulmonary embolism (PE) has risen dramatically but diagnostic yield has fallen over the past several decades, suggesting that lower risk patients are being tested. Given little evidence to suggest improved patient outcomes with higher CTPA utilization, and increasing evidence of harm, evidence-based guidelines have been developed to reduce unnecessary CTPA use. The objective of this study was to assess the impact of an electronic clinical decision support (CDS) intervention to reduce unnecessary CTPA utilization for emergency department (ED) patients with suspected PE. **Methods:** This was a cluster-randomized, controlled trial with physicians as the unit of randomization. All emergency physicians (EPs) at 4 urban adult EDs and 1 urgent care center were randomly assigned to receive either evidence-based imaging CDS for patients with suspected PE (intervention) or no CDS (control) over a 1-year study period. CDS was launched in an external web browser whenever an intervention EP ordered a CTPA from the computerized physician order entry software for ED patients CTAS 2-5; however, physician interaction with CDS was voluntary. The CDS tool enabled calculation of patient-specific information, including the patients Wells score, PERC score, and age-adjusted D-dimer, as well as prediction of each patients pre-test risk of PE along with an imaging/no imaging recommendation. CDS recommendations could be printed for the medical record as could educational patient handouts to support physician decision-making. The primary outcome was CTPA utilization for patients with CEDIS chief complaints of shortness of breath or chest pain on the index visit. Secondary outcomes included index visit length of stay (LOS), and CTPA use or VTE diagnosis within 90-days. This study was REB approved. **Results:** Demographics were similar among intervention and control EPs; however, during a 2-year pre-intervention period control EPs had a higher baseline CTPA rate (8.5% vs. 7.7%, $p < 0.001$). In the first 8-months following CDS implementation, 94 intervention EPs saw 9,609 patients and voluntarily interacted with the CDS tool on 43.2% of eligible encounters while 91 control EPs saw 9,498 patients. CTPA utilization was higher among intervention EPs than control (9.6% vs. 8.3%, $p < 0.001$) as was ED LOS (302 vs. 287 minutes, $p < 0.001$). There was no difference in 90-day CTPA use or VTE diagnoses. **Conclusion:** In one of the largest RCTs of CDS to date, exposure to CDS was associated with higher rates of CTPA utilization and longer ED LOS on the index visit, and no difference in 90-day CT use or VTE diagnoses. These results differ from a concurrent study of CDS for patients with mild traumatic brain injury in the same physician population and may relate to the implementation of the CDS intervention and/or complexity of the underlying evidence-based algorithms.

Keywords: clinical decision support, pulmonary embolism, diagnostic imaging

LO74

Cost-effectiveness of pathways for diagnosing pulmonary embolism in Canada

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Introduction: Pulmonary embolism (PE) is a common cardiovascular condition with high mortality rates if left untreated. Given the non-specific and varied symptoms of PE, its diagnosis remains challenging and approaches can lend themselves to inefficiencies through over-testing and over-diagnosis. Clinicians rely on a multi-component and sequential approach, including clinical risk assessment, rule-out biomarkers, and diagnostic imaging. This study assessed the potential cost-effectiveness of different diagnostic algorithms. **Methods:** A cost-utility model was developed with an upfront decision tree capturing the diagnostic accuracy and a Markov cohort model reflecting the lifetime disease progression and clinical utility of each diagnostic strategy. 57 diagnostic strategies were evaluated that were permutations of various clinical risk assessment, rule-out biomarkers and diagnostic imaging modalities. Diagnostic test accuracy was informed by systematic reviews and meta-analyses, and costs (2016 CAD) were obtained from Canadian costing databases to reflect a health-care payer perspective. Separate scenario analyses were conducted on patients contra-indicated for computed tomography (CT) or who are pregnant as this entails a comparison of a different set of diagnostic strategies. **Results:** Six diagnostic strategies formed the efficiency frontier. Diagnosing patients with PE was generally cost-effective if willingness-to-pay was greater than $1,481 per quality-adjusted-life year (QALY). CT dominated other imaging modality given its greater diagnostic accuracy, lower rates of non-diagnostic findings and lowest overall costs. The use of clinical prediction rules to determine clinical pre-test probability of PE and the application of rule-out test for patients with low-to-moderate risk of PE may be cost-effective while reducing the proportion of patients requiring CT and lowering radiation exposure. At a willingness-to-pay of $50,000 per QALY, the strategy of Wells (2 tier) –> d-dimer –> CT –> CT was the most likely cost-effective diagnostic strategy. However, different diagnostic strategies were considered cost-effective for pregnant patients and those contra-indicated for CT. **Conclusion:** This study highlighted the value of economic modelling to inform judicious use of resources in achieving a diagnosis for PE. These findings, in conjunction with a recent health technology assessment, may help to inform clinical practice and guidelines. Which strategy would be considered cost-effective reflected ones willingness to trade-off between misdiagnosis and over-diagnosis.

Keywords: health economics, methodology, diagnostic technologies

LO75

Utility of red flags to identify serious spinal pathology in patients with low back pain: a retrospective analysis

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Introduction: Practice guidelines discourage routine imaging for low back pain and recommend selective use when serious underlying conditions are suspected. Evidence about prevalence of serious pathologies and accuracy of red flags for decision-making is limited. We describe rates of serious low back pathology, assess the accuracy of three red flags and model the utility of combining administratively available red flags to reduce imaging. **Methods:** A seven-year retrospective study of patients presenting with low back pain to four emergency departments in Nova Scotia, Canada. Patient characteristics were available from administrative data. We test sensitivity, specificity, positive and negative predictive values, and likelihood ratios of individual and combinations of red flags. We use decision curve analyses to assess the clinical utility of three red flags to inform imaging. **Results:** We included data from 38,714 patients presenting with low back pain. Serious low back pathology was diagnosed in 1,196 (3.09%): 847 (2.19%) were vertebral fractures, 184 (0.48%) unstable fracture, 262 (0.68%) cancer, 57 (0.15%) cauda equina syndrome, and 30 (0.08%) spinal infection. Value of combining three red flags (age >65, female sex, and trauma) was found: positive likelihood ratios of 4.36 and 9.74 for vertebral fracture and unstable fracture, respectively. Imaging for

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low back pain could be reduced by 28 per 100 patients using a model that incorporates sex, age >65, and trauma. **Conclusion:** Serious low back pathology is extremely rare in patients presenting with low back pain. Combinations of red flags readily available in emergency departments have the potential to reduce unnecessary imaging tests.
Keywords: low back pain, diagnostic imaging, red flags

LO76

Can emergency physicians perform carotid artery ultrasound to detect severe stenosis in patients with TIA and stroke?

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Introduction: Carotid artery stenosis (CAS) is a common cause of stroke. Patients with severe, symptomatic CAS can have their subsequent stroke risk reduced by carotid endarterectomy or stenting when completed soon after a TIA or non-disabling stroke. Patients presenting to a peripheral ED with TIA/stroke, may require transfer to another hospital for imaging to rule-out CAS. The purpose of this study was to determine the test characteristics of carotid artery POCUS in detecting greater than 50% stenosis in patients presenting with TIA/stroke. **Methods:** We conducted a prospective cohort study on a convenience sample of adult patients presenting to a tertiary care academic ED with TIA/stroke between June and October 2017. Carotid POCUS was performed by a trained medical student or a trained emergency physician. Our outcome measure, CAS >50% was determined by the final radiology report of CTA imaging by a trained radiologist, blinded to our study. A blinded POCUS expert reviewed the carotid POCUS scans. We calculated the sensitivity and specificity for CAS >50% using carotid POCUS versus the gold standard of CTA. **Results:** We enrolled 75 patients of which 5 did not meet inclusion criteria. The mean age was 70.4 years, 57% were male. 16% were diagnosed with greater than 50% CAS. 47% were stroke codes and 37% were admitted to hospital. Carotid POCUS had a sensitivity and specificity of 72% (46%-99%) and 88% (80%-96%) respectively. There were three false negatives of which two were exactly 50% ICA stenosis on CTA and the other was 100% occlusion of the distal ICA. Kappa coefficient for inter-rater reliability between standard and expert interpretation was 0.68 for moderate agreement. The scan took a mean time of 6.2 minutes to complete. **Conclusion:** Carotid POCUS has moderate correlation with CTA for detection of CAS greater than 50%. Carotid POCUS identified all the critical 70-99% stenosis lesions that would need urgent surgery. Further research is needed to confirm these findings.
Keywords: stroke, point-of-care ultrasound, transient ischemic attack

LO77

Predictors of adverse self-reported 10-day outcomes in emergency department patients with acute ureteral colic

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Introduction: Our objective is to investigate predictors of adverse patient reported outcomes during the 10 days after an index emergency department (ED) encounter for ureteral colic. **Methods:** This prospective two-city patient experience survey enrolled ED patients with confirmed 2-10 mm ureteric stones. Researchers telephoned consenting patients 10 days post-ED visit and assessed quality of life (QoL) using survey items from the VR-12 Health Outcome Survey. We used five survey items and three other variables to derive a composite measure of patient adverse experience (AE). The association between patient characteristics, symptoms and perceptions of care with outcome was determined using multiple logistic regression. **Results:** Of 224 patients studied (68% male, mean age 52 years) 154 (68.8%) indicated that one or more of the following AEs occurred during their 10 day followup interval: 103 (46%) reported that the impact of pain on their life was >4/10; 87 (39%) described poor or fair health status; 83 (37%) required >7 days for return of normal function; 66 (27.7%) had >2 severe pain episodes per day; 62 (27.7%) required ED revisit or hospitalization; 47 (21%) found usual activities were limited most or all the time; 45 (20%) required >2 opioid doses/day; and 24 (10.7%) lost >7 work days. A composite measure derived from 3 survey items (days to normal, pain impact, health status) captured 92% of patients with adverse experiences. On multivariable logistic regression modeling, the strongest predictors of adverse (composite) outcome were male sex (adjusted OR = 0.44; CI, 0.22-0.85), (excellent) quality of physician answers (OR = 0.40; CI,0.2-0.77), proximal or mid-ureteric stone (OR = 1.9; CI, 1.1-3.5), arrival pain severity (OR = 1.18 per unit increase; CI,1.01-1.4), and perceived physician skill (OR = 0.81; CI, 0.65-1.0). Patient age, stone size, pain duration, nausea, discharge pain and perceived ED care quality were not independent predictors of 10-day adverse patient experience in multivariate models. **Conclusion:** Patient sex, quality of physician communication, patient sex, arrival pain severity, and proximal stone location are highly associated with 10-day patient reported AE.
Keywords: renal colic, patient adverse experiences, quality of life

LO78

Point-of-care ultrasound compared with manual palpation for the detection of a carotid pulse in live models: a randomized cross-over study

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Introduction: Pulse check by manual palpation (MP) is an unreliable skill even in the hands of healthcare professionals. In the context of cardiac arrest, this may translate into inappropriate chest compressions when a pulse is present, or conversely omitting chest compressions when one is absent. To date, no study has assessed the utility of B-mode ultrasound (US) for the detection of a carotid pulse. The primary objective of this study is to assess the time required to detect a carotid pulse in live subjects using US compared to the standard MP method. **Methods:** This is a prospective randomized controlled cross-over non-inferiority trial. Health care professionals from various backgrounds were invited to participate. They attended a 15 minute focused US workshop on identification of the carotid pulse. Following a washout period, they were randomized to detect a pulse in live subjects either by MP first or by US first. Both pulse check methods were timed for each participant on 2 different subjects. The primary outcome measure was time to carotid pulse detection in seconds. Secondary outcome measures included comfort levels of carotid pulse detection measured on a 100mm visual analog scale (VAS), and rates of prolonged pulse checks (greater than 5 or 10 seconds) for each technique. Mean pulse detection times were compared using Students t-test. The study was powered to determine whether US was not slower than MP by greater than 2 seconds. **Results:** A total of 93 participants completed the study. Time to detect pulse was 4.2 (SD = 3.4) seconds by US compared with 4.7 (SD = 6.5) seconds by MP (P = 0.43). Seventeen (18%) participants took >5 seconds to identify the carotid pulse using US compared to 19 (20%) by MP (P = 0.74). Eight (9%) candidates took >10 seconds to

identify the pulse using US compared to 9 (10%) by MP (P = 0.81). Prior to training, participants had a higher comfort level using MP than US pulse checks (67 vs. 26 mm, P < 0.001). Following the study, participants reported higher comfort levels using US than MP (88 vs. 78 mm, P < 0.001). **Conclusion:** Carotid pulse detection in live subjects was not slower using US as compared to MP in this study. A brief teaching session was sufficient to improve confidence of carotid pulse identification even in those with little to no previous US training. The preliminary results from this study provide the groundwork for larger studies to evaluate this pulse check method for patients in actual cardiac arrest.

Keywords: ultrasound, pulse, palpation

LO79

Climbing the learning curve teaching the pediatric emergency physician how to interpret point-of-care ultrasound images

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Introduction: Point-of-Care Ultrasound (POCUS) is rapidly being integrated into Pediatric Emergency Medicine (PEM), and image interpretation is an important component of this skill. Currently, PEM physicians often rely on case-by-case exposure and feedback by a POCUS expert physician to learn this skill; however, this may not be efficient, reliable or feasible. Thus, there is a pressing need to develop effective POCUS image interpretation learning and assessment tools. We developed an on-line learning platform that allowed for the deliberate practice of images in four POCUS applications [soft tissue, lung, cardiac and Focused Assessment Sonography for Trauma (FAST)], and determined the quantity of participant skill acquisition by deriving performance metrics and learning curves. **Methods:** This was a prospective cross-sectional study administered via an on-line learning and measurement platform. Images were acquired from a pediatric emergency department and each POCUS application contained 100 still/video images. Final diagnosis of each image was determined via the consensus of three PEM POCUS experts. PEM fellow and attending study participants were recruited from the USA and Canada and were required to complete the cases of at least one application. We aimed to enroll 200 participants who had to complete a minimum of 100 cases which, based on prior work, would provide sufficient raters for item analyses and comparisons between PEM attendings and fellows. To derive reference standard performance metrics and to validate image interpretations, a unique set of five PEM POCUS experts completed each application. **Results:** We enrolled 225 PEM physicians, 74 fellows and 151 attendings. For all applications, the Cohens d effect size was large at 0.87, and there was no difference between PEM attendings and fellows with respect to summary performance metrics (accuracy, p = 0.29; sensitivity, p = 0.13; specificity, p = 0.92). Final accuracy soft tissue, lung, cardiac, and FAST for all participants was 86.4%, 89.6%, 81.6%, 88.0%, respectively, and the corresponding accuracy of PEM POCUS experts for each application was 96.0%, 96.0%, 90.0%, and 93.0%. Learning curves show maximal learning gains (inflection point) up until 65 cases for soft tissue, 70 for FAST, 75 for lung, and 85 for cardiac. **Conclusion:** Deliberate practice of POCUS image interpretation was effective for ensuring broad domain coverage and predictable skill improvement. Specifically, there was a large learning effect after 100 case interpretations, and 65-85 case interpretations were needed to reach an accuracy threshold of approximately 85%.

Keywords: medical education, diagnosis, learning

LO80

Ondansetron administration to non-dehydrated children with acute gastroenteritis-associated vomiting, in emergency departments in Pakistan: a randomized, blinded, phase 3, superiority trial

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Introduction: In high-income countries, vomiting often impedes oral rehydration therapy, leading to intravenous rehydration fluid administration to children with acute gastroenteritis. Ondansetron administration reduces vomiting and intravenous fluid administration in this population. We evaluated whether ondansetron is similarly effective when employed in Pakistan. **Methods:** In this 2-hospital, double-blind, placebo-controlled, emergency department-based, randomized trial, we recruited children aged 0·5 to 5·0 years, without dehydration, who had diarrhea and 1 episode of vomiting within 4 hours of arrival. Patients were randomly assigned (1:1), via an internet-based randomization service, using a stratified, variable block randomization scheme, to receive a single dose of oral ondansetron or placebo. The primary endpoint was intravenous rehydration (administration of 20 ml/kg over 4 hours of an isotonic fluid) within 72 hours of randomization. All randomized children were analysed. **Results:** From July 3, 2014, to January 12, 2017, 626 children were randomized. Intravenous rehydration was provided to 10.8% (34/314) and 10.3% (27/312) of children administered placebo and ondansetron, respectively (OR: 0.946; 95% CI: 0.564, 1.587; P = 0.834). A regression model fitted with treatment group and adjusted for antiemetic administration and vomiting frequency in the preceding 24 hours, yielded similar results; OR = 0.952; 95% CI: 0.570, 1.589; P = 0.850. There was no evidence of interaction between treatment group and age (P = 0.974), 3 diarrheal stools in the preceding 24 hours (P = 0.983) or 3 vomits in the preceding 24 hours (P = 0.554). During the 4-hour study observation period, 24.0% (75/314) and 19.6% (61/312) of children in the placebo and ondansetron groups vomited, respectively; OR: 0.774; 95% CI: 0.528, 1.133; P = 0.187. **Conclusion:** Ondansetron administration did not significantly reduce intravenous rehydration use, suggesting that in children without dehydration, ondansetron administration does not significantly alter the disease course and should not be administered to this group of children.

Keywords: ondansetron, vomiting, gastroenteritis

LO81

Bridging the GAP: A deliberate practice method for learning genital abnormalities in prepubescent girls

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Introduction: Correctly identifying pathology in pre-pubertal females is a high-stakes physical examination skill. Currently, learning this skill relies heavily on case-by-case exposure, which is variable, limited and often results in suboptimal skill. Thus, there is a need to develop and evaluate learning platforms that simulate the presentation and diagnosis of this important clinical task. We developed an on-line learning and assessment platform that allowed the deliberate practice of 158 pre-pubertal female genital image interpretations . We examined the quantity of skill acquisition by deriving performance metrics and learning curves. **Methods:** This was a prospective cross-sectional study administered via an on-line learning and assessment platform. Colposcopic images were acquired from a child abuse clinic. Two child abuse experts

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interpreted images to determine case solutions and 40% of cases had medical or traumatic pathology. Further, to validate image interpretations, a unique set of five child abuse and pediatric gynaecology experts reviewed the cases. Study participants were recruited from the USA and Canada and were required to complete all 158 cases. For each image, learners designated cases as normal or abnormal and if abnormal indicated the abnormal area on the image. The primary outcome was the change in accuracy, sensitivity and specificity. **Results:** We enrolled 107 participants, 26 medical students, 31 pediatric residents, 24 pediatric emergency fellows, and 26 pediatric emergency attendings. For all participants, the change in accuracy was +9.6% for accuracy (<0.001), +1.4% for sensitivity ($p = 0.6$) and +15.7% ($p < 0.001$) for specificity. The final score for accuracy, sensitivity and specificity was 79.5%, 66.1%, and 87.8%, respectively. There was no difference between learner types with respect to summary performance metrics (accuracy, $p = 0.15$; sensitivity, $p = 0.44$; specificity, $p = 0.54$). Learning curves show maximal learning gains (inflection point) up until 100 cases. **Conclusion:** Deliberate practice of pre-pubertal female image interpretation was effective for ensuring predictable skill improvement for normal cases but was less effective for abnormal cases. Future research could examine how to refine the education tool to better serve diagnostic skill of abnormal cases.

Keywords: pediatrics, diagnosis, education

LO82

Normal bedside ultrasound of growth plates in healthy children

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Introduction: The diagnosis of Salter-Harris Type 1 fractures in the Emergency Department (ED) is primarily clinical, as radiographs are usually unrevealing. We hypothesize that bilateral asymmetry of the growth plate, detected using bedside ultrasound (US), could improve the accuracy of this diagnosis in the ED. This study seeks to determine growth plate size according to age, and to establish normal variation in bilateral symmetry of growth plate cartilage, for the ulna, radius, tibia, and fibula, using bedside US in normal healthy children. **Methods:** This prospective observational study was conducted in a convenience sample of children ages 0-17 during planned visits to an elementary school, high school, and an outpatient pediatric clinic. A sample size of 177 was determined with a linear regression model using previously published data on the subject. The study was approved by the hospital and universitys ethics board. After a medical questionnaire with a research nurse, the participants underwent ultrasound evaluation of bilateral ulnae, radii, fibulae, and tibiae, to obtain still images of the physes from two orthogonal views. The evaluations were performed by 3 medical residents, 1 medical student, and by the supervising emergency physician. All ultrasonographers were EDE1 certified and specifically trained for growth plate imagery. The still images were evaluated ulteriorly and measurements taken of the physeal cartilage. Ten percent of the patients had their images re-evaluated by the supervising physician to determine inter-rater reliability. **Results:** A total of 227 patients were recruited. The median age was 8 years old with an interquartile range of (3;14). Mean growth plate size by age was determined, confirming decreasing growth plate size with advancing age for all articulations. The percentage of absolute difference between right and left, for all growth plates together, was a mean of 17% with a 95% CI of 16-19%. The overall inter-rater reliability was excellent at 0.84. **Conclusion:** This study establishes a reproducible technique of measuring growth plates with ultrasound. We suspect that increased asymmetry at the growth plate, beyond this established normal variation, may signify a physis widening or hematoma consistent with a Salter-Harris Type 1 fracture; this will be evaluated in a second study.

Keywords: ultrasound, growth plate, Salter-Harris Type 1

LO83

Relevance of international opioid prescribing guidelines for emergency department practice

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Introduction: The opioid crisis in North America has led to more rigorous prescribing guidelines in various practice settings. Recent studies suggest that the Emergency Department is an environment with increased opioid prescribing, leading to increased rates of long-term use and dependence in opioid naive patients. Prior reviews of international opioid prescribing guidelines have demonstrated overall congruence of practice recommendations, although these are focused on primary care prescribers. The goal of this study was to review international opioid prescribing guidelines for recommendations relevant to emergency department practitioners. **Methods:** The search strategies of prior congruence studies were reproduced, updated and supplemented by electronic database and specialty organization searches. Only the most recent iteration of a published guideline was included, unless it was a limited update of a prior more comprehensive guideline, in which case both were assessed. Prescribing guidelines were included if they represented national practice statements, national or international specialty organizations generating guidelines. Sub-national or regional guidelines were excluded due to local practice bias tendency. Included guidelines were independently reviewed for evidence evaluation and recommendation formulation frameworks, relevance of recommendations for emergency medicine (EM) practice (and supporting levels of evidence), inclusion of EM authors (and corresponding conflict of interest statements), and involvement of EM-relevant stakeholders in reviewing guideline publications. **Results:** Sixteen international and specialty organization guidelines were included in the review. Evidence evaluation and recommendation formulation frameworks were incompletely reported (12/16), and used a multitude of evaluation processes when reported. Two guidelines included EM-relevant recommendations based on weak evidence. Three guidelines included EM authors, one of which reported a conflict of interest. None of the included guidelines were reviewed by EM-relevant stakeholder organizations prior to publication. **Conclusion:** International and specialty organization opioid prescribing guidelines virtually ignore relevant recommendations for EM practice, and any supporting evidence is weak. Emergency practitioners are nearly absent from authorship groups, and are excluded from external review of draft documents prior to final publication. This study reinforces the urgent need for EM organizations to create guidance documents around opioid prescribing for their own practitioners, and involving appropriate EM stakeholders.

Keywords: guidelines, opioids

LO84

Experiences of youth and family presenting to the emergency department for addiction and mental health

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Introduction: The Canadian Institute for Health Information reports the rate of child and youth emergency department (ED) visits for mental

health complaints increased by 50% between 2007 and 2015. Improving care for these patients is a major priority of Alberta Health Services (AHS). As part of a multi-phased approach to improving care, the Emergency and the Addiction and Mental Health Strategic Clinical Networks (SCNs) surveyed youth who had presented to an ED for mental health or substance use concerns and their families/caregivers. **Methods:** The online survey contained closed- and open-ended questions on reasons for ED visits, expectations about and experiences during their visits, and areas for improvement. An ethics approved survey was conducted for 4 weeks. Participants were recruited across the province using an extensive array of social media platforms. For each survey, we randomly selected a sample of open-ended responses to thematically analyze to the point of informational redundancy. **Results:** The Youth survey received 992 responses and the Family survey received 553. A small number of overarching themes emerged. For both surveys, the major themes were 1) Wait times and access: participants were disappointed with lengthy wait times and services in the community. Youth said this made them question their decision to seek help and left them feeling hopeless. 2) Care provider training: participants were unhappy with the quality of care provided (e.g., lack of compassion, minimizing symptoms). They felt better training would improve care and attitudes towards mental health patients. 3) Environment: participants were uncomfortable with the lack of privacy for discussing sensitive topics; youth also requested items such as pens/paper and phone chargers to make the stay more comfortable and provide distractions. An additional theme emerged in the Youth survey regarding family involvement; participants wanted to decide how much/what information is shared with their families. Youth noted they were less likely to be honest with family present. Communication and navigation were mentioned frequently in the Family survey; participants noted the complexity of the mental health care system and felt frustrated by the lack of information to help them access additional resources. **Conclusion:** There are a number of areas in need of improvement to provide high-quality, patient-centred care to youth with mental health or substance use concerns that present to the Emergency Department. Phase II of this project will involve a review of the themes and determine priorities and strategies to address the themes that could be implemented into the workflow.

Keywords: child, youth, addiction and mental health

LO85

Knowledge, attitudes, and practices regarding opioid use in the pediatric emergency department

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Introduction: Inadequate pain management in children is ubiquitous in the emergency department (ED). As the current national opioid crisis has highlighted, physicians are caught between balancing pain management and the risk of long term opioid dependence. This study aimed to describe pediatric emergency physicians (PEPs) willingness to prescribe opioids to children in the ED and at discharge. **Methods:** A unique survey tool was created using published methodology guidelines. Information regarding practices, knowledge, attitudes, perceived barriers, facilitators and demographics were collected. The survey was distributed to all physician members of Pediatric Emergency Research Canada (PERC), using a modified Dillmans Tailored Design method, from October to December 2017. **Results:** The response rate was 49.7% (124/242); 53% (57/107) were female, mean age was 43.6 years (+/−8.7), and 58% (72/124) had pediatric emergency subspecialty training. The most common first line ED pain medication was ibuprofen for mild, moderate and severe musculoskeletal injury (MSK-I)-related pain (94.4% (117/124), 89.5% (111/124), and 62.9% (78/124), respectively). For moderate and severe MSK-I, intranasal fentanyl was the most common opioid for first (35.5% (44/124) and 61.3% (76/124), respectively) and second line pain management (41.1% (51/124) and 20.2% (25/124), respectively). 74.8% (89/119) of PEPs reported that an opioid protocol would be helpful, specifically for morphine, fentanyl, and hydromorphone. Using a 0-100 scale, physicians minimally worried about physical dependence (13.3+/−19.3), addiction (16.6 +/−19.8), and diversion of opioids (32.8 +/− 26.4) when prescribing short-term opioids to children. They reported that the current opioid crisis minimally influenced their willingness to prescribe opioids (30.0 +/− 26.2). Physicians reported rarely (36%; 45/125) or never (28%; 35/125) completing a screening risk assessment prior to prescribing opioids. **Conclusion:** Ibuprofen remains the most common medication recommended for MSK-I pain in the ED and at discharge. Intranasal fentanyl was the top opioid for all pain intensities. PEPs are minimally concerned regarding dependence, addiction, and the current opioid crisis when prescribing short-term opioids to children. There is an urgent need for robust evidence regarding the dependence and addiction risk for children receiving short term opioids in order to create knowledge translation tools for ED physicians. Opioid specific protocols for both in the ED and at discharge would likely improve physician comfort in responsible and adequate pain management for children.

Keywords: opioids, addiction, pain

LO86

The diagnosis of concussion in pediatric emergency departments: a prospective multicenter study

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Introduction: Accurate identification of children with a concussion by emergency department (ED) physicians is important to initiate appropriate anticipatory guidance and management. In children meeting international criteria for concussion, we aimed to determine the proportion who were provided this diagnosis by the ED physician and which variables were associated with a physician-diagnosed concussion. We also compared persistent symptoms in concussion cases versus those with alternative diagnoses. **Methods:** This was a planned secondary analysis of a prospective, multicenter cohort study. Participants were children aged 5 through 17 years and met Zurich/Berlin International Consensus Statement criteria for concussion. The primary outcome was the proportion of study participants who were assigned a diagnosis of concussion by the treating ED physician. Based on available evidence, between 50% and 90% of children meeting international concussion criteria are also diagnosed by an ED physician as having a concussion. Assuming a worst case scenario that 50% of physicians would diagnose concussion, our anticipated study sample size of 2946 would be accompanied by a +2% margin of error at the 95% confidence level for the primary outcome. **Results:** Among the 2946 eligible children, 2340 [79.4% (95% CI 78.0, 80.8)] were diagnosed with a concussion by an ED physician. Twelve variables were associated with this ED diagnosis, five of which had an odds ratio (OR) > 1.5: older age (13-17 vs. 5-7 years, OR = 2.9), longer time to presentation (>16 vs. < 16 hours, OR = 2.1), nausea (OR = 1.7), sport mechanism (OR = 1.7), and amnesia (OR = 1.6). In those with physician-diagnosed concussion

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versus no concussion, the frequency of persistent symptoms was 62.5% vs. 38.8% ($p < 0.0001$) at one week, 46.3% vs. 25.8% ($p < 0.0001$) at two weeks and 33.0% vs. 23.0% ($p < 0.0001$) at four weeks. **Conclusion:** Most children meeting international criteria for concussion were provided this diagnosis by the ED physician. There were five variables which increased the odds of this diagnosis by at least 1.5-fold. Relative to international criteria, the more selective assignment of concussion by ED physicians was associated with a greater frequency of persistent concussion symptoms. Nevertheless, many patients with alternative diagnoses exhibited persistent concussive symptoms at all time points. Clinicians should therefore weigh the benefits and risks of strictly applying the Zurich/Berlin international criteria versus individual discretion.
Keywords: pediatrics, concussion, diagnosis

LO87

iPad distraction during intravenous cannulation in the pediatric emergency department: a randomized clinical trial

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Introduction: Intravenous (IV) cannulation is commonly performed in emergency departments (ED), often causing substantial pain and distress. Distraction has been shown to reduce child-reported pain, but there is currently little published about the effects of using iPad technology as a distraction tool. Our primary objective was to compare the reduction of pain and distress using iPad distraction (games, movies, books of the child's choice) in addition to standard care, versus standard care alone. **Methods:** This randomized clinical trial, conducted at the Stollery Childrens Hospital ED, recruited children between ages 6 to 11 years requiring IV cannulation. Study arm assignment was performed using REDCaps randomization feature. Due to the nature of the intervention, blinding was not possible for the children, parents or research and ED staff, but the data analyst was blinded to intervention assignment until completion of analysis. Pain, distress, and parental anxiety were measured using the Faces Pain Scale-Revised, the Observed Scale of Behavioural Distress-Revised, and the State Trait Anxiety Inventory, respectively. The pain scores and observed behavioural distress scores were compared using the Mann-Whitney U test. Other co-variates were analyzed using a linear regression analysis. **Results:** A total of 85 children were enrolled, with 42 receiving iPad distraction and 43 standard care, of which 40 (95%) and 35 (81%) children received topical anesthesia, respectively ($p = 0.09$). There were 40 girls (47.1%) with a mean age of 8.32 +/− 1.61 years. The pain scores during IV cannulation ($p = 0.35$) and the change in pain score during the procedure compared to baseline ($p = 0.79$) were not significantly different between the groups, nor were the observed distress scores during IV cannulation ($p = 0.09$), or the change in observed distress during the procedure compared to baseline ($p = 0.44$). A regression analysis showed children in both groups had greater total behavioural stress if it was their first ED visit ($p = 0.01$), had prior hospitalization experience ($p = 0.04$) or were admitted to hospital during this visit ($p = 0.007$). A previous ED visit, however, was predictive of a greater increase in parental anxiety from baseline ($p = 0.02$). When parents were asked whether they would use the same methods to manage pain for their child, parents of the iPad group were more likely to say yes than were parents of the standard care group ($p = 0.03$). **Conclusion:** iPad distraction during IV cannulation in school-aged children was not found to decrease pain or distress more than standard care alone, but parents preferred its use. The effects of iPad distraction may have been over-shadowed by potent topical anesthetic effect. Future directions include exploring iPad distraction for other age groups, and studying novel technology such as virtual reality and interactive humanoid robots.
Keywords: pain, digital technology, distress

LO88

Bronchiolitis management in Calgary emergency departments

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Introduction: Bronchiolitis is a viral respiratory infection and the most common reason for hospitalization of infants. Despite evidence that few interventions are beneficial in patients with bronchiolitis, other studies would have shown that a significant proportion of patients undergo various forms of low value care. This objective of this project was to 1. establish baseline management of bronchiolitis in the Calgary Zone, and 2. deliver audit and feedback (A&F) reports to pediatric emergency physicians (PEP) to identify opportunities and strategies for practice improvement. **Methods:** This retrospective cohort study included all patients 12 months old that presented to a Calgary emergency department or urgent care center with a diagnosis of bronchiolitis from April 1, 2013 to March 31, 2017. Using data from various electronic health data sources, we captured age, vital signs, CTAS, common therapeutic interventions (bronchodilators, steroids, antibiotics) and investigations (chest x-ray (CXR), viral studies, antibiotics). Results were stratified by site and by admission status. Descriptive statistics were used to report baseline characteristics and interventions. Interhospital ranges (IHR) were provided to compare different hospitals in the zone. For the A&F component of the project, consenting PEP received a report of both their individual and peer comparator data and an in-person multi-disciplinary facilitated feedback session. **Results:** We included 4023 patients from all 6 sites (range from 28 to 3316 patients). Admission rates were 21.7% (IHR 0-29%). Mean age was 5.4 months old. Bronchodilator use was 27.0% (IHR 21-41%). 22.0% of patients received a CXR (IHR 0-57%) and 30.3% had viral studies done (IHR range 0.8-33%). PEP had higher usage of viral studies (30% vs. 5.7%), whereas non-PEP had higher CXR usage (46.2% vs. 23.4%). 41 of 66 PEP consented to receive their individual A&F reports (62%). In the facilitated feedback session PEP 1. identified two areas (bronchodilators and viral studies) where improvements could be made and 2. discussed specific strategies to decrease practice variation and minimize low value care including development of a multi-disciplinary care pathway, alignment with inpatient management, education and repeated A&F reports. **Conclusion:** Significant variability exists in management of patients with bronchiolitis across different hospitals in our zone. A facilitated feedback session identified areas for improvement and multi-disciplinary strategies to reduced low value care for patients with bronchiolitis. Future phases of this project include repeated data in 6 months and implementation of a provincial care pathway for the management of bronchiolitis.
Keywords: bronchiolitis, low value care, audit and feedback

LO89

The effectiveness of video discharge instructions for acute otitis media in children: a randomized controlled trial

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Introduction: In children, acute otitis media (AOM) pain is undertreated. We sought to determine if video discharge instructions were

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associated with improved symptomatology, functional outcomes, and knowledge compared to a paper handout. **Methods:** We conducted a randomized controlled superiority trial comparing video discharge instructions (Easy Sketch Pro3TM) on management of pain to a paper handout detailing the same. We included caregivers of children 6 months to 5 years presenting to the emergency department (ED) with a clinical diagnosis of AOM. The primary outcome was symptomatology using the Acute Otitis Media Severity of Symptom (AOM SOS) score between 48 and 72 hours. The 7-item self-report AOM-SOS is scored from 0 to 13 with a higher score indicating more symptomatology. Secondary outcomes included knowledge gain using a 10-item survey, days of daycare/school/work missed, and recidivism. Assuming a minimal clinically important AOM-SOS difference of 2, 90% power, and 5% alpha, 60 individuals/group was needed. **Results:** 219 caregivers were randomized and 149 completed the 72-hour follow-up (72 paper and 77 video). The median (IQR) AOM-SOS score in the video group (adjusted for pre-intervention AOM-SOS, analgesic and antibiotic use) was significantly lower than paper [8 (7,11) versus 10 (7,13), respectively, $p = 0.004$]. There were no significant differences between video and paper in the mean (SD) knowledge score [9.2 (1.3) versus 8.8 (1.8) correct answers, respectively, $p = 0.07$], mean (SD) number that returned to a health provider [8/77 versus 10/72, respectively, $p = 0.49$), mean (SD) number of daycare/schooldays missed [1.2 (1.5) versus 1.1 (2.1), respectively, $p = 0.62$], and mean (SD) number of workdays missed by caregiver [0.5 (1) versus 0.8 (2), respectively, $p = 0.05$]. **Conclusion:** Video discharge instructions are associated with less symptomatology compared to a paper handout, are effective for caregiver education in the ED, and should be used routinely.

Keywords: otitis media, education, pain

LO90

Epidemiologic trends in substance and opioid misuse in Alberta: a cross-sectional, time-series analysis

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Introduction: Substance and opioid misuse are growing public health concerns in Canada. Substance use disorders affect 21.6% of Canadians and accounted for $267 million in healthcare costs in 2011. Opioid misuse is a current public health crisis. The extent of the rise in substance and opioid misuse-related Emergency Department (ED) visits in Canada and the demographic groups in which the rise is concentrated have not been elaborated. Alberta has one of the most complete provincial ED visit records and provides an important understanding of national trends. The objective of this study was to evaluate trends in substance and opioid misuse-related ED visits in Alberta from 2010/11 to 2014/5 within demographic cross-sections of the population using administrative ED visit data from the National Ambulatory Care Reporting System (NACRS). **Methods:** All visits made by adult patients (18 years old) to any of more than 100 Albertan EDs for a substance misuse-related presentation between 2010/11 and 2014/15 were analyzed. Visits were classified as being related to substance or opioid misuse if the primary and/or secondary visit diagnoses were among an a priori determined group of ICD-10 codes. Annual substance misuse-related visits were compared as visits per 100,000 adult population in Alberta to standardize for population growth. Linear regression was used to assess whether ED visits increased significantly over time. A cross-sectional time-series analysis was employed to examine trends within subgroups defined by sex and age categories (18-29, 30-39, 40-49, 50-59, and 60 years) over a 60-month period. **Results:** 149,719 substance misuse-related visits were made by 65,089 patients and 8768 opioid misuse-related visits were made by 5763 patients. From 2010/11 to 2014/15, substance misuse-related ED visits in Alberta increased by 38% from 811 to 1,119 visits per 100,000 population. Opioid misuse-related ED visits increased significantly (64%) from 44 to 72 per 100,000 population. Conversely, total ED visits per 100,000 population did not increase significantly. Substance and opioid misuse-related visits rose more in non-rural than rural areas. Cross-sectional time-series analysis showed that the greatest increase in substance and opioid misuse-related ED visits occurred in males and in the 18-29 year age category, in which visit increases for opioid misuse appeared exponential. **Conclusion:** Substance and opioid misuse-related ED visits increased significantly from 2010/11 to 2014/15 in Alberta, with the most dramatic increases occurring in young patients and males. These findings have important implications for targeting urgent preventative public health interventions to stem the rise of this epidemic.

Keywords: substance-related disorders, opioid-related disorders, public health

LO91

Relationship between pain, opioid treatment, and delirium in emergency department elderly patients

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Introduction: Emergency department (ED) stay and its associated conditions (immobility, inadequate hydration and nutrition, lack of stimulation) favor the development of delirium in vulnerable elderly patients. Poorly controlled pain, and paradoxically opioid pain treatment, has also been identified as a trigger for delirium. The aim of this study was to assess the relationship between pain, opioid treatment, and delirium in elderly ED patients. **Methods:** A multicenter prospective cohort study was conducted in four hospitals across the province of Québec (Canada). Patients aged 65 years old, waiting for care unit admission between February and May 2016, who were non-delirious upon ED arrival, independent or semi-independent for their activities of daily living, and had an ED stay of at least 8 hours were included. Delirium assessments were made twice a day for their entire ED stay and for the first 24 hours in the hospital ward using the Confusion Assessment Method (CAM). Pain intensity was evaluated using a visual analog scale (0-100) during the initial interview, and all opioid treatments were documented. **Results:** A total of 338 patients were included; 51% were female, mean age was 77 years (SD: 8). Forty-one patients (12%) experienced delirium during their hospital stay occurring within a mean delay of 47 hours (SD: 19) after ED admission. Among patients with pain intensity 60, 22% experienced delirium compared to 10.7% for patients with pain < 60 ($p < 0.05$). No significant association was found between opioid consumption and delirium ($p = 0.22$). Logistic regression controlling for age, sex, ED stay duration, and opioids intake showed that patients with pain intensity 60 are 2.6 (95% CI: 1.2-5.9) more likely to develop delirium than patients who had pain <60. **Conclusion:** Severe pain, not opioids, is associated with the development of delirium during ED stay. Adequate pain control during the hospital stay may contribute to the decrease of delirium episodes.

Keywords: delirium, opioids, pain

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LO92

Development of a predictive model for hospital admissions by utilizing frequencies of specific CEDIS presenting complaints

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Introduction: With hospital occupancy rates frequently approaching 100%, even small variations in daily admission numbers can have a large impact. The ability to predict variance in emergency admission rates would provide administrators with a significant advantage in managing hospital daily bed requirements. There is a growing interest in patterns of hospital admissions, and many EDs utilize historical admission patterns to attempt to predict daily bed requirements. Previous studies have utilized patient demographics and past medical history to develop an admission likelihood model. We wished to examine the predictive strength of individual CEDIS presenting complaints (PC) on admission likelihood **Methods:** Using a database analysis of over 285,000 ED presentations (2013-2017), we calculated visit frequencies and admission rates by PC. Using a logistic regression analysis PCs were ordered from high to medium predictive strength. **Results:** Of 285,155 presentations, there were 38,090 hospital admissions, a rate of 13.36%. Based on the number of visit frequencies and admission rates, the PCs demonstrating high predictive strength were Direct Referral (effect = 0.36, binomial CI: 0.28 to 0.44); Shortness of Breath (0.32: 0.26 to 0.41); General Weakness; Weakness/Query CVA; & Chest Pain Cardiac Features (each 0.30: 0.25 to 0.42); Altered level of consciousness (0.24: 0.16 to 0.31); and Confusion (0.18: 0.08 to 0.26). With our sample size, all remaining CEDIS PCs had low predictive value (the effect is <0.1), or were not predictive at all. **Conclusion:** We have demonstrated that, for our population, certain PCs are associated with an increased likelihood of admission and have quantified this effect using logistic regression analysis. Variance from the average daily admission rate may be predicted, in our population, by identifying these PCs at registration.We plan to develop a tool, based on this data and implemented at registration, to predict cumulative likely daily admission requirements as patients present over a 24hr period.

Keywords: predictive analytics, emergency department, hospital admission

Moderated Posters Presentations

MP01

Use of an unmanned aerial vehicle to provide situational awareness in a simulated mass casualty incident

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Introduction: Situational awareness (SA) is essential for maintenance of scene safety and effective resource allocation in mass casualty incidents (MCI). Unmanned aerial vehicles (UAV) can potentially enhance SA with real-time visual feedback during chaotic and evolving or inaccessible events. The purpose of this study was to test the ability of paramedics to use UAV video from a simulated MCI to identify scene hazards, initiate patient triage, and designate key operational locations. **Methods:** A simulated MCI, including fifteen patients of varying acuity (blast type injuries), plus four hazards, was created on a college campus. The scene was surveyed by UAV capturing video of all patients, hazards, surrounding buildings and streets. Attendees of a provincial paramedic meeting were invited to participate. Participants received a lecture on SALT Triage and the principles of MCI scene management. Next, they watched the UAV video footage. Participants were directed to sort patients according to SALT Triage step one, identify injuries, and localize the patients within the campus. Additionally, they were asked to select a start point for SALT Triage step two, identify and locate hazards, and designate locations for an Incident Command Post, Treatment Area, Transport Area and Access/Egress routes. Summary statistics were performed and a linear regression model was used to assess relationships between demographic variables and both patient triage and localization. **Results:** Ninety-six individuals participated. Mean age was 35 years (SD 11), 46% (44) were female, and 49% (47) were Primary Care Paramedics. Most participants (80 (84%)) correctly sorted at least 12 of 15 patients. Increased age was associated with decreased triage accuracy [-0.04(-0.07,-0.01); p = 0.031]. Fifty-two (54%) were able to localize 12 or more of the 15 patients to a 27x 20m grid area. Advanced paramedic certification, and local residency were associated with improved patient localization [2.47(0.23,4.72); p = 0.031], [-3.36(-5.61,-1.1); p = 0.004]. The majority of participants (78 (81%)) chose an acceptable location to start SALT triage step two and 84% (80) identified at least three of four hazards. Approximately half (53 (55%)) of participants designated four or more of five key operational areas in appropriate locations. **Conclusion:** This study demonstrates the potential of UAV technology to remotely provide emergency responders with SA in a MCI. Additional research is required to further investigate optimal strategies to deploy UAVs in this context.

Keywords: mass casualty incident, unmanned aerial vehicle, emergency medical services

MP02

Paramedic recognition of paroxysmal supraventricular tachycardia

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Introduction: Paroxysmal supraventricular tachycardia (PSVT) is a common group of arrhythmias that Advanced Care Paramedics (ACPs) can often manage with vagal maneuvers, adenosine, and/or cardioversion, provided that they correctly identify the rhythm. The purpose of this study is to determine the accuracy of ACP identification of PSVT. **Methods:** Following ethics approval, all calls for patients 18 years with a 12-lead ECG available, who were assessed by ACPs within a region of western Ontario between July 2015 - December 2015 and had a documented heart rate >150bpm, were included. Paramedic call reports were retrospectively reviewed for study data, including documentation of ACP identified PSVT. The reference standard was consensus between an EMS fellow and prehospital physician who adjudicated each ECG for the presence of PSVT in a blinded, independent fashion. In the event of a disagreement, a third, blinded prehospital physician was used for consensus. **Results:** Of the 442 patients included, 197 (45%) were male and the median age [Interquartile range(IQR)] was 70.0 (58.0-82.8). ACPs identified 74 (16.7%) patients as having PSVT while 38 (8.6%) were identified by physicians as having PSVT. 44.7% of patients with physician identified PSVT had a history of previous arrhythmia, compared to 30.9% of patients with no physician identified PSVT (p = 0.10). They were also significantly younger 58.5 (48.5-72.0) compared to those without physician identified PSVT 69.0 (60.0-84.0) (P = 0.0010). Sensitivity of ACP identified PSVT was 97.4% (95% CI:86.2%-99.9%) and specificity was 90.8% (95% CI:87.6%-93.5%). The positive predictive value (PV) of ACP identified PSVT was 50.0% (95% CI:42.3%-57.7%), the negative PV was 99.7% (95% CI:98.1%-99.9%), the

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positive likelihood ratio (LR) was 10.6 (95% CI:7.8-14.5) and negative LR was 0.03 (95% CI:0.0-0.2). Moderate inter-rater agreement was seen between initial ECG interpretations (kappa = 0.42, 95% CI:0.29-0.54) by the fellow and prehospital physician, while agreement was higher (good) between the two prehospital physicians (kappa = 0.76, 95% CI:0.55-0.96). **Conclusion:** These results indicate that ACPs are adept at identifying PSVT, but are prone to false positives. Given the relatively good sensitivity and specificity seen in this investigation, future studies should investigate ACP recognition of specific rare arrhythmias (antidromic accelerated atrial fibrillation) that may require different management including avoidance of adenosine.

Keywords: paroxysmal supraventricular tachycardia, emergency medical services

MP03

The epidemiology of mortality in patients transported by emergency medical services (EMS)

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Introduction: Outside of key conditions such as cardiac arrest and trauma, little is known about the epidemiology of mortality of all transported EMS patients. The objective of this study is to describe characteristics of EMS patients who after transport die in a health care facility. **Methods:** EMS transport events over one year (April, 2015-16) from a BLS/ALS system serving an urban/rural population of approximately 2 million were linked with in-hospital datasets to determine proportion of all-cause in-hospital mortality by Medical Priority Dispatch System (MPDS) determinant (911 call triage system), age in years (≥18 yrs. - adult, ≤17 yrs. - pediatric), sex, day of week, season, time (in six hour periods), and emergency department Canadian Triage and Acuity Scale (CTAS). The MPDS card, patient chief complaint, and ED diagnosis category (International Classification of Disease v.10 - Canadian) with the highest proportion of mortality are also reported. Analyses included two-sided t-test or chi-square with alpha <0.05. **Results:** A total of 239,534 EMS events resulted in 159,507 patient transports; 141,114 were included for analysis after duplicate removal (89.1% linkage), with 127,867 reporting final healthcare system outcome. There were 4,269 who died (3.3%; 95% CI 3.2%, 3.4%). The proportion of mortality by MPDS determinant was, from most to least critical 911 call, Echo (7.3%), Delta (37.2%), Charlie (31.3%), Bravo (5.8%), Alpha (18.3%), and Omega (0.3%). For adults the mean age of survivors was less than non-survivors (57.7 vs. 75.8; $p < 0.001$), but pediatric survivors were older than non-survivors (8.7 vs. 2.8; $p < 0.001$). There were more males that died than females (53.0% vs. 47.0%; $p < 0.001$). There was no statistically significant difference in the day of week ($p = 0.592$), but there was by season with the highest mortality in winter (27.1%; $p = 0.045$). The highest mortality occurred with patients presenting to EMS between 0600-1200 hours (34.6%), and the lowest between 0000-0600 hours (11.8%; $p < 0.001$). Mortality by CTAS was category 1 (27.1%), 2 (36.7%), 3 (29.9%), 4 (4.3%), and 5 (0.5%). The highest mortality was seen in MPDS card 26-Sick Person (specific diagnosis) (19.1%), chief complaint shortness of breath (19.3%), and ED diagnoses pertaining to the circulatory system (31.1%). **Conclusion:** Significant all-cause in-hospital mortality differences were found between event, patient, and clinical characteristics. These data provide foundational and hypothesis generating knowledge regarding mortality in transported EMS patients that can be used to guide research and training. Future research should further explore the characteristics of those that access health care through the EMS system.

Keywords: emergency medical services, mortality, epidemiology

MP04

Analysis of a needs-based assessment of paramedic continuing education

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Introduction: To determine trends in identified self-perceived knowledge deficits of paramedics, training barriers and desired methods of self-directed education. **Methods:** A written survey was delivered to all paramedics in an Ontario base-hospital. Respondents were asked to identify deficits from a 37-point, anatomic systems-based list. Preferred educational modalities to address knowledge deficits and factors taken into consideration when choosing self-directed education were captured. Top 5 perceived deficit topics, number of perceived deficits, top 5 factors associated with training modality chosen and factors taken into consideration for choosing training modalities, were compared against paramedic age, training (Advanced Care Paramedic; ACP, or Primary Care Paramedic; PCP) and primary location of practice (urban, rural, mixed setting). **Results:** Of 1262 paramedics, 746 (59.11%) completed the survey. PCPs had a higher report of deficit in both neonatal resuscitation and arrhythmia than ACPs (48.3% vs. 58.8%, $p = 0.015$; 40.3% vs. 58.5%, $p < 0.001$). Paramedics who listed rural as their primary practice location were more likely to report a deficit in pediatric respiratory disorder than those with a mixed urban/rural and primary urban practice (65.9% vs. 46.3%, $p = 0.000$; 65.9% vs. 45.9%, $p = 0.001$;) as well as a higher median number of listed deficits (9.00 vs. 6.00 vs. 6.00, $p < 0.001$). ACPs were more likely to consider scheduling, location/ease of attending and cost as barriers than PCPs (85.4% vs. 63.8%, $p = 0.000$; 69.5% vs. 51.4%, $p = 0.002$; 69.5% vs. 39.5%, $p = 0.000$) while reporting an increased desire for webinar material than PCPs (56.1% vs. 40.4%, $p = 0.007$). There were no significant differences found by age. **Conclusion:** Targeted educational needs-based assessments can help ensure appropriate topics are delivered in a fashion that overcomes identified barriers to self-directed learning. From our analysis, increased awareness of ease of attending sessions and preferred modalities, such as webinars may be beneficial; especially for ACPs who require more annual continuing educational hours. Paramedics in rural locations may require increased continuing education, especially for rarely encountered, high risk situations, such as pediatric critical care. These findings can help direct future education in our system and others.

Keywords: education, paramedic, prehospital

MP05

Injuries in refugee children presenting to a paediatric emergency department

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Introduction: The number of refugees accepted to Canada grew from 24,600 in 2014 to 46,700 in 2016. Many of these refugees have young families and the number of child refugees has increased accordingly. Although child refugee health care has been in the forefront of media and medical attention recently, there is limited data on injury patterns in this population. Canadian Hospitals Injury Reporting and Prevention

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Program (CHIRPP) collects data on injuries in children presenting to the emergency department (ED). Our objective is to examine the clinical presentations and outcomes of refugee children with injuries presenting to a tertiary care paediatric ED. **Methods:** Our paediatric hospital has approximately 70,000 ED visits per year of which 13,000 are due to injuries and/or poisonings. The CHIRPP database was accessed to identify children with injuries presenting to our ED from April 2014 to March 2017 with Interim Federal Health Program (IFHP) registration status. All patient charts were reviewed to extract demographic and clinical care information. **Results:** There were 74 children with 81 ED visits during the study period of whom 19% were transferred from other facilities. Most of them (72%) were males with a mean age of 8.7 years (standard deviation 4.29). There were significant medical histories in 32% of children. The presentation to our ED (greater than 24 hours post-injury) was seen in 25% of visits. Twenty five percent of injured children were seen in our ED. The distribution of Canadian Triage Acuity Score (CTAS) scores 1, 2, 3, 4, and 5 were 0%, 16%, 37%, 46% and 1% respectively. However, subspecialty consultations were required in 69%, 60% and 27% of CTAS 2, 3 and 4 children respectively. Overall, 46% of all patients required subspecialty consults. The top three categories of injuries include fractures (23%), soft tissue injuries (20%) and lacerations (17%). More than half (56%) required diagnostic imaging. Most (89%) were treated in ED and discharged (average length-of-stay 3 hours 55 minutes) and 11% required admissions. 47% of children lacked primary care physicians. **Conclusion:** Almost half of refugee children with IFHP status require DI testing, sub-specialty consultations and primary care referrals when presenting to our ED with injuries. Follow up arrangements are needed as many do not have access to primary care providers. This demonstrates a need for securing primary care providers early for this vulnerable population.

Keywords: refugee, children, injuries

MP06

Predictors of hypothermia upon emergency department arrival in severe trauma patients transported to hospital via emergency medical services

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Introduction: Hypothermia in severe trauma patients can increase mortality by 25%. Active re-warming decreases mortality and is recommended in trauma management guidelines. Despite this, many emergency medical services (EMS) vehicles do not carry equipment for active re-warming. This study sought to determine the local rate of hypothermia in major trauma patients on trauma centre arrival (TCA), and to establish which patients are at highest risk by identifying factors present in the pre-hospital setting associated with hypothermia in a humid continental climate. **Methods:** This single-centre retrospective chart review included adults (age 18) in the local trauma registry (trauma team activation or injury severity score >12) from January 2009-June 2016. Patients were excluded if: temperature on TCA unknown or 38°C, not transported by EMS, or if there was >24 hrs from injury to TCA. The primary outcome was the rate of hypothermia (<35°C) in major trauma patients transported by EMS on arrival at the local trauma centre. Secondary outcomes included hospital length of stay and survival to discharge. Logistic regression was used to identify predictors of hypothermia on TCA; it included the following factors: age, sex, weight, number of comorbidities, injury severity, injury mechanism, EMS modality, direct transport from scene or referred from peripheral hospital, time on scene, transport time, local temperature, and pre-hospital heart rate, systolic blood pressure (SBP), intubation, and volume of crystalloid. **Results:** A total of 3070 adult traumas were included, 159 of which were hypothermic on TCA a rate of 5%. Multivariate analysis identified seven risk factors for hypothermia: intubation pre-hospital (OR 8.10, $p < 0.001$), blunt trauma (OR 3.37, $p = 0.044$ vs. penetrating, and OR 7.35, $p = 0.023$ vs. other), direct transport (OR 1.94, $p = 0.005$), number of comorbidities (OR 1.14, $p = 0.036$), injury severity (OR 1.03, $p < 0.001$), 1°C local temperature drop (OR 1.03, $p < 0.001$), and 1mmHg SBP drop (OR 1.01, $p < 0.001$). Ninety-four percent of normothermic patients and 69.2% of hypothermic patients survived to discharge. Average length of stay was 7.98 and 15.23 days respectively. **Conclusion:** Avoidance of hypothermia is imperative to the management of major trauma patients. Those at highest risk in a humid continental climate are severely injured blunt trauma patients with multiple co-morbidities, a low pre-hospital SBP and EMS intubation. Future studies should focus on the benefits of pre-hospital rewarming in these high-risk patients.

Keywords: trauma, hypothermia, emergency medical services

MP07

Rate of return: prevalence and correlates of revictimization among sexual and domestic assault cases presenting to the emergency department

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Introduction: Many survivors of sexual and domestic assault return to violent environments following post-assault care. The objective of this study was to estimate the annual prevalence of revictimization and examine factors associated with return emergency department (ED) visits following their initial encounter for sexual or domestic assault. **Methods:** The Sexual Assault and Partner Abuse Care Program (SAPACP) at The Ottawa Hospital is the only program in Ottawa offering emergency and forensic care for survivors of sexual assault and domestic violence. Information on demographics, assailant characteristics and clinical presentation were extracted from the SAPACP case registry (January 1 2015- January 31 2016). We conducted descriptive analyses to describe the study sample, and bivariable and multivariable logistic regression modelling to assess factors most strongly associated with revictimization using odds ratios (OR), adjusted OR (AOR) and 95% confidence intervals (CI). **Results:** Among 377 unique patients seen at the SAPACP, there were 409 encounters for sexual and domestic violence. There were 24 revictimization cases (6.4%) with the number of repeat visits ranging from 2-6. There were 343 (91.0%) female patients and 182 (48.3) under the age of 25. There were 243 (64.5%) sexual assaults, 125 (33.2%) physical assaults, and 42 (11.1%) verbal assaults. Compared to patients who presented once, revictimized patients were more likely to have experienced violence from a current or former intimate partner (AOR:3.02, 95% CI:1.24-7.34), have a substance use disorder (AOR:5.57, 95% CI:2.11-14.68), and were more likely to be taking anti-depressants (AOR:3.34, 95% CI:1.39-8.01). **Conclusion:** This study has identified a high prevalence of revictimization, with some clients being revictimized as many as 6 subsequent times. Key factors to help identify patients at risk of revictimization are assaults by intimate partners, having substance use problems, and being on antidepressants. Reducing revictimization and preventing further violence is a critical component of care to ensure survivors are safe following their ED encounter.

Keywords: sexual assault, domestic violence, intimate partner violence

MP08

A novel measure to capture transactional stress in paramedic services

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Introduction: In the past few years, there has been an increase in awareness of the challenge of managing work related stress in EMS. Extant research has liked different types of chronic and critical incident stress to stress reactions like posttraumatic stress. However, there is no tool to capture the transactional stresses which are associated with the day to day provision of service (e.g., dealing with offload delays or mandatory overtime) and interacting with allied professions (e.g., emergency department staff) or allied agencies (e.g., law enforcement). The purpose of this study was to develop and validate a measure which captured transactional stresses in paramedics **Methods:** An online survey was conducted with ten Canadian Paramedic Services with a 40.5% response rate (n = 717). Factor analysis was used to identify variation in responses related to the latent factor of transactional stress. The scale was validated using both exploratory and confirmatory factor analyses. **Results:** The sample of transactional stress questions was split to allow for multiple analyses (EFA n = 360/ CFA n = 357). In the exploratory factor analysis, principal axis factoring with an oblique rotation revealed a two-factor, twelve item solution, (KMO = .832, x2 = 1440.19, df = 66, p < .001). Confirmatory factor analysis also endorsed a two factor, 12 item solution, (x2 = 130.39, df = 51, p < .001, CFI = .95, TLI = .93, RMSEA = .07, SRMR = .06). Results supported two groups of six-item factors that captured transactional stress in the provision of service. The factors, clearly aligned with transactional stress issues internal to the ambulance and transactional stress relationships external to the ambulance. Both subscales demonstrated good internal reliability (= .843/ = .768) and were correlated (p.01) with a convergent validity measure. **Conclusion:** This study successfully validated a two-factor scale which captures stress associated with the day to day provision of EMS and the interaction with allied professions. The development of this measure of transactional stresses further expands the potential that paramedics, Paramedic Services, employers, and prehospital physicians may understand the dynamics that influence provider health and safety. As a result, there may be greater opportunities to intervene holistically to improve paramedic health and well-being.

Keywords: paramedic services, stress, factor analysis

MP09

Incidence of emergency department induced delirium: a Canadian two years prospective study

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Introduction: Prevalence and incidence of delirium in older patients admitted to acute and long-term care facilities ranges between 9.6% and 89% but little is known in the context of emergency department (ED) incident delirium. Literature regarding the incidence of delirium in the ED and its potential impacts on hospital length of stay (LOS), functional status and unplanned ED readmissions is scant, its consequences have yet to be clearly identified in order to orient modern acute medical care. **Methods:** This study is part of the multicenter prospective cohort INDEED study. Three Canadian EDs completed the two years prospective study (March-July 2015 and Feb-May 2016). Patients aged 65 years old, initially free of delirium with an ED stay 8hours were followed up to 24h after ward admission. Patients were assessed 2x/day during their entire ED stay and up to 24 hours on hospital ward by research assistants (RA). The primary outcome of this study was incident delirium in the ED or within 24 h of ward admission. Functional and cognitive status were assessed using validated Older Americans' Resources and Services and the Telephone Interview for Cognitive Status- modified tools. The Confusion Assessment Method (CAM) was used to detect incident delirium. ED and hospital administrative data were collected. Inter-observer agreement was realized among RA. **Results:** Incident delirium was not different between sites, nor between phases, nor between times from one site to another. All phases confounded, there is between 7 to 11% of ED related incident delirious episodes. Differences were seen in ED LOS between sites in non-delirious patients, but also between some sites for delirious participants ($p < 0.05$). Only one site had a difference in ED LOS between their delirious and non-delirious patients, respectively of 52.1 and 40.1 hours ($p < 0.05$). There is also a difference between sites in the time between arrival to the ED and the incidence of delirium ($p = 0.003$). Kappa statistics were computed to measure inter-rater reliability of the CAM. Based on an alpha of 5%, 138 patients would allow 80% power for an estimated overall incidence proportion of 15 % with 5% precision.. Other predictive delirium variables, such as cognitive status, environmental factors, functional status, comorbidities, physiological status, and ED and hospital length of stay were similar between sites and phases. **Conclusion:** The fact that incidence of delirium was the same for all sites, despite the differences of ED LOS and different time periods suggest that many other modifiable and non-modifiable factors along LOS influenced the incidence of ED induced delirium. Emergency physician should concentrate on improving senior-friendly environment for the ED.

Keywords: delirium, length of stay, emergency department

MP10

Implementation of the PulsePoint mobile device application in Kingston, Ontario, Canada: a pilot study on crowdsourcing bystander CPR for victims of out-of-hospital cardiac arrest

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Introduction: Every year 40,000 out-of-hospital cardiac arrests (OHCA) occur in Canada. Only 1 in 10 survive. Early bystander cardiopulmonary resuscitation (CPR) and defibrillation can triple odds of survival. PulsePoint is a mobile device application designed to crowdsource bystander CPR and public access defibrillation for victims of OHCA. Kingston, Ontario was the first Canadian city to launch PulsePoint. The objective of this project was to determine feasibility of PulsePoint implementation in a Canadian setting and to describe system performance. **Methods:** This was a descriptive observational study. We included all 9-1-1 incidents involving PulsePoint system activation in Kingston, Ontario and all confirmed, public location OHCAs assessed by local emergency medical services (EMS) between March 23, 2015 to January 23, 2017. By using time and location data from PulsePoint system alert notifications, we attempted to link each PulsePoint activation to de-identified ambulance call records. **Results:** Between March 23, 2015 to January 23, 2017, there were 258 PulsePoint system activations in Kingston and a total of 32 cases of confirmed OHCAs. Only 58 (22%) of PulsePoint activations could be linked to EMS records with high confidence. Of these linked cases, 10 were confirmed OHCAs,

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reflecting 17% (10/58) of all linked PulsePoint activations and 31% (10/32) of all confirmed OHCAs. Of the remaining 48 cases that triggered PulsePoint activation numerous final paramedic problem codes were assigned of which 14% (8/58) were deemed alcohol intoxication, 10% (6/58) were active seizures, 7% (4/58) were behavioural/psychiatric events, among others. 10 incidents (17%) that triggered PulsePoint activation did not have an assigned final paramedic problem code. **Conclusion:** Implementation of PulsePoint is feasible in Canadian communities. Improved capabilities for linking with local EMS data will improve data capture, program monitoring capacity, and opportunity for research. The impact of PulsePoint on clinical outcomes remains uncertain and should be determined in future research.

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

MP11

Underreport of incident delirium in elderly patients treated in the emergency department

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Introduction: It is documented that physicians and nurses fail to detect delirium in more than half of cases from various clinical settings, which could have serious consequences for seniors and for our health care system. The present study aimed to describe the rate of documented incident delirium in 5 Canadian Emergency departments (ED) by health professionals (HP). **Methods:** This study is part of the multicenter prospective cohort INDEED study. Patients aged 65 years old, initially free of delirium with an ED stay 8hours were followed up to 24h after ward admission. Delirium status was assessed twice daily using the Confusion Assessment Method (CAM) by trained research assistants (RA). HP reviewed patient charts to assess detection of delirium. HP had no specific routine detection of delirious ED patients. Inter-observer agreement was realized among RA. Comparison of detection between RA and HP was realized with univariate analyses. **Results:** Among the 652 included patients, 66 developed a delirium as evaluated with the CAM by the RA. Among those 66 patients, only 10 deliriums (15.2%) were documented in the patients medical file by the HP. 54 (81.8%) patients with a CAM positive for delirium by the RA were not recorded by the HP, 2 had incomplete charts. The delirium index was significantly higher in the HP reported group compared to the HP not reported, respectively 7.1 and 4.5 ($p < 0.05$). Other predictive delirium variables, such as cognitive status, functional status, comorbidities, physiological status, and ED and hospital length of stay were similar between groups. **Conclusion:** It seems that health professionals missed 81.8% of the potential delirious ED patients in comparison to routine structured screening of delirium. HP could identify patients with a greater severity of symptoms. Our study points out the need to better identify elders at risk to develop delirium and the need for fast and reliable tools to improve the screening of this disorder.

Keywords: delirium, seniors, screening

MP12

Emergency department boarding: predictors and outcomes

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Introduction: Delays in transfer to an in-patient bed of admitted patients boarded in the ED has been identified as one of the chief drivers of ED overcrowding. Our study aims to replicate findings from a previous study in identifying patient characteristics associated with increased boarding time, and the impact of increased boarding time on in-patient length of stay (IPLOS). **Methods:** We conducted a retrospective single-centre observational study during the period between January 1, 2015 December 31, 2015 at a very high volume community hospital (~75,000 ED visits/year). All patients admitted from the ED to Medicine, Pediatrics, Surgery, and Critical Care were identified. The mean time to in-patient bed (TTB), as well as patient-specific and institutional factors that were associated with prolonged boarding times (12 hours) were identified. Mean IP LOS was calculated for those with prolonged boarding times and compared to those without prolonged boarding times. **Results:** There were 8,096 unique admissions during the study period. Patients admitted to the Medicine service exhibited significantly higher boarding times than those admitted to other services, with a mean boarding time of 17.4 hrs, as compared to 4.2 hrs, 5.7 hrs, and 4.0 hrs for those admitted to Surgery, Critical Care and Pediatrics respectively. Within Medicine patients, there was a statistically significant greater odds of prolonged boarding time for patients who were older, had a greater comorbidity burden, and required more specialized in-patient care (i.e. an isolation bed or telemetry bed). Medicine patients with prolonged boarding times also experienced 0.7 days longer IP LOS, even after correcting for age and comorbidity (mean adjusted IP LOS 10.6 days versus 11.3 days). **Conclusion:** Within our study period, older, sicker patients and those patients requiring more resource-intensive in-patient care have the longest ED boarding times. These prolonged 'boarding' times are associated with significantly increased IP LOS.

Keywords: emergency department overcrowding, patient safety, administrative database

MP13

Accuracy of Korean Triage and Acuity Scale when pain severity is used as a modifier

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Introduction: Accurate triage is important because under-triage may delay critical care for emergent patients and over-triage may inhibit efficient management of emergency department (ED) resources. In Korea, the Korean Triage and Acuity Scale (KTAS) was developed based on the CTAS in 2015. The purpose of this study was to evaluate the accuracy of KTAS in predicting patient's severity when degree of pain was used as a modifier. **Methods:** This was a retrospective observational cohort study, conducted in an ED of urban tertiary university hospital with more than 90,000 visits per year. We studied adult patients who visited the ED from January 2016 to June 2016. Patients were devided into pain group and non-pain group according to whether the degree of pain was used as a modifier in the KTAS evaluation. We used acute area registration, emergency procedure, emergency operation, hospitalization, intensive care unit admission, and hospital mortality as markers to determine urgent patients. To evaluate discriminative ability of KTAS, the odds ratios of each KTAS values compared to KTAS 3 for the urgent patients were calculated. And to compare the predictive power of KTAS for urgent patients between the two groups, the area under the receiver operating characteristic (ROC) curves were compared by DeLongs method. **Results:** There were 9,175 (37.8%) patients in the pain group and 15,078 (62.2%) patients in the non-pain group. When KTAS was assessed as 2, only 20.3% of the

patients in the pain group were registered to the acute area, while 71.2% of the patients in the non-pain group were registered to the acute area ($p < 0.001$). And the proportion of emergency procedure, admission, ICU admission, and mortality was also higher in patients with pain group. Similarly, in the patients of KTAS 3, the proportion of urgent patients was higher in the non-pain group except emergency operation. The odds ratio for the occurrence of urgent patients decreased as the KTAS value increased in both groups, however, the difference between the odds ratios of each KTAS was more evident in the non-pain group. In pain group, compared to patients with KTAS 3, the odds ratio (95% CI) for acute area registration were 2.32 (1.92-2.80), 0.61 (0.51-0.73), and 0.35 (0.23-0.53) for patients with KTAS 2, 4, 5, respectively; in non-pain group, odds ratio were 5.59 (5.09-6.13), 0.28 (0.25-0.32), and 0.13 (0.10-0.16). The non-pain group showed better predictive power of KTAS for acute area registration than pain group; AUC (95% CI), 0.864 (0.861-0.867) vs. 0.810 (0.802-0.818), $p < 0.0001$). The predictability of KTAS was also higher in non-pain group for emergency procedure, emergency operation, admission, and ICU admission. **Conclusion:** We have confirmed that the use of pain severity as a modifier in KTAS is a factor affecting accuracy. The acuity level is overestimated when pain severity is used as modifier in KTAS evaluation.

Keywords: triage, patient acuity, pain

MP14

Community paramedic point of care blood analysis: validity and usability testing of two commercially available devices

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Introduction: Community Paramedics (CPs) require access to timely blood analysis in the field to guide treatment and transport decisions. Point of care testing (POCT), as opposed to traditional laboratory analysis, may offer a solution, but limited research exists on CP POCT. The objective of this study is to compare the validity of two POCT devices (Abbott i-STAT® and Alere epoc®) and their use by CPs in the community. **Methods:** In a CP programme responding to 6,000 annual patient care events, a split sample validation of POCT against traditional laboratory analysis for seven analytes (sodium, potassium, chloride, creatinine, hemoglobin, hematocrit, and glucose) was conducted on a consecutive sample of patients. The difference of proportion of discrepant results between POCT and laboratory was compared using a two sample proportion test. Usability was analysed by survey of CP experience, an expert heuristic evaluation of devices, a review of device-logged errors, coded observations of POCT use during quality control testing, and a linear mixed effects model of Systems Usability Scale (SUS) adjusted for CP clinical and POCT experience. **Results:** Of 1,649 CP calls for service screened for enrollment, 174 had a blood draw, with 108 patient care encounters (62.1%) enrolled from 73 participants. Participants had a mean age of 58.7 years (SD16.3); 49% were female. In 4 of 646 (0.6%) individual comparisons, POCT reported a critical value that the laboratory did not; with no statistically significant difference in the number of discrepant critical values reported with epoc® compared to i-STAT®. There were no instances of the laboratory reporting a critical value when POCT did not. In 88 of 1,046 (8.4%) individual comparisons, the a priori defined acceptable difference between POCT and the laboratory was exceeded; occurring more often in epoc® (10.7%;95% CI:8.1%,13.3%) compared to i-STAT® (6.1%;95% CI:4.1%,8.2%) ($p = 0.007$). Eighteen of 19 CP surveys were returned, with 11/18 (61.1%) preferring i-STAT® over epoc®. The i-STAT® had a higher mean SUS score (higher usability) compared to the epoc® (84.0/100 vs. 59.6/100; $p = 0.011$). Fewer field blood analysis device-logged errors occurred in i-STAT® (7.8%;95% CI:2.9%,12.7%) compared to epoc® (15.5%;95% CI:9.3%,21.7%) although not statistically significant ($p = 0.063$). **Conclusion:** CP programs can expect valid results from POCT. Usability assessment suggests a preference for i-STAT.

Keywords: community paramedic, point-of-care testing

MP15

Innovative use of simulation to consolidate pediatric didactic curriculum. A pilot in emergency department continuing medical education

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Introduction: Our emergency department (ED) sees a low volume of high acuity pediatric cases. A needs assessment revealed that 68% of our Emergency Physicians (EP) manage pediatric patients in less than 25% of their shifts. The same percentage of EPs as well as ED nurses indicated they were uncomfortable managing a critically unwell neonate. Thus, an interprofessional curriculum focused on pediatric emergencies for ED staff was developed. In-situ simulation education was chosen as the most appropriate method to consolidate each didactic block of curriculum, and uncover important system gaps. **Methods:** Needs assessment conducted, and emerging themes informed IPE curriculum objectives. A committee of experts in simulation, pediatric emergencies and nursing education designed a full-day, RCPSC accredited, interprofessional in-situ simulation program. **Results:** Progressive segmental strategy maximized learning outcomes. The initial phase (2 hrs) comprised an" early recognition of sepsis" seminar and 4 rotating skills stations (equipment familiarity, sedating the child, IV starts, and mixing IV medication). This deliberate, adaptive, customized practice was enhanced by expert facilitation at each station, directly engaging participants and providing real-time feedback. The second phase allowed interprofessional teams of MDs, RNs and Physician Assistants to apply knowledge gained from the didactic and skills stations to in-situ simulated emergencies. Each group participated in two pediatric emergency scenarios. Scenarios ran 20 minutes, followed by a 40 minute debrief. Each scenario had a trained debriefer and content expert. The day concluded with a final debrief, attended by all participants. Formalized checklists assessed participants knowledge translation during simulation exercises. Participants assessed facilitators and evaluated the simulation day and curriculum via anonymous feedback forms. Debriefing sessions were scribed and knowledge gaps and system errors were recorded. Results were distributed to ED leaders and responsibilities assigned to key stakeholders to ensure accountability and improvement in system errors. Results All participants reported the experience to be relevant and helpful in their learning. All participants requested more frequent simulation days. System gaps identified included: use of metric vs imperial measurements, non-compatible laryngoscope equipment, inadequate identification of team personnel. As a result, the above-mentioned equipment has been replaced, and we are developing resuscitation room ID stickers for all team roles. **Conclusion:** Simulation as a culmination to a didactic curriculum provides a safe environment to translate acquired knowledge, increasing ED staff comfort and familiarity with rare pediatric cases. Additionally, is an excellent tool to reveal system gaps and allow us to fill these gaps to improve departmental functioning and safety.

Keywords: innovations in emergency medicine education, interprofessional simulation, curriculum

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MP16

Development, implementation and evaluation of a curriculum for healthcare students working at electronic dance music events

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Introduction: Mass Gathering Medicine (MGM) is a growing field within emergency medicine (EM) and providing care at electronic dance music events (EDMEs) is an increasingly popular activity with MGM groups. Often, health care students are allowed to participate. However, there is a lack of documented curricula to train junior learners in providing medical care at these events. To address this, we developed and initiated an interprofessional, simulation-based workshop for University of Alberta health care students interested in working at EDMEs. **Methods:** We used Kerns six-step approach to develop the workshops. Our MGM Interest Group identified a need for educational sessions in toxicology case management at EDMEs. A subsequent literature review revealed a paucity of pre-existing curricula on this topic for MGM learners. We created goals and objectives for the workshops, reflecting the knowledge, skills and attitudinal competencies required to provide appropriate medical care at these events. The workshops were implemented and evaluated in November 2016 and 2017. **Results:** A total of 44 medical and nursing students attended the workshops. An EM resident and staff physician, both with prior experience working at EDMEs, led each session. Each workshop began with a short didactic lecture followed by two hours of case-based training using two standardized patients and a high fidelity simulator. Topics were chosen based on previously published articles describing medical cases seen at EDMEs. The simulation replicated the actual space, noise and equipment available at the medical tents at these events. Two interprofessional learner groups took turns managing a different set of 3 patients: Set 1-opioid overdose (OD), alcohol/vomiting, sympathomimetic OD; Set 2-opioid OD not responsive to naloxone, anticholinergic/seizure, OD with hyperthermia. Initial assessment, medical management and team communication skills were emphasized. Debriefing was provided to learners immediately after each set of cases. After each workshop, the learners completed evaluation forms utilizing both Likert scale and open-ended responses. Overall, students were extremely complimentary about the workshop structure, content and communication skills teaching. They were especially appreciative of the opportunity to participate in their first interprofessional team experience. **Conclusion:** To address local needs, a well-received simulation-based workshop was created to train students in toxicology case management at EDMEs. Future work will include using this workshop in a just-in-time fashion before upcoming EDMEs and documenting students actual use of skills taught (Kirkpatrick level 3). The workshop will also be further modified to implement more detailed interprofessional objectives and can provide a venue for EM residents to practice teaching interprofessional education competencies as part of their CanMEDS Scholar role.

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

MP17

Evaluating the efficacy of the flipped classroom model in postgraduate emergency medicine training

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Introduction: As the value of interactive teaching becomes increasingly recognized, the Flipped Classroom model is receiving more attention in the medical education community. In this model, learners master core declarative knowledge through self-learning prior to class and then expand upon this learning with integrative class exercises. The objective of this study was to assess the effectiveness of the new Flipped Classroom in a Canadian Emergency Medicine postgraduate program. **Methods:** The residents and staff were educated on the new model. An online questionnaire was sent to all EM residents and staff who had participated in the program 9 months after implementation. The survey tool assessed the participants opinions on utility, time-management, effectiveness in learning material, sustainability, collaboration with other members and overall impressions. Resident scores on national preparatory examinations including the Canadian In-Training Examination (CITE) and the American Board of Emergency medicine (ABEM) were compared before and after implementation of the new model. **Results:** Teaching staff were trained in the Flipped Classroom model and the majority of teaching sessions for the 2016 academic year were carried out using this paradigm. In addition, third year postgraduates received intensive training in the theory and implementation of interactive teaching techniques. A curriculum renewal committee generated objectives for each teaching session and suggested materials for learner pre-reading. **Conclusion:** Overall, both residents and staff physicians indicated that the flipped classroom model is a better format for EM academic day learning. Residents and staff collaborated more and felt more engaged during academic day. Residents spent more time preparing for the sessions with the new model, while staff spent less time preparing. Paired comparisons of same residency years for test exam scores using Wilcoxon signed-rank test showed an improvement in both CITE and ABEM exam test scores. In conclusion, the new flipped classroom model produced improvements in educational experience, satisfaction, and test examination scores.

Keywords: innovations in emergency medicine education, flipped classroom

MP18

Development and implementation of a workshop for advanced care planning and goals of care conversations in the emergency department

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Introduction: Advanced care planning (ACP) and Goals of Care (GOC) discussions are becoming increasingly common in our emergency departments (ED). The national ACP task group has found that the majority of Canadians have not had prior ACP/GOC discussions, nor have they obtained proper documentation of their wishes. The task of having these difficult but important conversations falls frequently to the ED. Despite this, our emergency medicine (EM) residents receive little formal training in ACP discussions. To address this need, we developed and implemented a workshop in ACP/GOC conversations for the University of Alberta EM academic curriculum. **Methods:** A literature search was performed to identify best practices for ACP discussions in the ED, barriers to ACP in the ED, and tools for identifying ED patients appropriate for ACP. Experts in ACP/palliative care and staff ED physicians were asked to identify previous difficult ACP discussions and highlight aspects of these cases that were challenging in the ED environment. These experiences, best practices and published APC curricula informed the development of a 3-hour case-based workshop that was implemented in the 2016/17 academic year for EM staff and residents. **Results:** Cases utilized in the workshop emphasized common ACP/GOC situations that occur in the emergency department: Case 1: An 84 year old with C1 GOC whose family did not accept the GOC designation. Case 2: A 72 year old with multiple comorbidities arriving intubated with no GOC documented. Case 3: An 82 year old

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with decreased LOC whose family asks for an ACP discussion in the ED. Participants were divided into groups (5-6 members). Each small group analyzed and discussed each case before the participants reconvened and discussed their opinions in one large group. ACP experts from palliative care, emergency medical services and EM facilitated the discussions highlighting the best practices from the literature for each case reviewed. Pre and post Likert surveys were distributed to workshop participants to assess changes in confidence in a variety of domains. A Wilcoxon Signed Rank Test showed statistically significant improvement in learner confidence within the following areas ($N = 21$; $p < 0.05$): identifying patients appropriate for GOC discussions, initiating GOC discussions, and identifying barriers to GOC, in the ED. The majority (89%) of participants agreed the workshops should become part of our academic curriculum. **Conclusion:** An ACP/GOC workshop was successfully implemented and further ACP/GOC sessions are planned for the upcoming academic year. Looking ahead, we will look at using other teaching modalities such as simulation to further enhance the delivery of the curriculum. We will also attempt to capture defined physician behaviors (e.g. documenting GOC in the ED chart, sending letters to family physicians documenting GOC discussions) to gauge uptake of the workshop principles into clinical practice.

Keywords: innovations in emergency medicine education, advanced care planning, goals of care

MP19

Interprofessional airway microskill checklists facilitate the deliberate practice of direct intubation with a bougie and airway manikins

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Introduction: Deliberate practice (DP) is the evolution of practice using continually challenging and focused practice on a particular task. DP involves immediate feedback, time for problem-solving and evaluation, and opportunities for repeated performance. Mircroskills training breaks down larger tasks into multiple smaller subtasks and then adds opportunities for feedback and adjustment for each subtask. Microskills training is routinely used to achieve excellence in competitive sports, martial arts, military operations, and music. Endotracheal intubation is a complex task with a clinically significant complication and failure rate. **Methods:** Two doctors and three nurses developed stepwise team microskills checklist from case review, simulations and published evidence. The checklist was tested, evaluated and developed during four days of simulation faculty team training. The final 36 item checklist was used to facilitate skills training for doctors, nurses, respiratory therapists and ACPs in one level 2, and two level 3 trauma centers from April 2017 to October 2017. The microskills checklist was used in four phases: 1. Group discussion of each microskill step 2. Groups of three team members; operator, assistant and microskill facilitator (using the checklist) to enable the deliberate analysis of the teams current performance. Each subtask is performed with immediate peer and where necessary faculty feedback. Changes are recorded. 3. Total task run though without interruption. Changes are recorded. 4. Repetition and feedback using different team members, manikins, including time pressure. User satisfaction surveys were collected after the skills training session **Results:** Results. Teams were composed of Registered Nurses (8), Physicians (9), and Respiratory Therapists (2). All of the teams experienced a change in practice. The median number of microskills changed for MDs 13/30, RNs 7/16. The commonest changes in practice were patient positioning (all teams). All professions agreed strongly that the approach produces a positive change in practice (median score 4.8/5). **Conclusion:** Microskills checklist facilitate endotracheal intubation with a bougie skill development in interprofessional teams in this provisional analysis.

Keywords: innovations in emergency medicine education, airway management, deliberate practice

MP20

ImageSim - performance-based medical image interpretation learning system

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Introduction: Medical images (e.g. radiographs) are the most commonly ordered tests in emergency medicine. As such, emergency medicine physicians are faced with the task of learning the skill of interpreting these images to an expert performance level by the time they provide opinions that guide patient management decisions. However, discordant interpretations of these images between emergency physicians and expert counterparts (e.g. radiologists) is a common cause of medical error. In pediatrics, this problem is even greater due to the changing physiology with age. **Methods:** ImageSim (https://imagesim.com) is an evidence-based on-line learning platform derived and validated over an 11 year period (https://imagesim.com/research-and-efficacy). This learning system incorporates the concepts of cognitive simulation, gamification, deliberate practice, and performance-based competency in the presentation and interpretation of medical images. Specifically, ImageSim presents images as they are experienced in clinical practice and incorporates a normal to abnormal ratio is representative of that seen in emergency medicine. Further, it forces the participant to commit to the case being normal or abnormal and if abnormal, the participant has to visually locate the specific area of pathology on the image. The participant submits a response and gets text and visual feedback with every case. After each case, the participant gets to play again until they reach a desired competency threshold (80% is bronze resident; 90% silver staff emergency medicine physician; 97% gold radiologist). Importantly, the learning experience also emphasizes deliberate practice such that the learning system provides hundreds of case examples and therefore each participants performance has the opportunity to improve along their individual learning curve. **Results:** Course selection was made based on known medical image interpretation knowledge gaps for practicing emergency physicians. Currently, ImageSim live courses include pediatric musculoskeletal radiographs (2,100 cases, 7 modules) and pediatric chest radiographs (434 cases). In 2018, we will also release a pediatric point-of-care ultrasound course (400 cases, 4 modules) and the pre-pubertal female genital examination (150 cases). For a demo, go to https://imagesim.com/demo. Using ImageSim, the deliberate practice of about 120 cases (1 hour time commitment) increases accuracy on average by 15%. Currently integrated into 10 emergency medicine training programs and there are about 300 continuing medical education world-wide participants. **Conclusion:** While acquiring mastery for these images may take years to acquire via clinical practice alone, this learning system can potentially help achieve this in just a few hours.

Keywords: deliberate practice, computer assisted learning, competency

MP21

Global emergency medicine fellowship: establishing a global EM training program at Queen's University

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Introduction: Global Emergency Medicine (Global EM) is growing rapidly as an academic niche in Canada. An increasing number of Canadian emergency physicians work internationally as part of their practice, and trainees consistently seek out international projects and electives. For the most part however, residents have had to create their own training opportunities as formal Global EM fellowship training has been lacking in Canada. To address this identified need, Queens University established a Global EM fellowship, the first of its kind in the country. **Methods:** The fellowship is designed to provide the skills necessary for an academic career in Global Emergency Medicine. Curriculum and objectives are modeled on similar well-established fellowships in the United States. Areas of expertise include emergency medicine systems development, humanitarian medicine, disaster response, public health, tropical medicine, research, administration and education. Fellows have the opportunity to tailor their training according to their specific interests within these domains. Importantly, the fellowship provides direct mentorship from academic global EM and public health physicians, and networking opportunities within the global health sphere. **Results:** The two-year fellowship curriculum is divided between: 1) coursework to complete a Master of Public Health (MPH) Degree 2) fieldwork 3) relevant international emergency medicine training courses and 4) clinical work in the emergency departments at the Kingston Health Sciences Center. The Queens Global EM fellowship admitted its first fellow in August 2017. To date, the inaugural fellow has completed the MissionCraft Leadership in Disaster Relief course as well as a Humanitarian U Disaster and Response course, in addition to submitting a research grant as a co-principal investigator, starting coursework for an MPH degree and giving several invited lectures on humanitarian medicine. The fellow also travelled to Lebanon to support research in collaboration with aid organizations responding to the Syrian crisis. Upcoming fieldwork involves teaching at a newly established emergency medicine residency program in Haiti as well as a humanitarian crisis deployment. **Conclusion:** In response to a lack of formal international emergency medicine training opportunities in Canada, Queens University has established a Global Emergency Medicine fellowship. The fellowship aims to provide protected time, access to field opportunities and dedicated mentorship to develop the skills necessary to succeed as an academic Global EM physician. We believe it provides a unique opportunity to significantly expand fellows experiences in global health fieldwork, education and research while continuing to practice in a Canadian tertiary emergency department.

Keywords: innovations in emergency medicine education, global emergency medicine, global health training

MP22

Improving treatment of children's presenting and procedural pain for emergency department visits: a province-wide quality improvement collaborative

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Introduction: Pediatric pain is often under-treated in emergency departments (EDs), which is known to cause short and long-term harm. A recent quality improvement collaborative (QIC) was successful in improving treatment of children's pain across 4 EDs in our city. A new QIC was then formed among EDs across our province to improve treatment of presenting and procedural pain. Aims were to improve the proportion of children <12 years of age who receive topical anesthetic before needle procedures from 13% to 50%; and for children <17 years of age with fractures: to 1) improve the proportion who receive analgesic medication from 35% to 50%; 2) improve the proportion who have a documented pain score from 23% to 50%, and 3) reduce median time to analgesia from 59 minutes to 30 minutes, within 1 year. **Methods:** Invitations to participate in the QIC were sent to all 113 EDs in the province that treat children and had not participated in the previous QIC. Each site was asked to form a project team, participate in monthly webinars, develop key driver diagrams and project aims, undertake PDSA tests of change, and audit charts to assess performance. Sites are given a list of 20 randomly selected charts per month for audit. Audit data was entered into REDCap and uploaded to a provincial run chart dashboard. All participating sites received a "comfort kit" consisting of distraction items for children as well as educational materials. Measures of presenting pain included proportion of children <17 years with a diagnosis of fracture who have a documented pain score, proportion who receive an analgesic medication, and minutes to analgesia. The measure for procedural pain was the proportion of children <12 years who receive topical anesthetic prior to a needle procedure for a laboratory test. Length of stay for pediatric patients and all patients were balancing measures. Run charts were used to detect special cause. Difference in proportions were compared using 2. Final analysis will include interrupted time series. **Results:** 34 of 113 invited sites (30%) agreed to participate, including rural and regional representation from all geographic zones; 4222 visits since June 2016 were analyzed. Implementation began June 2017. Comparing the first 4 months following implementation to the preceding year, the proportion of children receiving topical anesthetic prior to needles increased from 13% to 25% ($p < 0.001$). For children with fractures, the proportion with pain scores increased from 23% to 35% ($p < 0.001$), proportion receiving analgesic medication increased from 35% to 42% ($p < 0.001$), and median minutes to analgesia decreased from 59 to 43. Insufficient time points at this stage preclude identification of special cause. **Conclusion:** This province-wide QIC has already resulted in significant progress toward aims during the first 4 months of implementation. The QIC approach shows promise for improving pain outcomes in children visiting diverse EDs across a province.

Keywords: quality improvement and patient safety, quality improvement collaborative, pediatric pain

MP23

A collaborative quality improvement initiative to improve the time to electrocardiogram in patients with chest pain presenting to the emergency department

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Introduction: For patients with chest pain, the target time from first medical contact to obtaining an electrocardiogram (ECG) is 10 minutes, as reperfusion within 120 minutes can reduce the risk of death and adverse outcomes in patients with ST elevation myocardial infarction (STEMI). In 2007, Vancouver Coastal Health (VCH) began tracking key indicators including time to first ECG. The Vancouver General Hospital (VGH) Emergency Department (ED) has been troubled with the longest door to ECG times in the region since 2014. In 2016, the VGH ED Quality Council developed a strategy to address this issue, with an aim of obtaining ECGs on 95% of patients presenting to the VGH ED with active chest pain within 10 minutes of presentation within a 6 month period. **Methods:** The VGH ED Quality Council brought together frontline clinicians, ECG technicians, and other

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stakeholders and completed a process map. We obtained baseline data regarding the median time to ECG in both patients with STEMI and all patients presenting with chest pain. Root cause analysis determined two main barriers: access to designated space to obtain ECGs, and the need for patients to be registered in the computer system before an ECG could be ordered. The team identified strategies to eliminate these barriers, identifying a dedicated space and undergoing multiple PDSA cycles to change the workflow to stream patients to this space before registration. **Results:** Our median times in patients with STEMI have gone from 33 minutes to 8 minutes as of June 2017. In all patients presenting with chest pain, we improved from a median of 36 to 17 minutes. As of April 2017 we are obtaining an ECG within 10 minutes in 27% of our patients, compared to 3% in 2016. Given the limitations in our data extraction process, we were not able to differentiate between patients with active chest pain versus those whose chest pain had resolved. **Conclusion:** By involving frontline staff, and having frontline champions providing real time support, we were able to make significant changes to the culture at triage. We cultivated sustainability by changing the workflow and physical space, and not relying on education only. While we have improved the times for our walk-in patients, we have not perfected the process when a patient moves immediately to a bed or presents via ambulance. Implementing small changes and incorporating feedback has allowed us to identify these new challenges early.

Keywords: quality improvement and patient safety, emergency department, electrocardiogram

MP24

Doc in the box: effectiveness of physician initial assessment at triage in the emergency department

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Introduction: Physician Initial Assessment (PIA) time at the Montfort Emergency Department (ED) in Ottawa is one of the longest in the province. PIA, Length of Stay (LOS), and Left Without Being Seen (LWBS) are all performance measures which impact hospital funding through the pay for results (P4R) system. Increased PIA times negatively impact hospital funding, patient satisfaction and may be correlated to patient safety. Our aim was to examine whether having a physician at triage during the last hour of their shift decreased PIA time, LOS, and LWBS rate, and also to overall improve patient care received in the Emergency Department. **Methods:** During the last hour of five different Emergency Department (ED) shifts (14-15h, 16-17h, 19-20h, 22-23h, 23h-00h), the physician worked with a designated registered nurse, evaluating patients in a room adjacent to triage and the waiting room. The current study evaluated the effectiveness of having a physician perform initial assessments at triage (including history, physical and ECG) and assess the impact on PIA time, LOS, and LWBS during the specific hours that a physician is at triage. This is a pre-post retrospective study. Baseline data was collected retrospectively over a period of 20 weeks prior to the intervention (between January 2017 and June 2017). Intervention data was collected over a period of 20 weeks starting in June 2017. Statistical process control (SPC) methodologies were then applied to the pre-post data of continuous variables. PIA time and LOS averages were obtained for each hour in which the physician was stationed at triage. I (XmR) charts were used for statistical analysis. Analysis was done using QI macros in Microsoft Excel. **Results:** Reductions in PIA times of 8 minutes (14-15h), 16 minutes (16-17h), 30 minutes (19-20h), 72 minutes (22-23h) and 88 minutes (23h-00h) were demonstrated across the 5 shifts throughout the trial period. No clear increase in LWBS wait times were demonstrated. Overall ED volumes increased modestly over the course of the intervention. Overall ED LOS in the department decreased about 25 minutes over this same period. There were no other PIA or LOS reduction initiatives taking place in the ED over the trial period. **Conclusion:** The goal of this study was to have patients seen quickly by an emergency physician at triage who would perform a rapid initial assessment and respond to needs for pain management, and order urgent testing or imaging. In this study, PIA times improved after the process change for every time period tested. One possible limitation was that this intervention likely had less adherence at the beginning of the trial as the staff adjusted to the new shift flow. This seems to be reflected in the data, since an improved process change is demonstrated near the end of the trial period. The next step in quality care improvement is to look at lab and imaging data to evaluate the utilization of tests with a physician at triage.

Keywords: quality improvement and patient safety, physician initial assessment time in the emergency department, emergency physician at triage

MP25

The quality improvement and patient safety curriculum for emergency medicine residents at the University of Toronto: results from the first cohort

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Introduction: The 2015 CanMEDS framework requires all residency programs to increase their focus on Quality Improvement and Patient Safety (QIPS). We created a longitudinal (4-year), modular QIPS curriculum for FRCP emergency medicine residents at the University of Toronto (UT) using multiple educational methods. The curriculum addresses three levels of QIPS training: knowledge, practical skills at the microsystem level, and practical skills at the organization level. Aim Statement: To increase the UT FRCP emergency medicine residents absolute score on the QIKAT-R (Quality Improvement Knowledge Application Tool Revised) by 10% after the completion of the QIPS curriculum. **Methods:** Physicians and other healthcare professionals with QI expertise collaboratively designed and taught the curriculum. We used the QIKAT-R as the outcome measure to evaluate QI knowledge and its applicability. The QIKAT-R is a validated measure that assesses an individuals ability to decipher a QI issue within the healthcare context, and propose a change initiative to address it. The first cohort of residents completed the QIKAT-R prior to the first session in 2014 (pre) and at the completion of the curriculum in 2017 (post). Each response was anonymized and scored by physicians with QI expertise. The QIKAT-R scores and comments from course evaluations are used to make yearly iterative curriculum changes. **Results:** The QIPS curriculum was implemented in September 2014. All nine residents in the first cohort completed the curriculum; they demonstrated an absolute increase of 19.6% (5.3/27) in the mean QIKAT-R score (13.0 +/−3.3 pre vs. 18.3 +/− 3.8 post, $p = 0.001$). Of the pre-test responses, 26% were categorized as poor, 70% as good, and 4% as excellent, whereas of the post-test 11% of responses were categorized as poor, 37% as good, and 52% as excellent ($p < 0.001$). Two iterative curriculum changes were made at the end of each academic year since 2014: (1) The time between sessions were decreased to promote knowledge retention, and (2) different PGY3 QI practical project options were provided to suit residents individual QI interests. QIKAT-R scores and resident feedback were used to

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evaluate the impact of the curriculum changes. **Conclusion:** A collaborative, modular, longitudinal QIPS curriculum for UT FRCP emergency medicine residents that met CanMEDS requirements was created using multiple educational methods. The first resident cohort that completed the curriculum demonstrated an absolute increase in QI knowledge and its applicability (as measured by the QIKAT-R) by 19.6%. Two PDSA cycles were completed to improve the curriculum with the change ideas generated from resident feedback. Ongoing challenges include limited staff availability to teach and supervise resident QI projects. Future directions include incentivising staff participation and providing mentorship for residents with a career interest in QI beyond what is offered by the curriculum.

Keywords: quality improvement and patient safety, residency training, CanMEDS

MP26

An emergency department team-based quality improvement initiative reduces narcotic and benzodiazepine 'to-go' medication administration

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Introduction: The administration of "to-go" medications in the Kelowna General Hospital Emergency Department was identified as an issue. Frequently, multiple administrations of "to-go" medication prepacks were administered to individual patients on a frequent basis. In addition, the variability in "to-go" medication was substantial between providers. Recognizing the patient issues (addiction, dependency and diversion) and system issues (costs, risk) a team-based quality improvement initiative was instituted, utilizing a variety of quality improvement techniques. The aim was to reduce the number of "to-go" medications by half, within a year. **Methods:** The project began January 2015, and is ongoing. Multiple stakeholders were engaged within the emergency department; these included leaders of the physician, nursing and pharmacy teams, including an executive sponsor. Using change theory, and traditional Plan-Do-Study-Act (PDSA) cycles, an iterative methodology was proposed. The outcome measure proposed was number of "to-go" medications administered; secondary measures included number of opioid "to-go" and benzodiazepine "to-go"prescriptions. Balancing measures were the number of narcotic prescriptions written. Physician prescribing practice and nursing practice were reviewed at meetings and huddles. Individualized reports were provided to physicians for self-review. Data was collated at baseline then reviewed quarterly at meetings and huddles. Run charts were utilized along with raw data and individualized reports. **Results:** At baseline (January 2015), the number of "to-go" medications was 708. Over the next year, this value reduced to 459, showing a 35% reduction in "to-go". Two years later (June 2017), this had reduced to 142, resulting in an overall reduction of 80% "to-go" medications. Secondary measures are currently under analysis. Further, no increase in prescribing of narcotics was seen during this time period. **Conclusion:** The administration of "to-go" medications from the emergency department has significant individual and societal impact. Frequently, these medications are diverted; meaning, sold for profit on the black market. Further, opioid prescribing is under increased scrutiny as the linkage between opioid prescriptions and addiction / dependency becomes more evident. This quality improvement initiative was successful for a number of reasons. First, we had strong engagement from the full emergency department clinical teams. The issue was first identified collaboratively, and teamwork and participation was strong from the outset. Second, we used individual and aggregate data to provide feedback on a regular basis. Third, we had strong support from our executive sponsor(s) who were able to support the efforts and champion and present the results locally, and now, throughout the Health Region.

Keywords: quality improvement and patient safety, opioids, prescribing practices

MP27

Publishing emergency department wait times in the waiting room: implementation and evaluation of a co-designed patient centered solution

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Introduction: Patients in our ED were dissatisfied with their waiting experience, which resulted in patient anxiety and complaints. In 8 months, we aimed to (1) improve patient satisfaction with the ED waiting experience from triage to physician initial assessment by a 15% improvement in patients who rate their experience very good/excellent on a Likert Scale, and (2) improve patient knowledge of ED wait time by a 50% increase in understanding on a Likert Scale. **Methods:** We co-designed a display with ED patients to notify those in the waiting room of their wait process and wait time. The intervention was selected after root cause diagnostics including: Fishbone exercise, Pareto Diagram, and Driver Diagram. The display was co-designed with ED patients and improved via PDSA cycles to establish information displayed and how to incorporate it into the waiting experience. After co-design, a low-fidelity display was piloted in the waiting room. **Results:** A family of measures were evaluated using patient/provider surveys and hospital data metrics. Outcome measures were (1) percentage of patients who rated their ED experience as very good/excellent on a Likert scale, and (2) patients who had a clear/very clear understanding of their wait time on a Likert scale. Process measures were the percentage of patients who (1) looked at the wait time display, and (2) felt they could communicate their wait time to others. Balancing measures were clerk/nurse satisfaction and self-reported interruptions of patients asking wait time. Outcomes were tracked using statistical process charts and run charts. Following display implementation, patient rating of their ED experience and patient understanding of wait time showed positive improvement. Clerks/nurses were also more satisfied with their jobs and self-reported interruptions decreased. **Conclusion:** A low-fidelity wait time display co-designed with patients improved patient satisfaction and understanding of ED wait times. We plan to develop an automated electronic display that resembles the low-fidelity display and evaluate the impact of the intervention on the established measures. This intervention has the potential to be sustainable, feasible for other EDs, and require minimal upkeep costs.

Keywords: quality improvement and patient safety, patient-centered, patient co-design

MP28

Reducing door-to-needle times across Alberta to 36 minutes

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Introduction: The effectiveness of intravenous alteplase is highly time dependent, and very short door-to-needle times (DNT) of 30 minutes or

less have been reported in single centre hospitals, but never in an entire population. QuICR (Quality Improvement and Clinical Research) Alberta Stroke Program aimed to reduce DNT to a median of 30 minutes across the Canadian province of Alberta. **Methods:** We used the Improvement Collaborative Methodology from early 2015 to September 2016 with participation from all 17 Stroke Centres in Alberta. This methodology included 4 face-to-face workshops, site visits, webinars, data collection, data feedback, intensive process mapping, and process improvements. We compared data in the pre-intervention period from 2009-2014 (collected during the Alberta Provincial Stroke Strategy) to data in the post-intervention period from March 2016-February 2017 (collected during the QuICR DTN Collaborative). Data from January 2015-February 2016 were excluded, as improvements were being implemented during this time. **Results:** There were a total of 2,322 treated cases in the pre- and post-intervention periods. The results show that the median DNT dropped from 68 minutes (n = 1,846) in the pre-intervention period to 36 minutes (n = 476) in the post-intervention period ($p < 0.001$). There were reductions in DNT across all hospital types: median DNT dropped from 63 to 32 minutes in Urban Tertiary Centres ($p < 0.001$), from 73 to 32 minutes in Community with 24/7 neurology ($p < 0.001$), from 85 to 62 minutes in Community with limited/no neurology ($p < 0.001$), and from 74 to 52.5 minutes in rural centres ($p < 0.001$). **Conclusion:** There were 21.5 to 41 minute reductions in median DNT across all hospital types including smaller rural and community hospitals. A targeted multi-site improvement collaborative can be an effective intervention to reduce DNT across an entire population.

Keywords: door to needle times, quality improvement, acute stroke

MP29

Creation of the CAEP Acute Atrial Fibrillation/Flutter Best Practices Checklist

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Introduction: Patients with acute atrial fibrillation or flutter (AAFF) are the most common acute arrhythmia cases requiring care in the ED. Our goal was to adapt the existing Canadian Cardiovascular Society (CCS) AF Management Guidelines into an emergency physician-friendly best practices checklist. **Methods:** We chose to adapt, for use by emergency physicians, existing high-quality clinical practice guidelines (CPG) previously developed by the CCS using the GRADE system. We used the Canadian CAN-IMPLEMENT© process adapted from the ADAPTE Collaboration. We created an Advisory Committee consisting of 14 academic and community emergency physicians, three cardiologists, one PhD methodologist, and two patients. The Advisory Committee communicated by a two-day face-to-face meeting, teleconferences, and email. The checklist was prepared and revised through a process of feedback and discussions through ten iterations until consensus was achieved. We then circulated the draft checklist for comment to approximately 300 emergency medicine and cardiology colleagues whose written feedback was further incorporated into the final approved version. **Results:** The final CAEP ED AAFF Guidelines are comprised of two algorithms and four sets of checklists, organized by 1) Assessment and Risk Stratification, 2) Rhythm and Rate Control, 3) Long-term Stroke Prevention with the CHADS-65 Algorithm, and 4) Disposition and Follow-up. The guidelines have been endorsed by CAEP and accepted for publication in the Canadian Journal of Emergency Medicine. During the consensus and feedback processes, we addressed a number of issues and concerns. We highlighted the issue that many unstable patients are actually suffering from underlying medical problems rather than a primary arrhythmia. One controversial recommendation is to consider rate control or transesophageal echocardiography guided cardioversion if the duration of symptoms is 24-48 hours and the patient has two or more CHADS-65 criteria. We emphasize the importance of evaluating long-term stroke risk by use of the CHADS-65 algorithm and encourage ED physicians to prescribe anticoagulants where indicated. **Conclusion:** We have created the CAEP AAFF Best Practices Checklist which we hope will standardize and improve care of AAFF patients in all EDs across Canada. We believe that most of these patients can be managed rapidly and safely with ED rhythm control, early discharge, and appropriate use of anticoagulants.

Keywords: atrial fibrillation, guidelines, cardiology

MP30

Impact des bicarbonates sur le devenir des patients souffrant d'un arrêt cardiaque préhospitalier

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Introduction: Les patients souffrant dun arrêt cardiaque extra hospitalier (ACEH) sont fréquemment traités à laide de soins avancés en réanimation cardiovasculaire (SARC). Dans ce contexte, des bicarbonates de sodium sont parfois administrés à des patients en arrêt cardiaque réfractaire chez qui une acidose métabolique importante, une hyperkaliémie ou une intoxication est suspectée. Puisquil ny a que peu dévidences quant à cet usage, lobjectif de la présente étude est dévaluer lassociation entre le traitement à laide de bicarbonate de sodium (une dose ou plus) et le devenir (retour de circulation spontané et survie au congé) chez les patients souffrant dun ACEH. **Methods:** La présente étude de cohorte a été réalisée à partir des bases de données de la Corporation dUrgences-santé dans la région de Montréal entre 2010 et 2015. Les patients adultes ayant souffert dun ACEH dorigine médicale traités en préhospitalier par des paramédics de soins avancés prodiguant des SARC ont été inclus. Les associations dintérêt ont été évaluées initialement à laide de régressions logistiques univariées, puis à laide de régressions logistiques multivariées ajustant pour les variables sociodémographiques et cliniques pertinentes. **Results:** Un total de 1973 patients (1,349 hommes et 683 femmes) dun âge moyen de 66 ans (±17) ont été inclus dans cette étude, parmi lesquels 77 (3,8%) ont reçu une dose de bicarbonate, 763 (37,5%) ont retrouvés un pouls en préhospitalier et 222 (10,9%) ont survécu jusquà leur congé de lhôpital. Sans ajustement, il y avait une association négative entre le traitement à laide de bicarbonates et le retour de circulation spontané (rapport de cotes [RC] = 0,46 [intervalle de confiance {IC} 95% 0,27-0,79], p = 0,005) et la survie au congé (RC = 0,21 [IC 95% 0,05-0,86], p = 0,030). Cependant, ces associations nétaient plus significatives suite à lajustement pour les autres covariables (RC ajusté = 0,63 [IC 95% 0,34-1,18], p = 0,15 et RC ajusté = 1,69 [95% IC 0,29-10,01], p = 0,56). **Conclusion:** Il ny a pas dassociation indépendante entre le traitement à

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laide de bicarbonates et le devenir chez les patients souffrant dun ACEH. Dans ce contexte, il serait adéquat de réaliser un essai clinique afin de trancher définitivement sur cette question.
Keywords: out-of-hospital cardiac arrest, sodium bicarbonate

MP31

Debriefing critical incidents in health care: a review of the evidence

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Introduction: Emergency health care providers (HCPs) regularly perform difficult medical resuscitations that require complex decision making and action. Critical incident debriefing has been proposed as a mechanism to mitigate the psychological effect of these stressful events and improve both provider and patient outcomes. The purpose of this updated systematic review is to determine if HCPs performing debriefing after critical incidents, compared to no debriefing, improves the outcomes of the HCPs or patients. **Methods:** We performed a librarian assisted systematic review of OVID Medline, CINAHL, OVID Embase and Google Scholar (January 2006 to February 2017) No restrictions for language were imposed. Two investigators evaluated articles independently for inclusion criteria, quality and data collection. Agreement was measured using the Kappa statistic and quality of the articles were assessed using the Downs and Black evaluation tool. **Results:** Among the 658 publications identified 16 met inclusion criteria. Participants included physicians, nurses, allied health and learners involved in both adult and pediatric resuscitations. Findings suggest that HCPs view debriefing positively (n = 7). One moderate quality study showed that debriefing can enhance medical student and resident knowledge. Several studies (n = 8) demonstrated at least some improvement in CPR and intubation related technical skills. Debriefing is also associated with improved short term patient survival but not survival to discharge (n = 5). Two studies reported benefits to HCPs mental health as evidenced by improved ability to manage grief and decreased reported symptoms of Post-Traumatic Stress Disorder (PTSD). **Conclusion:** We found HCPs value debriefing after critical incidents and that debriefing is associated with improved HCP knowledge, skill and well-being. Despite these positive findings, there continues to be limited evidence that debriefing significantly impacts long term patient outcomes. Larger scale higher quality studies are required to further delineate the effect of structured debriefing on patient and provider outcomes.
Keywords: debrief, resuscitation, emergency service, hospital

MP32

Paramedics using near-infrared spectroscopy in out-of-hospital cardiac arrest: a feasibility study

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Introduction: Long-term outcomes following out-of-hospital cardiac arrest (OHCA) remain poor. Two-thirds of OHCA patients surviving to hospital admission die from neurological injuries, and of those discharged, one-third have irreversible cognitive disabilities due to cerebral ischemia. Near-infrared spectroscopy (NIRS) is a non-invasive imaging technique which is able to continuously detect regional cerebral oxygenation (rSO2). NIRS monitoring has been used to measure rSO2 during in-hospital cardiac arrest resuscitation. Our study is the first feasibility study of paramedics applying NIRS monitoring during OHCA resuscitation. **Methods:** One NIRS monitor (Equanox 7600; Nonin, Plymouth, MI, USA) was placed on an Emergency Response Unit (ERU) with York Region Paramedic Services. ERU paramedics were trained to apply the device to patients foreheads during OHCA resuscitation and record rSO2 until arrival at hospital or termination of resuscitation. Paramedics did not alter any aspect of patient care by using the NIRS monitor. They were instructed to press an action marker on the device during ACLS interventions (e.g. defibrillation, intubation, medications, etc). rSO2 data was later downloaded for analysis. Our feasibility criteria was to obtain >70% of data files with rSO2 data and >70% of data files with event markers. **Results:** Data was collected from 24 OHCA patients over a period of 10 months. 19 cases (79%) files contained rSO2 data and 17 cases (71%) had event markers. The rSO2 data present in each file varied widely from complete recording for the entire call duration to sporadic brief readings. Event markers varied from 1 to 10 markers spaced throughout the cases. **Conclusion:** This is the first study to demonstrate that the use of NIRS by paramedics as part of OHCA resuscitation is feasible. Future studies are required to determine how rSO2 monitoring can be used to guide OHCA resuscitation. The results of this study will help inform protocols for future studies evaluating the use of NIRS in the out-of-hospital setting.
Keywords: out-of-hospital cardiac arrest, cerebral oxygenation, feasibility

MP33

Refining nursing symptom-driven guidelines for ED laboratory test ordering

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Introduction: Recent reports suggest that up to 30% of medical interventions provide no benefit to patients. In a response to ED overcrowding, guidelines commonly exist to guide blood test ordering in patients waiting to see a physician. In many cases, this increases the use of tests without benefiting patients. We describe a quality improvement project designed to reduce the number of laboratory tests considered routine for waiting patients. **Methods:** A multidisciplinary group reviewed existing symptom-prompted nursing blood test guidelines for serum electrolytes and glucose, renal function tests, liver tests, lipase, toxicological tests and beta Human Chorionic gonadotrophin levels. Order sets were revised with tests eliminated from the routine panels that were not felt to routinely contribute to patient care. The new guidelines were communicated to nursing staff in a series of educational sessions, and the revised guidelines were posted at nursing stations. Physician ordering practice was not changed. A pre-post evaluation compared the period 1 December 2014 - 30 November 2015 with 1 December 2015 - 30 November 2016. Clinical outcomes and patient wait times were not evaluated. **Results:** The use of tests in these categories decreased 32% between the two periods, at a net saving of $210, 246c. The largest savings came from total protein (73% decrease), Creatine kinase (68%), chloride (64%), glucose (49%), and albumin (47%). Sodium/Potassium testing decreased by only 13%. The only increase in test ordering recorded was AST (3% increase). **Conclusion:** Simply changing symptom driven order sets resulted in significant savings to the system. In the era of Choosing wisely regular review of lab order sets is indicated. Further study is needed to assess the effect of these changes on patient flow and on clinical outcome.
Keywords: Choosing Wisely, emergency laboratory testing

MP34

Evaluation of real-time virtual support for rural emergency care

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Introduction: In many rural and remote communities in BC, family physicians who are providing excellent primary and emergency care would like to access useful, timely, and collegial support to ensure the highest quality of health services for their patients. We undertook a real-time virtual support project in Robson Valley, located in northern BC, to evaluate the use of digital technologies such as videoconferencing for on demand consultation between family physicians at rural sites and emergency physicians at a regional site. Telehealth consults also occurred between rural sites with nurses at community emergency rooms consulting with local on-call physicians. Our aim was to use telehealth to facilitate timely access to high quality, comprehensive, coordinated team-based care. An evaluation framework, based on the Triple Aim sought to: 1) Identify telehealth use cases and assess impact on patient outcomes, patient and health professional experience, and cost of health care delivery; and 2) Assess the role of relationships among care team members in progressing from uptake to normalization of telehealth into routine usage. **Methods:** Using a participatory approach, all members of the pilot project were involved in shaping the pilot including the co-development of the evaluation itself. Evaluation was used iteratively throughout implementation for ongoing quality improvement via regular team meetings, sharing and reflecting on findings, and adjusting processes as required. Mixed methods were used including: interviews with family physicians, nurses, and patients at rural sites, and emergency physicians at regional site; review of records such as technology use statistics; and stakeholder focus groups. **Results:** From November 2016 to July 2017, 26 cases of telehealth use were captured and evaluated. Findings indicate that telehealth has positively impacted care team, patients, and health system. Benefits for care team at the rural sites included confidence in diagnoses through timely access to advice and support, while emergency physicians at the regional site gained deeper understanding of the practice settings of rural colleagues. Nevertheless, telehealth has complicated the emergency department work flow and increased physician workload. Findings demonstrated efficiencies for the health system, including reducing the need for patient transfer. Patients expressed confidence in the physicians and telehealth system; by receiving care closer to home, they experienced personal cost savings. Implementation saw a move away from scheduled telehealth visits to real use of technology for timely access. **Conclusion:** Evidence of the benefits of telehealth in emergency settings is needed to support stakeholder engagement to address issues of workflow and capacity. This pilot has early indications of significant local impact and will inform the expansion of emergency telehealth in all emergency settings in BC.

Keywords: quality improvement and patient safety, telehealth, rural

MP35

An educational and audit-and-feedback approach to decreasing unnecessary intravenous therapy in low-acuity emergency patients

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Introduction: Intravenous (IV) therapy in the emergency department (ED) is associated with risk of harm from IV complications, higher ED monitoring requirements and increased ED length of stay (LOS), the latter a measure most cumbersome in lower-acuity patients that are eventually discharged from the ED. The aim of this quality improvement project was to evaluate the effectiveness of educational and audit-and-feedback interventions, with a goal of relative reduction of ED IV therapy by 20% over eight week periods, in lower-acuity patients in the high-turnover intake area of the ED who were discharged from the ED. **Methods:** The first cycle of the project was education about IV therapy use and alternatives in lower-acuity, ED patients (Canadian Triage Acuity Scale (CTAS) 3 and 4) from July 2 to August 31, 2017. Education was delivered through email information, posters, education sessions with nurse educators, and working groups sharing information. The second cycle of the project, from October 16 to December 15, 2017, also integrated an audit-and-feedback tool whereby physicians received their own pooled ordering data of IVs from the same period the previous year and then trial period as well pooled comparison averages for the physician group in the population of interest. Measures were the percentage of IVs ordered by physicians and administered by nurses in the population of interest in each time period. **Results:** From July 2 to August 31, 2017, when the intervention was education only, the rate of IV therapy changed from 31% to 37%, which reflects a 19% relative increase in IV use. In the beginning of the second cycle utilizing both education and audit-and-feedback interventions, from October 16 to December 15, 2017, 35% of patients had IV therapy. At the end of the second cycle, 25% of patients had IV therapy, a 28% relative decrease in IV therapy rates. When both cycles are reviewed sequentially, IV therapy rates decreased from 31% to 25%, a relative reduction of IV usage of 19%. **Conclusion:** In this quality improvement project, an educational initiative for the interdisciplinary team alone did not reduce IV use in lower-acuity patients. Concurrent education and audit-and-feedback interventions were more effective than education alone in decreasing IV therapy in appropriately selected patients in a tertiary ED.

Keywords: quality improvement and patient safety, audit and feedback, intravenous therapy use

MP36

Can one emergency physician improve department flow? A proof-of-concept trial of a physician float role

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Introduction: Emergency departments (EDs) are overcrowded and patient acuity and volumes are ever-increasing. While changes to the flow of ED patient input and output are outside the control of frontline ED teams, the efficiency of ED throughput can be optimized. One widely studied intervention is the implementation of a physician liaison role to assist in managing overall ED flow. The Physician Float (PF) acts as a triage liaison, second physician for resuscitations, ED procedural sedation physician, and fields ED referral calls. This is a first-iteration proof-of-concept trial to plan, implement and evaluate if the PF role could decrease ED length of stay (LOS) by a goal of 30 minutes, over a four-week period, without adverse changes to left without being seen (LWBS) and bounce-back rates. **Methods:** The PF role was implemented as a scheduled emergency physician shift in the fall of 2017. Ongoing iterations of this role implementation are being reviewed for re-implementation. The primary outcome measure was ED LOS; secondary outcomes included time-to-physician initial assessment (PIA), EMS offload rates, and LWBS and 72-hour bounce-back rates. Qualitative data including patient concerns and physician feedback were also collected. Data were collected after the trial from a

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centralized, de-identified ED information system database with time-stamp quantifiers and compared to the following four-week time period where the shift is a regular ED physician shift at the same time. The ED physician and nursing team planned and implemented the PF role, then results were evaluated and shared with the wider ED staff in departmental grand rounds and quality council presentation formats, and recommendations were gathered from to adjust and strengthen future iterations of PF role implementation. **Results:** Descriptive statistics and Mann-Whitney and Median tests were calculated. On average there were 185 daily ED visits in the trial and comparison periods. Median ED LOS decreased by 12 minutes in the PF trial period ($p < 0.05$). Furthermore, there was a 12 minute decreased ED LOS for all discharged patients ($p < 0.05$). PIA time decreased by 13 minutes for patients that were admitted. The average percentage of EMS offloads within 60 min improved from 75% to 80.7% for admitted patients. LWBS and 72-hour bounce-back rates were unchanged. No additional patient concerns arose related to or during the trial. Physician feedback on the PF role was mainly positive. **Conclusion:** The defined role of a PF in an ED can decrease ED LOS, albeit not achieving the desired 30-minute reduction on the first iteration, this trial supported proof-of-concept for implementation of a PF role in a tertiary care centre ED. Further iterations are needed to evaluate the scalability and sustainability of this role.

Keywords: quality improvement and patient safety, physician float, emergency department throughput

MP37

Conceptualizing unnecessary care in emergency departments (ED): qualitative interviews with ED physicians and site chiefs

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Introduction: Unnecessary care is an increasingly commonly used term in medicine. Previous survey research suggests that definitions of unnecessary care vary within and among professional and patient groups. This research explores how emergency physicians and administrators understand the term unnecessary care. **Methods:** Site chiefs and emergency physicians in an Alberta region were recruited through email and online surveys respectively for a qualitative study. One hour one-on-one in-depth interviews explored understandings of unnecessary care within the emergency department (ED) context. Interview transcripts underwent thematic analysis. **Results:** Five physicians and seven site chiefs completed interviews. Two key themes emerged. First, interviewees conceptualized unnecessary care as inappropriate or non-urgent presentations. This patient-centric view raised non-urgent ED presentations as a health system problem with complex components, including: lack of public knowledge of healthcare resources, shrinking comfort and scope of community providers and patient willingness to utilize other resources. Despite concerns over non-urgent visits, interviewees expressed that these patients still need to be seen, assessed and managed. The second conceptualization focused on over-investigation (and to lesser extent, treatment). This physician-centric conceptualization identified issues around: variation in physician risk tolerance, established decision rules with the allowable miss rates, patient expectation for testing or physician feeling that the patient was owed something or that patient would not accept their diagnosis/treatment without testing. Additionally, interviewees described patient characteristics that may initiate more aggressive investigation (e.g., patient reliability, follow-up care access, etc.). An overarching concern about the connection between unnecessary care and wasted resources was identified. Additionally, interviewees emphasized that patient conversations are outside the scope of unnecessary care despite their possible implications for limited time resources. **Conclusion:** A range of concepts surrounding unnecessary care in the ED were identified. Further exploring nuances of these conceptualizations may inform and improve the effectiveness of campaigns seeking to improve efficiency in practice and reduce inappropriate care. Additionally, this work provides an impetus for developing clearer concepts of care within the ED.

Keywords: unnecessary care, qualitative research

MP38

Barriers and facilitators to physician use of computerized clinical decision support for mild traumatic brain injury and suspected pulmonary embolism

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Introduction: As utilization of CT imaging has risen dramatically, evidence-based decision rules and clinical decision support (CDS) tools have been developed to avoid unnecessary CT use in low risk patients. However, their ability to change physician practice has been limited to date, with a number of barriers cited. The purpose of this study was to identify the barriers and facilitators to CDS adoption following a local CDS implementation. **Methods:** All emergency physicians at 4 urban EDs and 1 urgent care center were randomized to voluntary evidence-based CT imaging CDS for patients with either mild traumatic brain injury (MTBI) or suspected pulmonary embolism (PE). CDS was integrated into the computerized physician order entry (CPOE) software and triggered whenever a CT scan for an eligible patient was ordered. Physicians in both the MTBI and PE arms were ranked according to their CDS use, and a stratified sampling strategy was used to randomly select 5 physicians from each of the low, medium and high CDS use tertiles in each study arm. Each physician was invited to participate in a 30-minute semi-structured interview to assess the barriers and facilitators to CDS use. Physician responses were reported using a thematic analysis. **Results:** A total of 202 emergency physicians were randomized to receive CDS for either MTBI or PE, triggering CDS 4561 times, and interacting with the CDS software 1936 times (42.4%). Variation in CDS use ranged from 0% to 88.9% of eligible encounters by physician. Fourteen physicians have participated in interviews to date, and data collection is ongoing. Physicians reported that CDS use was facilitated by their confidence in the evidence supporting the CDS algorithms and that it provided documentation to reduce medico-legal risk. CDS use was not impeded by concerns over missed diagnoses or patient expectations. Reported barriers to CDS use included suboptimal integration into the CPOE such as the inability to auto-populate test results, it disrupted the ordering process and was time consuming. A common concern was that CDS was implemented too late in workflow as most decision making takes place at the bedside. Physicians did not view CDS as infringing on physician autonomy, however they advised that CDS should be a passive educational option and should not automatically trigger for all physicians and eligible encounters. **Conclusion:** Physicians were generally supportive of CDS integration into practice, and were confident that CDS is an evidence-based way to reduce unnecessary CT studies. However, concerns were raised about the optimal integration of CDS into CPOE and workflow. Physicians also stated a preference to a passive educational approach to CDS rather than an automatic triggering mechanism requiring clinical documentation.

Keywords: clinical decision support, knowledge translation, barriers and facilitators

MP39

Characteristics of clinical decision support tools that impact physician behaviour: a systematic review and meta-analysis

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Introduction: Clinical decision support (CDS) has been implemented in many clinical settings in order to improve decision-making. Their potential to improve diagnostic accuracy and reduce unnecessary testing is well documented; however, their effectiveness in impacting physician practice in real world implementations has been limited by poor physician adherence. The objective of this systematic review and meta-regression was to establish the effectiveness of CDS tools on adherence and identify which characteristics of CDS tools increase physician use of and adherence. **Methods:** A systematic review and meta-analysis was conducted. MEDLINE, EMBASE, PsychINFO, the Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews were searched from inception to June 2017. Included studies examined CDS in a hospital setting, reported on physician adherence to or use of CDS, utilized a comparative study design, and reported primary data. All tool type was classified based on the Cochrane Effective Practice and Organization of Care (EPOC) classifications. Studies were stratified based on study design (RCT vs. observational). Meta-regression was completed to assess the different effect of characteristics of the tool (e.g. whether the tool was mandatory or voluntary, EPOC classifications). **Results:** A total of 3,359 candidate articles were identified. Seventy-two met inclusion criteria, of which 46 reported outcomes appropriate for meta-regression (5 RCTs and 41 observational studies). Overall, a trend of increased CDS use was found (pooled RCT OR: 1.36 [95% CI: 0.97-1.89]; pooled observational OR: 2.12 [95% CI: 1.75-2.56]).When type of tool is considered, clinical practice guidelines were superior compared to other interventions ($p = .150$). Reminders ($p = .473$) and educational interventions ($p = .489$) were less successful than other interventions. Multi-modal tools were not more successful that single interventions ($p = .810$). Lastly, voluntary tools may be supperior to than mandatory tools ($p = .148$). None of these results are statistically significant. **Conclusion:** CDS tools accompanied by a planned intervention increases physician utilization and adherence to the tool. Meta-regression found that clinical practice guidelines had the biggest impact on physician adherence although not statistically significant. Further research is required to understand the most effective intervention to maximize physician utilization of CDS tools.

Keywords: clinical decision support tools, emergency medicine technology

MP40

Do doctors cherry pick?

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Introduction: Physician access to presenting complaint information may lead to cherry picking if some patients are seen as more attractive than others. Our objective was to determine whether chief complaint CC descriptors are associated with differing wait time to MD, hence whether physicians preferentially see patients with selected presenting complaints. **Methods:** We collated administrative data on all Calgary ED patients from 2016. Those in CTAS categories 1 and 5 were excluded, as well as fast track patients (because of single coverage). We described most common chief complaint (CC) categories and their median wait time to MD, adjusted for ED arrival site, patient sex, triage acuity, and need for admission. **Results:** We studied 128,812 subjects (54% CTAS2, 46% CTAS34) with 56,243 males and 72,569 females. Mean age was 50.6 years ($sd = 20$), and most common CC categories (%) were abdominal pain (22%), chest pain (14.6%), musculoskeletal problems (7.2%), flank pain (5.2%), URI/Fever (4.7%), dyspnea (4.6%), headache (4.6%), and back pain (4.0%). Median TTMD was 84 min and admission rate in the study cohort was 30.4%. Multiple linear regression modeling showed that, in addition to CC category and ED arrival site, CTAS level, female sex, and need for admission changed TTMD by 18.6 min (per CTAS level), 6.6 min, -19.2 min respectively. Based on adjusted TTMD, the least attractive CC categories (adjusted median TTMD) were constipation (104 min), back pain (103), Depression/anxiety (103), abdominal pain (102), and dizziness/sensory disturbance (98); while the most attractive were trauma (44 min), allergic reaction (46), stroke symptoms (49), palpitations (61), and overdoses (66). **Conclusion:** There is a larger than expected difference in waiting times associated with specific chief complaint categories. This has implications for the way that patients are assigned to physicians or perhaps the way that chief complaint data is transmitted.

Keywords: quality improvement and patient safety, wait times, triage

MP41

Validity of the Canadian CT head rule age criterion for mild traumatic brain injury

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Introduction: With a Canadian aging population, the prevalence of mild traumatic brain injury (mTBI) among elderly is increasing and the age criterion of the Canadian CT head rule (CCHR) is challenged by many emergency physicians. We evaluated if increasing the age criterion of the CCHR would maintain its validity. **Methods:** We conducted an historical cohort study using the medical charts of all patients 65 years old or more who consulted at a Level One Trauma Centre emergency department (ED) for a mTBI between 2010 and 2014. The main outcome measures were clinically important brain injury (CIBI) on Computed Tomography (CT) and the presence of the CCHR criteria. The clinical and radiological data collection was standardized. Univariate analysis was performed to measure the predictive capacities of modified age cut-offs at 70 and 75 years old. **Results:** Out of the 104 confirmed mTBI in this study, 32 (30,8%) had CIBI on CT scan. Sensitivity and specificity [C.I. 95%] of the CCHR were 100% [89.1 - 100] and 0% [0.0 5.0] for an age criterion of 65 years old and above; 100% [89.1 - 100] and 4,2% [0.9 11.7] for a modified criterion of 70 years old; 100% [89.1 - 100] and 13,9% [6.9 24.1] for 75 years old. Furthermore, for an age criterion of 80 and 85 years old, sensitivity was respectively 90,6% [75.0 98.0] and 75,0% [56.6 88.5]. **Conclusion:** In our cohort, increasing the age criterion of the CCHR for minor head injury to 75 years old would benefit ED by further reducing CT scans without missing CIBI. A larger prospective study is indicated to confirm the proposed modification.

Keywords: mild traumatic brain injury, computed tomography, Canadian CT head rule

MP42

Validation of the Stoplight Pain Scale tool in the Canadian emergency setting

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Introduction: A variety of pain assessment tools exist for children, however none of the current scales were created specifically for family use. Further, none provide direct guidance with regards to pain treatment threshold. This study aimed to validate a novel, three faced, coloured coded (red, yellow, green), family-friendly pain tool, the Stoplight Pain Scale, by comparing it to the widely accepted and validated Faces Pain Scale-Revised (FPS-R). This novel tool has the capability to guide families with regards to treatment, as well as measure pain. **Methods:** A prospective observational cohort study was conducted at the Stollery Childrens Hospital emergency department (ED) (Edmonton, Alberta) from November, 2014 to February, 2017. Demographic information was collected, and patients (3-12 years) and their caregivers were asked to rate their pain using the novel Stoplight Pain Scale as well as the FPS-R. Pain was measured at presentation to the ED, immediately following painful procedures, and thirty minutes after analgesia administration. Patients and their caregivers also indicated their preferred scale for assessing pain. **Results:** A purposeful random sample of 227 patients were included for analyses; 61/227 (26.9%) of patients were 3-5 years old and 166/227 (73.1%) were 6-12 years old. 53/227 (23.3%) of patients had been previously hospitalized. Correlation between the two pain scales was consistently fair to moderate; using Kappa Statistics, a baseline correlation for Stoplight and FPS-R was fair for both caregivers (0.38, 95% CI 0.28 0.48) and patients (0.36 95% CI 0.27-0.45). The Stoplight Pain Scale had fair to moderate correlation between caregiver and patient scores, (0.37, 95% CI 0.27-0.47), compared to FPS-R which showed poor to fair agreement between caregiver and child scores (0.20, 95% CI 0.12-0.29). Regardless of age or hospitalization status, 64% of patients (139/218) and 54% caregivers (118/220) preferred the Stoplight Pain scale ($p = 0.001$). **Conclusion:** The Stoplight Pain Scale correlates moderately well with FPS-R, a validated pain assessment tool for children and shows good correlation between patients and caregivers assessment of reported pain. The Stoplight Pain Scale is a simple, easy to administer tool that may have a role in empowering family involvement in ED pain management. Future research should focus on at-home study of the tool.
Keywords: pain, measurement, self-report

MP43

Evaluation of an innovative web-based educational program to teach the management of alcohol withdrawal

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Introduction: Ideal management of alcohol withdrawal syndrome (AWS) incorporates a symptom driven approach, whereby patients are regularly assessed using a standardized scoring system (Clinical Institute Withdrawal Assessment for Alcohol-Revised; CIWA-Ar) and treated according to severity. Accurate administration of the CIWA-Ar requires experience, yet there is no training program to teach this competency. The objective of this study was to develop and evaluate a web-based curriculum to teach clinicians how to accurately assess and treat AWS. **Methods:** This was a three-phase educational program consisting of a series of 3 e-learning modules of core competency material, in-person seminar to orient learners to high fidelity simulation, and summative evaluation in an OSCE setting using a standardized patient. To determine the ED impact of the AWS curriculum, we recorded how often the CIWA-Ar was appropriately applied in the ED pre and post training. ED length of stay, total dose of benzodiazepines administered in the ED, and number of prescriptions and unit benzodiazepine doses given upon discharge were also recorded. **Results:** 74 nurses from an academic ED completed the AWS curriculum. There were 130 and 126 patients in the pre and post AWS training periods, respectively. Management of AWS was not compliant with CIWA-Ar protocol in 78 (60.0%) and 46 (36.5%) patients pre and post AWS training, respectively (23.5%; 95% CI: 11.3%, 34.7%), resulting in administration of benzodiazepine when it was not required, or not giving benzodiazepines with a CIWA-Ar score of 10. There was an average of 4 CIWA-Ar scores per patient in both the pre and post implementation periods. Prior to AWS training, 144/560 (25.5%) CIWA-Ar scores resulted in a breach of protocol, compared to 64/547 (11.7%) following AWS training (13.8%; 95% CI: 9.3%, 18.3%). Median total dose of benzodiazepines administered in the ED was lower after the implementation of the AWS curriculum (40mg vs. 30mg; 10mg; 95% CI: 0mg, 20mg). ED length of stay and the amount of benzodiazepines given to patients at discharge were similar between groups. **Conclusion:** This AWS curriculum appears to be an effective way to train ED clinicians on the proper administration of the CIWA-Ar protocol, and results in improved patient care.
Keywords: alcohol withdrawal syndrome, emergency department, clinical institute withdrawal assessment for alcohol scale

MP44

TEC4Home heart failure: using home telemonitoring to decrease ED readmissions and clinical flow

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Introduction: Patients with Heart failure (HF) experience frequent decompensation necessitating multiple emergency department (ED) visits and hospitalizations. If patients are able to receive timely interventions and optimize self-management, recurrent ED visits may be reduced. In this feasibility study, we piloted the application of home telemonitoring to support the discharge of HF patients from hospital to home. We hypothesized that TEC4Home would decrease ED revisits and hospital admissions and improve patient health outcomes. **Methods:** Upon discharge from the ED or hospital, patients with HF received a blood pressure cuff, weight scale, pulse oximeter, and a touchscreen tablet. Participants submitted measurements and answered questions on the tablet about their HF symptoms daily for 60 days. Data were reviewed by a monitoring nurse. From November 2016 to July 2017, 69 participants were recruited from Vancouver General Hospital (VGH), St. Pauls Hospital (SPH) and Kelowna General Hospital (KGH). Participants completed pre-surveys at enrollement and post-surveys 30 days after monitoring finished. Administrative data related to ED visits and hospital admissions were reviewed. Interviews were conducted with the monitoring nurses to assess the impact of monitoring on patient health outcomes. **Results:** A preliminary analysis was conducted on a subsample of participants ($n = 22$) enrolled across all 3 sites by March 31, 2017. At VGH and SPH ($n = 14$), 25% fewer patients required an ED visit in the post-survey reporting compared to pre-survey. During the monitoring period, the monitoring nurse observed seven likely avoided ED admissions due to early intervention. In total, admissions were reduced by 20% and total hospital length of stay reduced by 69%. At KGH ($n = 8$), 43% fewer patients required an ED visit in the post-survey reporting compared to the pre-survey. Hospital admissions were reduced by 20% and total hospital length of stay reduced by 50%. Overall, TEC4Home participants from all sites showed a significant

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improvement in health-related quality of life and in self-care behaviour pre- to 90 days post-monitoring. A full analysis of the 69 patients will be complete in February 2018. **Conclusion:** Preliminary findings indicate that home telemonitoring for HF patients can decrease ED revisits and improve patient experience. The length of stay data may also suggest the potential for early discharge of ED patients with home telemonitoring to avoid or reduce hospitalization. A stepped-wedge randomized controlled trial of TEC4Home in 22 BC communities will be conducted in 2018 to generate evidence and scale up the service in urban, regional and rural communities. This work is submitted on behalf of the TEC4Home Healthcare Innovation Community.
Keywords: emergency department readmissions, transition of care, home telemonitoring

Posters Presentations

P001

Age-adjusted D-dimer and two-site compression point of care ultrasonography to rule out acute deep vein thrombosis - a pilot study

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Introduction: Deep vein thrombosis (DVT) can lead to significant morbidity and mortality if not diagnosed and treated promptly. Currently, few methods aside from venous duplex scanning can rule out DVT in patients presenting to the Emergency Department (ED). Current screening tools, including the use of the subjective Wells score, frequently leads to unnecessary investigations and anticoagulation. In this study, we sought to determine whether two-site compression point-of-care ultrasound (POCUS) combined with a negative age-adjusted D-dimer test can accurately rule out DVT in ED patients irrespective of the modified Wells score. **Methods:** This is a single-center, prospective observational study in the ED of the Jewish General Hospital in Montreal. We are recruiting a convenience sample of patients presenting to the ED with symptoms suggestive of DVT. All enrolled patients are risk-stratified using the modified Wells criteria for DVT, then undergo two-site compression POCUS, and testing for age-adjusted D-dimer. Patients with DVT unlikely according to modified Wells score, negative POCUS and negative age-adjusted D-dimer are discharged home and receive a three-month phone follow-up. Patients with DVT likely according to modified Wells score, a positive POCUS or a positive age-adjusted D-dimer, will undergo a venous duplex scan. A true negative DVT is defined as either a negative venous duplex scan or a negative follow-up phone questionnaire for patients who were sent home without a venous duplex scan. **Results:** Of the 42 patients recruited thus far, the mean age is 56 years old and 42.8% are male. Twelve (28.6%) patients had DVT unlikely as per modified Wells score, negative POCUS and negative age-adjusted D-dimer and were discharged home. None of these patients developed a DVT on three-month follow-up. Thirty patients (71.4%) had either a DVT likely as per modified Wells score, a positive POCUS or a positive age-adjusted D-dimer and underwent a venous duplex scan. Of those, six patients had a confirmed DVT (3 proximal & 3 distal). POCUS detected all proximal DVTs, while combined POCUS and age-adjusted D-dimer detected all proximal and distal DVTs. None of the patients with a negative POCUS and age-adjusted D-dimer were found to have a DVT. **Conclusion:** Two-site compression POCUS combined with a negative age-adjusted D-dimer test appears to accurately rule out DVT in ED patients without the need for follow-up duplex venous scan. Using this approach would alleviate the need to calculate the Wells score, and also reduce the need for radiology-performed duplex venous scan for many patients.
Keywords: acute deep vein thrombosis, age-adjusted D-dimer, point-of-care ultrasonography

P002

Prehospital analgesia with intra-nasal ketamine: a randomized double-blind pilot study

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Introduction: Primary care paramedics (PCPs) have limited options to provide analgesia during transport thus timely pain relief is often significantly delayed. Inhaled nitrous oxide is considered usual care for PCPs, but is limited in effectiveness. Intranasal (IN) ketamine has been shown to provide effective analgesia with no deleterious effects on cardiorespiratory function thus may provide rapid, easily-administered and well-tolerated analgesia in prehospital transports. **Methods:** This was a randomized double-blind pilot series. Patients with an acute painful condition reporting a pain score of 5 or more on an 11-point verbal numeric rating scale (VNRS) were included. Exclusion criteria were age under 18 years, known intolerance to ketamine, non-traumatic chest pain, altered mental status, pregnancy and nasal occlusion. Patients were randomized to 0.75 mg/kg of IN ketamine or IN saline. All patents received inhaled nitrous oxide. The primary outcome was the proportion of patients experiencing a reduction in VNRS pain score of two points or more (clinically significant pain reduction) at 30 minutes. Secondary outcomes were patient-reported comfort, patient and provider satisfaction, and incidence of adverse events. **Results:** 40 patients were enrolled, 20 in each group. 80% of IN ketamine patients compared to 60% of placebo patients reported a 2-point reduction in VNRS pain score by 30 minutes. 50% of ketamine vs. 25% of placebo patients reported feeling moderately or much better. 85% of ketamine vs 75% of placebo patients reported any improvement in subjective comfort. 80% of ketamine patients reported minor adverse effects compared to 52% of placebo patients. No serious adverse effects were reported. **Conclusion:** The addition of IN ketamine to usual care with nitrous oxide appears to result in a greater proportion of patients reporting a clinically significant reduction in VNRS pain score and improved subjective comfort, with a greater incidence of minor adverse effects. These findings will be used to power a definitive randomized double-blind trial.
Keywords: analgesia, prehospital, ketamine

P003

Which factors predict resuscitation outcomes in patients arriving to the emergency department in cardiac arrest? A SHoC series study

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Introduction: The decision as to whether to end resuscitation for prehospital cardiac arrest (CA) patients in the field or in the emergency department (ED) is commonly made based upon standard criteria. We studied the reliability of several easily determined criteria as predictors of resuscitation outcomes in a population of adults in CA transported to the ED. **Methods:** A retrospective database and chart analysis was completed for patients arriving to a tertiary ED in cardiac arrest,

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between 2010 and 2014. Patients were excluded if aged under 19. Multiple data were abstracted from charts using a standardized form. Regression analysis was used to compare criteria that predicted return of spontaneous circulation (ROSC) and survival to hospital admission (SHA). **Results:** 264 patients met the study inclusion criteria. Logistic regression was used to identify predictors of ROSC and SHA. The criteria that emerged as significant predictors for ROSC included; longer ED resuscitation time (Odds ratio 1.11 (1.06- 1.18)), witnessed arrest (Odds ratio 9.43 (2.58- 53.0)) and having an initial cardiac rhythm of Pulseless Electrical Activity (Odds Ratio 3.23 (1.07-9.811)) over Asystole. Receiving point of care ultrasound (PoCUS; Odds ratio 0.22 (0.07-0.69)); and having an initial cardiac rhythm of Pulseless Electrical Activity (Odds Ratio 4.10 (1.43-11.88)) were the significant predictors for SHA. Longer times for ED resuscitation was close to reaching significance for predicting SHA **Conclusion:** Our results suggest that both fixed and adaptable factors, including increasing resuscitation time, and PoCUS use in the ED were important independent predictors of successful resuscitation. Several commonly used criteria were unreliable predictors.

Keywords: cardiac arrest, resuscitation outcomes, prediction

P004

Simulation for emergency department quality improvement

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Introduction: There have been an increasing number of studies published since 2011 investigating the benefits of in situ simulation as a quality improvement (QI) modality. We instituted an emergency department (ED) in situ simulation program at Kelowna General Hospital in 2015 with the aims of improving inter-professional collaboration, improving team communication, developing resident resuscitation leadership skills, educating ED professionals on resuscitation medical expertise, and identifying QI action items from each simulation session. **Methods:** We applied the SMART framework. Our specific, measureable, and attainable goal was to select two QI action items discovered from each simulation session. Realistic and timely follow-up on each action item was conducted by the nurse educator group who reported back to the local ED network, pharmacy, or manager depending on the action item. This ensured sustainability of our model. **Results:** A total of 65 individuals participated in 2015 at program inception. This increased to 213 individuals in 2017 with an average of 24 participants/session. Attendants included nurses (31%), ED physicians (20%), ED residents (18%), paramedics (10%), and medical students, respiratory therapists, pharmacists, and others (21%). Our QI action items were grouped as (1) team/communication, (2) equipment/resources, and (3) knowledge/tasks. Examples of each category were: (1) Inability to hear paramedic bedside reports resulting in reinforcement of one paramedic speaking while the team remains quiet, (2) Difficulty in looking up medication information in the resuscitation bay resulting in installation of an additional computer in the resuscitation bay, and (3) Uncertainty of local process for initiating extra corporeal membrane oxygenation (ECMO) in the ED resulting in review of team placement, patient transfer, and initiation of ECMO lines in the ED. Inter-professional team members have reported through electronic feedback on the value of these sessions, including improved inter agency cooperation and understanding. **Conclusion:** This quality improvement initiative used in situ simulation as a QI tool. We were able to identify latent safety threats, test new patient care protocols, find equipment issues, and foster teamwork in a sustainable way to improve the quality of care in our ED. We hope that this serves as encouragement to others who are initiating a similar program. Our main suggestions after reflection include: (1) Engage a multidisciplinary team in the development of an in situ simulation program, (2) Start with aims and objectives, (3) Foster attendance and buy in by making it convenient for people to attend, (4) Celebrate your successes through interdepartmental communication, and (5) Recruit individuals with expertise in simulation based education.

Keywords: quality improvement and patient safety, simulation, emergency department

P005

Optimum accuracy of massive transfusion protocol activation criteria: the clinician's view

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Introduction: Massive Transfusion Protocol (MTP) activation allows for efficient delivery of a balanced transfusion strategy to exsanguinating patients, and should deliver a reasonable ratio of plasma and platelets to red blood cells. MTP activation should facilitate communication between care providers and laboratory services in order to minimize blood product wastage. Unfortunately, it is unclear which activation criteria are best to achieve this. Understanding of acceptable sensitivity and specificity, as well as reasons for blood component wastage, may provide refinement to MTP design. **Methods:** We surveyed clinicians, who were identified as content experts in their fields, using a snowball survey technique. Respondents were categorized into two groups: Group 1 included Emergency Medicine, Anesthesia, Critical Care, and Surgery; Group 2 included Hematology, Hematopathology and Transfusion Medicine. Between-group differences were examined using the Pearsons Chi-Square Test. Statistical significance was set at $p < 0.05$. **Results:** 50% of physicians in Group 1 considered an MTP under-call rate of 5-10% to be acceptable, whereas the majority (57.1%) of physicians in Group 2 considered an under-call rate of <5% to be acceptable. Both groups agreed on an acceptable over-call rate of 5-10%. A significantly greater proportion of physicians in Group 1 felt that MTP activation criteria including transfusion of an entire blood volume within 24 hours, loss of >50% blood volume within 3 hours and anticipated transfusion of >10U of PRBC in 24 hours were appropriate for MTP activation. Physicians in Group 2 were more likely to consider poor communication a reason for blood component wastage. **Conclusion:** Similarities in acceptable over- and under-call rates of MTP highlight the similar values in MTP activation between different medical specialties. Collaboration between the resuscitation team and consultants in transfusion medicine is necessary for MTP protocol development to improve patient outcomes and reduce blood wastage.

Keywords: transfusion, resuscitation, survey

P006

Patient passports in the emergency department: a scoping review

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Introduction: Discharge communication in the emergency department occurs frequently and has been identified as an important, underestimated problem. Tools, such as patient or caregiver-held passports have been used in other departments to improve communication and facilitate provider and patient decision making. The objective of this review was to identify what modalities, methods and designs have been

used and evaluated when implementing a communication tool or passport type document in the emergency department setting. **Methods:** This review was conducted following Joanna Briggs Institute methodology. Iterative steps included identifying the research question, identifying relevant studies, data extraction and synthesis. Keywords and indexed terms were used to search PubMed, Cinahl, Embase and Web of Science. The reference list of all identified reports and articles from that search were reviewed for additional studies and a hand search of the last 5 years of Annals of Emergency Medicine and the Canadian Journal of Emergency Medicine was completed. Inclusion criteria were set to select studies investigating either patients, caregivers or health care providers use of passports, communication documents or journals with the goal of improving any aspect of communication in the emergency department setting. **Results:** Of the 81 potential publications screened, only 4 met inclusion criteria for extraction. 1 reviewed a passport that aimed at pediatric pain management in settings that include the emergency department, 2 of the publications reported on the same project which developed a passport for asthma patients and 1 discussed a passport for patients with learning disabilities. All the included publications were published in and discuss passports that were developed for use in the UK. Descriptions of implementation, evaluation and perception of the passports in these publications was limited. **Conclusion:** This scoping review has revealed a major gap in the current literature on communication tools in the emergency department, a department where communication, especially about discharge is of utmost importance. The included studies focused on very different patient populations and aim to improve different outcomes and therefore dont allow us to make for passports aimed at helping the general emergency department population.

Keywords: communication, passport, discharge communication

P007

Safety and effectiveness of a care protocol to treat migraine with Propofol in the emergency department

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Introduction: An evidence-based care protocol to treat migraine with low-dose Propofol was implemented in May 2014 at the emergency department (ED) of the CHUL (Québec city). Given potential side effects of Propofol, we aimed to evaluate the safety and effectiveness of this protocol. **Methods:** We reviewed charts of all patients aged 16 years and older who received Propofol between May 2014 and August 2017 for a migraine headache with or without aura, as defined in the International Headache Society Classification. The care protocol consisted of: 1) administration of intra-venous Propofol 20 mg each 5 to 10 minutes as needed (maximum of 6 doses); 2) sets of vital signs before and after each dose; and 3) continuous cardiac and saturation monitoring. Our primary outcome measures were the incidence (95% CI) of the following side effects: low arterial pressure (<90 systolic or <65 mean), desaturation (SaO2 <92%), excessive sedation (scores 3 or 4 on the Pasero scale), and any arrhythmia. We also compared the mean reduction (95% CI) of pain pre- and post-treatment (visual analogous scale VAS 0-10) and the proportion (95% CI) of rescue medication among patients who received Propofol as first-line medication to a matched cohort of patients who had Metoclopramide first. The two cohorts were paired for gender, age, triage priority, and month/year of ED visit. **Results:** Over the 3-year study period, 45 patients with migraine received Propofol through the care protocol, either as a first-line or a rescue therapy. In this cohort, hypotension, bradycardia (<60/min) and desaturation occurred in 17.8% (8.0-32.1), 13.3% (5.1-26.8) and 6.7% (1.4-18.3) of cases respectively; no excessive sedation was reported. An intervention was undertaken in 4 cases [8.9% (2.5-21.2) 3 iv fluid bolus, 1 supplemental oxygen] to palliate the side effects of Propofol. A statistically significant mean reduction of 3.6 points (2.8-4.4) on the VAS scale was observed in patients treated with Propofol as first-line therapy ($n = 35$). However, patients managed with first-line Metoclopramide ($n = 100$) experienced a significantly higher mean reduction of their VAS score [5.3 (4.6-6.0)] than the Propofol group ($p = 0.003$). The proportion of patients requiring the use of rescue medication was higher among patients first treated with Propofol [77.1% (63.2-91.1) vs. 29.0% (20.1-37.9); $p < 0.001$]. **Conclusion:** Our care protocol to treat migraine with low doses of Propofol appears to be safe and to cause very few side effects prompting corrective interventions. Continuous (as opposed to intermittent) heart and saturation monitoring is probably not indicated. Given the effectiveness of Propofol compared to Metoclopramide, our care protocol will be used as a second-line therapy.

Keywords: quality improvement and safety, migraine, Propofol

P008

Hereditary Angioedema Rapid Triage Tool (HAE-RT): translating clinical research into clinical practice

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Introduction: Hereditary angioedema (HAE) patients (both diagnosed and undiagnosed) commonly present to the emergency department (ED). Presenting symptoms (swelling and pain) may be erroneously attributed to common allergic and gastrointestinal conditions resulting in major delays in diagnosis and appropriate treatment. No published tools currently exist for HAE screening and management in undiagnosed disease. The overall goal of the study was to develop a HAE-RT tool for ED settings. **Methods:** A two-phase mixed methods approach was used to develop the HAE-RT Tool including: Phase 1: A Delphi Study [HAE specialists ($N = 9$) and National Patient Advocacy Group Members ($N = 3$)] was conducted to reach consensus (80% agreement) on predictor variables to include. Phase 2: A retrospective chart review was conducted to assess the predictive findings of the predictor variables. A convenient sample of patients presenting with angioedema (with and without HAE) between January 2012 January 2017 were included in the study. **Results:** Of the 12 experts invited, 9 (75%) participated in the Delphi study. Of 8 HAE-specific predictive variables, 4 reached consensuses including: (1) recurrent angioedema; (2) absence of urticaria; (3) past recurrent abdominal pain/swelling; (4) response to allergic therapy. The retrospective study included 85 patients ($N = 46$ with HAE; $N = 39$ non-HAE; overall 72% female). HAE patients were significantly more likely to have a family history of HAE (72% vs. 0%; $P < 0.0001$); previous recurrent angioedema (96%; $P < 0.009$); present with no hives (91%; $P < 0.036$); previous recurrent abdominal pain (80%; $P < 0.0001$); and only 2% responded positively to allergy treatments ($P < 0.0001$). **Conclusion:** Our study emphasizes the importance of key stakeholder involvement and feedback to facilitate the prioritization of important information that must be included in the design of an HAE-RT tool. The next step is to observe the effect of the HAE-RT tool on patient triage in the ED.

Keywords: hereditary angioedema, clinical decision support tools, triage

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P009

Emergency department overcrowding associated with increased door-to-ecg time in patients with chest pain

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Introduction: Emergency Department (ED) overcrowding has been shown to delay time sensitive tests and therapies. North American guidelines call for Door-to ECG (DTE) times to be <10min in patients presenting with chest pain as delays have been shown to lead to poorer patient outcomes. We hypothesize that increased ED crowding will increase the DTE times. **Methods:** This was a retrospective cohort study from July 2015-May 2016 at a single tertiary care Canadian ED (53000 visits per year). Data were extracted from the ED information system (EDIS) which contains an organized record of ED activity for each visit. Our selection criteria screened for patients presenting with complaints that included chest pain, chest heaviness, chest tightness and chest burning. The primary outcome of the study was the association between ED occupancy and DTE time, which was measured using a non-parametric Spearman correlation. Multivariable linear regression models controlling for age and sex were developed for both time in minutes, and the log transformed time in minutes. **Results:** There were 2479 ECGs done on patients presenting with chest pain that met inclusion criteria. The median DTE time was 55.1 minutes. There was a significant positive association between DTE time and ED occupancy (rho = .133, $p < 0.001$). DTE time increased by 0.64 minutes (or approximately 0.4%) for each additional patient in the ED, $p < 0.001$. Additionally, younger age and female sex were also associated with increased DTE time. **Conclusion:** Increased ED occupancy was correlated with longer DTE times at a single Canadian ED, even after controlling for age and sex. This study provides an example of the negative consequences of ED overcrowding.

Keywords: overcrowding

P010

A systematic review of the association between emergency medical services (EMS) time factors and survival

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Introduction: EMS time factors such as total prehospital, activation, response, scene and transport intervals have been used as a measure of EMS system quality with the assumption that shorter EMS time factors save lives. The objective was to assess in adults and children accessing ground EMS (population), whether operational time factors (intervention and control) were associated with survival at hospital discharge (outcome). **Methods:** Medline, EMBASE, and CINAHL were searched up to January 2015 for articles reporting original data that associated EMS operational time factors and survival. Conference abstracts and non-English language articles were excluded. Two investigators independently assessed the candidate titles, abstracts, and full text with discrepant reviews resolved by consensus. Risk of bias was assessed using GRADE. **Results:** A total of 10,151 abstracts were screened for potential inclusion, 199 articles were reviewed in full-text, and 73 met inclusion criteria. Amongst included studies, 49 investigated response time, while 24 investigated other time factors. All articles were observational studies. Amongst the 14 (28.6%) studies where response time was the primary analysis, statistically significant associations between shorter response time and increased survival were found in 5 of 7 cardiac arrest, 1 of 5 general EMS population, and 0 of 2 trauma studies. Other time factors were reported in the primary analysis in 10 (41.7%) studies. One study reported shorter combined scene and transport intervals associated with increased survival in acute heart failure patients. Two studies in trauma patients had somewhat conflicting results with one study reporting shorter prehospital interval associated with increased survival whereas the other reported increased survival associated with longer scene and transport intervals. Study design, analysis, and methodological quality were of considerable variability, and thus, meta-analyses were not possible. **Conclusion:** There is a substantial body of literature describing the association between EMS time factors and survival, but evidence informing these relationships are heterogeneous and complex. Important details such as patient population, EMS system characteristics, and analytical approach must be taken into consideration to appropriately translate these findings to practice. These results will be important for EMS leaders wishing to create evidence-based time policies.

Keywords: prehospital, response time, time factors

P011

Performance of emergency department nurses in evaluating a simulated patient with alcohol withdrawal syndrome following an education curriculum

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Introduction: The optimal management of emergency department (ED) patients with alcohol withdrawal syndrome (AWS) includes a symptom driven approach with scheduled reassessments using a standardized scoring system (Clinical Institute Withdrawal Assessment for Alcohol-Revised; CIWA-Ar) and treatments according to symptom severity. The subjective nature of the CIWA-Ar, and lack of standardized competency-based education related to alcohol withdrawal results in widely variable treatment. The objective of this study was to perform a summative evaluation of clinical staff during the objective structured clinical examination (OSCE) of a simulated patient (SP) with AWS. **Methods:** The AWS education curriculum was completed by all staff nurses in our ED (mandatory for full-time, optional to part-time staff). It was based on a real clinical scenario depicting moderate alcohol withdrawal and portrayed by a single SP. Prior to the OSCE, participants attended a seminar orienting them to the simulation. Each participant was asked to do a complete assessment of the SP, and graded for completeness on 37 individual components of history/physical exam, including the 10 domains of the CIWA-Ar. **Results:** 74 participants completed the educational curriculum over 8 weeks. At least 9/10 domains of the CIWA-Ar assessment were completed by 65 (88%) of participants, and 28 (38%) correctly assessed at least 80% of all summative evaluation components. 63 (85%) participants correctly identified the need for treatment of withdrawal symptoms. Only 13 (18%) participant assessments exactly matched our exact target CIWA-Ar score of 15, however 61% were within 2 points on the CIWA-Ar scale. In only 4 (5%) instances would a participant have inappropriately rated AWS severity below the treatment threshold. 62/72 (86%) participants rated the SP tremor as 2-4 (intended tremor = 3). Clinical features most often overlooked were history of other addictions (25 participants, 33%) and history of liver disease (15 participants, 20%). **Conclusion:** The majority of participants in this OSCE correctly assessed the important elements in the assessment of AWS, and diagnosed the SP as having moderate alcohol withdrawal. Thus our educational intervention

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resulted in 85% of participants properly identifying the severity of AWS, and developing an appropriate treatment strategy. The impact of this curriculum on actual patient treatment requires further evaluation.
Keywords: alcohol withdrawal syndrome, clinical institute withdrawal assessment for alcohol scale, education

P012

Why did you leave? Contacting Left Without Being Seen (LWBS) patients to understand their emergency department experience

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Introduction: As experienced in Emergency Departments (EDs) across Canada, Saskatoon EDs have a percentage of patients that leave before being assessed by a physician. This Left Without Being Seen (LWBS) group is well documented and we follow the numbers closely as a marker of quality, what happens after they leave is not well documented. In Saskatoon EDs, if a CTAS 3 patient that has not been assessed by a physician decides to leave the physician working in the ED is notified. The ED physician will: try to talk to the patient and convince them to stay, can assess the patient immediately if required, or discuss other appropriate care options for the patient. In spite of this plan patients with a CTAS score of 3 or higher (more acute) still leave Saskatoon EDs without ever being seen by a physician. Our desire was to follow up with the LWBS patients and try to understand why they left the ED. **Methods:** Daily records from one of the three EDs in Saskatoon documenting patients with a CTAS of 3 or more acute who left before being seen by a physician were reviewed over an eight-month period. A nurse used a standardized questionnaire to call patients within a few days of their ED visit to ask why they left. If the patients declined to take part in the quality initiative the interaction ended, but if they agreed a series of questions was asked. These included: how long they waited, reasons why they left, if they went somewhere else for care and suggestions for improvement. Descriptive statistics were obtained and analyzed to answer the above questions. **Results:** We identified 322 LWBS patients in an eight-month time period as CTAS 3 or more acute. We were able to contact 41.6% of patients. The average wait time was 2 hours and 18 minutes. The shortest wait time was 11 minutes, whereas the longest wait time was 8 hours and 39 minutes. It was found that 49.1% of patients went to another health care option (Medi-Clinic or another ED in Saskatoon) within 24hrs of leaving the ED. Long wait times were cited as the number one reason for leaving. Lack of better communication from triage staff regarding wait time expectations was cited as the top response for perceived roadblocks to care. Reducing wait times was cited as the number one improvement needed to increase the likelihood of staying. **Conclusion:** The Saskatoon ED LWBS patient population reports long wait times as the main reason for leaving. In order to improve the LWBS rates, improving communication and expectations regarding perceived wait times is necessary. The patient perception of the ED experience is largely intertwined with wait times, their initial interaction with triage staff, and how easily they navigate our very busy departments. Therefore, it is vital that we integrate the patient voice in future initiatives geared towards improving health care processes.
Keywords: quality improvement and patient safety, left without being seen, emergency department

P013

Management of intimate partner violence in the emergency department

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Introduction: Intimate partner violence (IPV) is a serious public health concern with complex medico-legal implications and a wide range of morbidity. While the ED is often the primary access point for these patients, IPV is under-recognized. Our objectives were to describe the characteristics of female IPV patients in the ED and determine the assessment and management patterns of physicians at a tertiary care academic ED. **Methods:** We conducted a health records review of adult (>18years) female patients seen at a tertiary care hospital ED presenting with evidence of IPV from January to September 2016. A combined search strategy of hospital records and Sexual Assault and Partner Abuse Care Program (SAPACP) patient rosters was used to identify study subjects. Data were collected for patient demographic/presenting characteristics, assault characteristics, and patterns of referral, management and patient disposition/discharge. Descriptive statistics were generated. **Results:** 100 patients met inclusion criteria with; mean age 35.1, female 100.0%, arrival by ambulance 53.0%, and mean CTAS level of 2.4. Abuse screening was completed at triage only 24.0% of the time. Presenting complaints were varied, with the most common being injury or trauma (32.0%). Most patients were only identified from the SAPACP roster. Patients reported strangulation, a strong predictor of future homicide, in 34.0% of cases. Admission to hospital occurred in 7.0% of cases with 19.0% involving specialist consultation and 7.0% leaving against medical advice or without being seen. Legal interactions including police involvement occurred 72.0% of the time and Childrens Aid Society was involved in 26.0% of cases. The final diagnosis was recorded as IPV or equivalent in only 49.0% of cases; the remainder were discharged with a final diagnosis of injury/trauma (26.0%), sexual assault (6.0%), somatic complaint (6.0%), mental health (8.0%), substance use/abuse (3.0%) or other (2.0%). **Conclusion:** Our study highlights that IPV is a common and heterogeneous entity with a wide spectrum of presentations and morbidity. Strangulation rates were high and are associated with increased risk of homicide. IPV is currently under-recognized and continues to carry stigma as ER physicians only recorded a discharge diagnosis of IPV or equivalent in half of cases. Educational strategies are required to highlight the importance of IPV to ED staff.
Keywords: intimate partner violence, domestic violence

P014

Comparison of prehospital administration of naloxone to patients with or without a history of an opioid overdose

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Introduction: Paramedics frequently make immediate life-altering decisions with minimal clinical information. This applies to their decision to treat an unconscious patient with naloxone when the history of an opioid overdose cannot be readily established. Among patients treated by paramedics with naloxone, our objective was to compare patient demographics, treatment interventions and clinical response between patients with and without a confirmed history of an opioid overdose. **Methods:** This was a retrospective cohort study design of consecutive patients treated with naloxone by paramedics between January 1, 2016, and June 30, 2017. Patients were classified based on whether paramedics did or did not document a history of an opioid overdose. Baseline characteristics, treatment interventions, and response to naloxone were compared between groups. Comparisons were done using a chi-squared or Fishers exact test. **Results:** We identified 294 patients of whom 113 (38%) did not have a confirmed history of an opioid overdose. The groups were similar in gender, bystander CPR, and bystander administration. There were no differences in the presence

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of pinpoint pupils, initial oxygen saturation, initial Glasgow Coma Score (GCS), respiratory rate, or time on scene. Both patient groups were managed similarly with respect to route of naloxone administration and the use of a bag valve mask. All patients who were intubated were in the no confirmed history group ($n = 5$; $p = 0.003$). Post naloxone there were no differences in last recorded vital signs except the no confirmed history group was less likely to achieve a GCS 10 (57% versus 89%; $p < 0.001$). The overall post-naloxone development of agitation (9%) was moderate while the need for physical/chemical restraint (2%) was low with no differences between groups. All patients were transported to the hospital. **Conclusion:** A substantial proportion of patients who received naloxone did not have a confirmed history of an opioid overdose. These patients closely resembled those with a confirmed history with respect to demographics and physical characteristics. The primary difference was a lower proportion of patients with no confirmed history who achieved a post naloxone GCS 10. Despite a moderate development of post naloxone agitation, paramedics were able to manage most of these patients without the use of physical/chemical restraints.

Keywords: emergency medical services, opioid overdose, naloxone

P015

Staff skills: a procedural skills curriculum for emergency medicine attending physicians in Calgary

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Introduction: Emergency medicine attending physicians perform many essential procedures but some infrequently. Skill proficiency and familiarity declines over time. We intended to identify skills where colleagues felt deficient and create an opportunity to demonstrate and practice in a safe environment. **Methods:** Sessions began from a review of ultrasound guided central line and pacemaker insertion. Other procedures have been added as a result of critical incidents, needs assessments by attending physicians, acquisition of new technology/equipment and expert consensus. An evaluation and needs assessment is performed after each session to adjust curricula. **Results:** Since 2011, we have held 2-3 skill sessions per year at the Advanced Trauma Surgical Skills Laboratory at the University of Calgary. Sessions are taught by attending emergency physicians, employ task trainers, simulators, animal and human cadaveric models, ultrasound, and procedural equipment stocked in our local hospitals. We are able to accommodate ~30 participants per session for 3 hours of rotating 7-8 participants through various stations. Every session has been fully attended with a wait list. Physicians register by email with preference given to new participants and those identified during clinical practice review of requiring remediation. Costs of sessions are covered by voluntary contribution to an emergency department physician support fund. Procedures practiced have included airway (basic, adjuncts, bronchoscopy, video laryngoscopy, surgical airway, chest tube), vascular access (ultrasound guided central venous insertion, transvenous pacemaker insertion, nerve blocks, IO insertion), surgical skills (thoracotomy, chest tube, canthotomy, surgical airway) and other percutaneous procedures (paracentesis, thoracentesis, nerve block, lumbar puncture). High fidelity skills videos were created to augment the sessions, available on the department website. Four point scale evaluations from our most recent session yielded 100% excellent rating for overall workshop and relevance to practice. The 6 facilitators performance received 100% excellent or good ratings. **Conclusion:** We have developed a fun, nonthreatening opportunity for attending physicians to practice infrequent but important ED procedures. The sessions are well received, well attended, foster collegiality, confidence and competence in performance of infrequent ED skills. Our model could be generalized to other centres.

Keywords: innovations in emergency medicine education, procedural skills, attending physician

P016

Junior and senior clinician educators rank key medical education articles differently depending on topic

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Introduction: Medical education includes a diverse range of topics and disciplines. For junior clinician educators, it may be difficult to get a grasp of pertinent literature. Our study aims to retrospectively identify whether senior clinician educators (SCEs) and junior clinician educators (JCEs) differ in their selection of what they perceive as key medical education articles. **Methods:** As a part of the Academic Life in Emergency Medicine (ALiEM) Faculty Incubator program, we developed a series of primer articles for JCEs over the preceding year, designed to enhance their educational growth by identifying and discussing key articles within specific medical education arenas. Each set of articles within the primer series were selected based on data collected from JCEs and SCEs, who ranked the specific articles with respect to their perceived relevancy to the JCEs. ANOVA analysis was performed for each of the nine primer series to determine whether there was a statistically significant difference between senior and junior CEs ratings of articles. **Results:** 216 total articles were evaluated within the nine different primer topics. Through a multilevel regression analysis of the data, no statistically significant difference was found between the rankings of papers by SCEs and JCEs (95% CI: -0.27, 0.40). However, a subgroup analysis of the data found that 3 of the 9 primers showed statistically significant divergence based on seniority ($p < 0.05$). **Conclusion:** Based on this data, involvement of JCEs in the consensus-building process was important in identifying divergence in views between JCEs and SCEs in one-third of cases. To our knowledge, no other group have compared whether junior and senior clinical educators may have divergent opinions about the relevance of medical education literature. Our findings suggest that it may be important to involve JCEs in selecting articles that are worthwhile for their learning, since SCEs may not fully understand their needs.

Keywords: innovations in emergency medicine education, mismatch between junior and senior clinical educator priorities

P017

When the rules hit the road: how emergency physicians make decisions in the era of the clinical decision rules

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Introduction: The diagnostic process is wrought with potential sources of error. Psychologists seek to coach physicians to refine their cognition. Researchers try to create cognitive scaffolds to guide decision-making. Physicians however, are caught in middle between their own daily cognitive processes and these external theories that might influence their behaviour. Few attempts have been made to understand how experienced clinicians integrate guidelines or clinical decision rules (CDRs) into their decision-making. We sought to explore experienced clinicians decision-making via a simulated exercise, to develop a model of how physicians integrate CDRs into their diagnostic thinking. **Methods:** From July 2015-March 2016, 16 practicing emergency physicians (EPs)

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were interviewed via a think aloud protocol study. Six cases were constructed and video recorded as prompts to spur the clinicians to think aloud and describe their approach to the cases. Cases were designed to be slightly suggestive for pulmonary embolism or deep vein thrombosis, since these conditions are associated with CDRs. Using a constructivist grounded theory analysis, three investigators independently reviewed the transcripts from the interviews, meeting regularly to discuss emergent themes and subthemes until sufficiency was reached. Disagreements about themes were resolved by discussion and consensus. **Results:** Our analysis suggests that physicians engage in an iterative process when they are faced with undifferentiated chest pain and leg pain cases. After generating an original differential diagnosis, EPs engage in an iterative diagnostic process. They flip between hypothesis-driven data collection (e.g. history, physical exam, tests) and analysis of this data, and use this process to weigh probabilities of various diagnoses. EPs only apply CDRs once they are sufficiently suspicious of a diagnosis requiring guidance from a CDR and when they experience diagnostic uncertainty or wish to bolster their decision with evidence. **Conclusion:** EP cognition around diagnosis is a dynamic and iterative process, and may only peripherally integrate relevant CDRs if a threshold level of suspicion is met. Our findings may be useful for improving knowledge translation of CDRs and prevent diagnostic error.
Keywords: clinical decision making, clinical decision rules, clinical reasoning

P018

Blocked practice outperforms random practice for learning resuscitative transesophageal echocardiography: a randomized controlled trial

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Introduction: Resuscitative clinician-performed transesophageal echocardiography (TEE) is a relatively new ultrasound application, however the optimal teaching methods have not been determined. Previous studies have demonstrated that random practice (RP), which increases the variability of training, may improve learning of procedural skills compared with blocked practice (BP). We compared RP and BP for teaching a resuscitative TEE protocol to emergency medicine residents using a simulator. **Methods:** We recruited emergency medicine residents with no prior TEE experience from a university-affiliated hospital. Participants completed a questionnaire and baseline skill assessment on a simulator, then were randomized to one of two groups. The BP group completed 10 repetitions of a fixed 5-view TEE sequence with instructor feedback, while the RP group completed 10 different random 5-view TEE sequences with feedback. Participants completed a simulation-based performance assessment immediately, and a transfer test consisting of a simulated patient encounter 1-2 weeks after training. Ultrasound images and transducer motion metrics were captured by the simulator for blinded analysis. Our primary outcome was the percentage of successful views on the transfer test, and secondary outcomes included participants confidence level, image quality, percentage of correct diagnoses, and efficiency of movement. We compared all scores using two-tailed, independent samples t-tests. **Results:** 22 participants completed the study (11 in the RP group, 11 in the BP group). There were no significant baseline differences between the groups. The BP group had a higher rate of successful views compared with the RP group on the transfer test (92.7% vs. 80.9%, $p = 0.02$). While not statistically significant, the BP group had higher image quality on a 5-point scale (3.2 vs. 2.9, $p = 0.09$), and fewer probe accelerations (297 vs. 403, $p = 0.09$). The groups did not differ in rate of correct diagnoses (77.3% vs. 72.7%, $p = 0.73$), confidence level on a 10-point scale (6.2 vs. 6.2, $p = 1.0$), or scan time (173 vs. 199 seconds, $p = 0.28$). **Conclusion:** Emergency medicine residents randomized to BP had a higher success rate on a transfer test, compared to RP when learning resuscitative TEE using a simulator. We consider this pilot work that can inform future studies in both simulation and real clinical settings.
Keywords: transesophageal echocardiography, emergency ultrasound, medical education

P019

The path of least resistance: how computerized provider order entry can lead to (and reduce) wasteful practices

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Introduction: Background Computerized provider order entry (CPOE) is rapidly becoming the mainstay in clinical care and has the potential to improve provider efficiency and accuracy. However, this hinges on careful planning and implementation. Poorly planned CPOE order sets can lead to undetected errors and waste. In our emergency department (ED), lactate dehydrogenase (LDH) was bundled into various blood work panels, but had little clinical value. Aim Statement This quality improvement initiative aimed to reduce unnecessary LDH testing in the ED. **Methods:** Methods A group of ED physicians reviewed CPOE blood work panels and uncoupled LDH in conditions where it was deemed not to provide any clinically useful information. We measured the daily number of LDH tests performed before and after its removal. We tracked the frequency of other serum tests as controls. We also analyzed the number of add-on LDH (i.e. to add LDH to samples already sent to the lab) as a balancing measure, since this can disrupt work flow and delay care. **Results:** Results Through this intervention, we reduced the number of LDH tests performed by 69%, from an average of 75.1 tests per day to 23.2 ($p < 0.0005$). The baseline controls did not differ after the intervention (e.g. a complete blood count was performed 197.7 and 196.1 times per day pre- and post-intervention, respectively [$p = 0.7663$]). There was less than 1 add-on LDH per day on average. This translates to a cost savings of $33,340.65 at our institution. **Conclusion:** Conclusions CPOE care templates can be powerful in shaping behaviours and reducing variability. However, close oversight of these panels is necessary to prevent errors and waste.
Keywords: quality improvement and patient safety, computerized provider order entry, order sets

P020

Post-return of spontaneous circulation care and outcomes a single centre experience

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Introduction: Out of hospital cardiac arrest (OHCA) continues to carry a very high mortality rate, with approximately 10% surviving to hospital discharge. In 2015, the American Heart Association release updated guidelines dictating best practices in post-return of spontaneous circulation (ROSC) care, advocating for more liberal utilization of emergent coronary angiography. We sought to determine if the post-ROSC care at our centre during our study period adhered to the previously published (2010) guidelines. **Methods:** We performed a retrospective analysis (Sept. 2011 - June 2015) of the Resuscitation Outcomes Consortium (ROC) database, which contains pre-hospital, hospital and outcomes data on adult, EMS-treated, non-traumatic OHCA. Patients under 18 years, with missing age data or with obvious non-cardiac causes of arrest were

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excluded. Key variables included rates of post-ROSC emergent angiography, survival to hospital discharge and survival to hospital discharge with favourable neurologic outcome (modified Rankin score 2). **Results:** During the study period, there were a total of 997 OHCA; 86 met exclusion criteria. Of the 911 remaining patients, 557 (61.1%) were transported to a local ED. Of those transported to the ED, 262 (47.0%) achieved sustained ROSC, defined as survival to ED discharge. Of those who achieved sustained ROSC, median age was 65 years (IQR = 21.75), 66.8% were male. ECG interpretation data was available on 214 patients, of whom 56 had definite STEMI, and 135 had definite absence of STEMI. 37/56 (66.1%) definite STEMI patients received coronary angiography within 24 hours of presentation, as per AHA guidelines. 58/262 (22.1%) post-ROSC patients overall received coronary angiography within 24 hours of presentation to the ED. Of those 58 patients who received emergent angiography, 38 (65.5%) underwent percutaneous coronary intervention (PCI). No patients received fibrinolysis. Of post-ROSC patients who received emergent coronary angiography, 40/58 (69.0%) survived to hospital discharge and 37/58 (63.8%) survived with good neurologic outcome. In comparison, 55/204 (27.0%) who did not receive emergent angiography survived to hospital discharge and 18.8% survived with good neurologic outcome. **Conclusion:** Only 22.1% of patients with OHCA, and only 66.1% with ECG-proven STEMI underwent emergent coronary angiography post-ROSC. Further investigation into causes for delay or the withholding of emergent angiography is necessary.
Keywords: cardiac arrest, angiography

P021

Outcomes of out of hospital cardiac arrest in London, Ontario

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Introduction: Out of hospital cardiac arrest (OHCA) continues to carry a very high mortality rate, with approximately 10% surviving to hospital discharge. We sought to determine if outcomes from out of hospital cardiac arrest (OHCA) at our centre were consistent with recently published North American outcomes data from the Resuscitation Outcomes Consortium (ROC). **Methods:** We performed a retrospective analysis (Sept 2011 June 2015) of the Resuscitation Outcomes Consortium (ROC) database, which contains pre-hospital, in-hospital and outcomes data on adult, EMS-treated, non-traumatic OHCA. Patients under 18 years, with missing age data or with obvious non-cardiac causes of arrest were excluded. **Results:** During the study period, there were a total of 997 OHCA; 86 met exclusion criteria. Of the 911 remaining patients, 557 (61.1%) were transported to a local ED. 92 (35.1%) were receiving ongoing CPR at the time of their presentation to the ED. Of those transported to the ED, 262 (47.0%) achieved sustained ROSC, defined as survival to ED discharge. A total of 95 patients survived to hospital discharge (36.3% of patients who achieved sustained ROSC, 17.1% of those who were transported to the ED, and 10.4% of the all OHCA). Of those who survived to hospital discharge who had neurologic outcome data, 90.5% had a modified Rankin score of 2. Initial presenting rhythm with EMS was ventricular fibrillation or pulseless ventricular tachycardia in 233 patients. Of these, 212 (91.0%) were transported to the ED, 134 (57.5%) achieved sustained ROSC, and 71 (30.5%) survived to hospital discharge. 54/60 (90.0%) of those with a documented neurologic exam had a favourable neurologic outcome. Initial presenting rhythm with EMS was PEA or asystole in 636 patients. Of these, 320 (50.3%) were transported to the ED, 115 (18.1%) achieved sustained ROSC, and 17 (2.7%) survived to hospital discharge. 9/10 (90%) of those with a documented neurologic exam had a favourable neurologic outcome. 358 of the arrests were witnessed. Of these, 274 (76.5%) were transported to the ED, 150 (41.9%) achieved sustained ROSC, and 51 (15.9%) survived to hospital discharge. 47/53 (88.7%) of those with a documented neurologic exam had a favourable neurologic outcome. **Conclusion:** Outcomes from out of hospital cardiac arrest in London, Ontario are comparable to other sites across North America.
Keywords: cardiac arrest, survival outcomes

P022

The revised METRIQ score: an international, social-media based usability analysis of a quality evaluation instrument for medical education blogs

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Introduction: Online medical education resources are widely used in emergency medicine (EM), but strategies to assess quality remain elusive. We previously derived the Medical Education Translational Resources: Impact and Quality (METRIQ) 8 instrument to evaluate quality in medical education blog posts. **Methods:** As part of a subsequent validation study (The METRIQ Blog Study), a mixed-methods usability analysis was performed to obtain user feedback on the quality assessment instrument in order to improve its clarity and reliability. Participants in the METRIQ Study were first asked to rate five blog posts using the METRIQ-8 Score. They then evaluated the METRIQ-8 instruments ease of use and likelihood of being recommended to others using a 7-point Likert scale and free text comments. Participants were also asked to flag and comment on items within the score that they felt were unclear. Global usability ratings were summarized using median scores or percent rated unclear. We used ANOVA to test associations between ease of use and demographic factors. A thematic analysis was performed on the comments. **Results:** 309 EM medical students, residents, and attendings completed the survey. Global ratings were generally very favorable (median 2 [IQR 2-3], with 7 being the lowest score) for ease of use and likelihood of recommendation, and did not vary by participants country of origin, frequency of blog use, or learner level. Participants stated that the score was structured, systematic, and straightforward. They found it useful for junior learners and for guiding blog creation. Four questions in the score (questions 2, 4, 5, and 7) were identified by 10% of subjects to be unclear. Thematic analysis of comments identified suggested four main themes for improving the score: adding clearer definitions with marking rubrics; shortening the 7-point scale; adding items evaluating blog post presentation and utility; and, rephrasing the wording of certain questions for clarity. **Conclusion:** A mixed methods usability analysis of the METRIQ-8 instrument for assessing blog quality was globally well received by EM medical students, residents, and attendings. Qualitative analyses revealed multiple areas to improve the instruments clarity and usability. The METRIQ score is a promising instrument for evaluating the quality of blogs; further development and testing is needed to improve its utility.
Keywords: blogs, score/tool, mixed methods study

P023

La valeur diagnostique du 'Score de détection de la dissection aortique' et du ratio neutrophiles sur lymphocytes pour le syndrome aortique aigu

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Introduction: Le syndrome aortique aigu (SAA) est une condition rare et généralement mortelle qui demeure difficile à diagnostiquer. Le Score de détection de la dissection aortique (DDA) et le ratio de neutrophiles sur lymphocytes (NL) ont été proposés comme des éléments pouvant contribuer à exclure le diagnostic du SAA. Lobjectif primaire de cette étude est de déterminer la valeur diagnostique (sensibilité et spécificité et rapport de vraisemblance négatif [RV-]) de ces deux éléments de façon indépendante et combinée chez les patients suspectés de SAA au département durgence. **Methods:** Les patients ayant subi une angiographie par tomodensitométrie (angioCT) à la recherche dune dissection aortique entre 2008 et 2014 à lurgence dun hôpital tertiaire montréalais ont été inclus dans cette étude de cohorte rétrospective. Le score DDA a été établi à partir des dossiers médicaux et le ratio NL calculé à partir de la première formule sanguine prélevée chez ces patients. Pour le score DDA, un score de 1 ou plus et de 2 ou plus ont été évalués comme seuils de positivité. Pour le ratio NL, une valeur de plus de 4,6 a été choisie comme seuil puisquil sagissait du ratio proposé afin de différencier les patients atteints dun SAA de ceux souffrant dun anévrysme chronique. Pour lévaluation de la combinaison des deux tests, afin de maximiser la sensibilité, un score DAA de 1 ou plus ou un ratio NL de plus de 4,6 serait considéré comme positif. Le test de référence pour tous les patients était langiographie par tomodensitométrie. À partir de cela, la sensibilité, la spécificité et le rapport de vraisemblance négatif de chacun de ces tests/combinaison de tests et leurs intervalles de confiance (IC) ont été calculés. **Results:** Un total de 198 patients (99 hommes et 99 femmes) dun âge moyen de 63 ans (±16) ont été inclus dans létude, parmi lesquels 26 (13%) souffraient dun SAA. Un score DDA de 1 ou plus avait une sensibilité de 84,6% (IC 95% 65,1-95,6), une spécificité de 65,7% (IC 95% 58,1-72,8) et un VR- de 0,23 (IC 95% 0,09-0,58). Un score DDA de 2 ou plus avait une sensibilité de 23,1% (IC 95% 9,0-43,7), une spécificité de 95,3% (IC 95% 91,0-98,0) et un VR- de 0,81 (IC 95% 0,65-1,00). La sensibilité dun ratio NL de plus de 4,6 était de 42,3% (IC 95% 23,4-63,1), la spécificité de 58,7% (IC 95% 51,0-66,3) et le VR- de 0,98 (0,69-1,40). La combinaison du score DDA et du ratio NL avait une sensibilité de 88,5% (IC 95% 69,9-97,6), une spécificité de 38,4% (IC 95% 30,9-46,0) et un VR- de 0,30 (IC 95% 0,10-0,89). **Conclusion:** Avoir un score de DDA inférieur à 1 diminue significativement les chances davoir un SAA, nélimine pas cette possibilité et ne devrait pas être utilisé, sauf chez les patients ayant une probabilité pré-test déjà très faible. Le ratio NL en utilisant un seuil de 4,6 na aucune utilité diagnostique pour le SAA.

Keywords: aortic dissection, diagnostic

P024

Sharing evidence, experiences and expertise: the value of networking to standardize emergency care for kids in Canada

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Introduction: TREKK is a national knowledge mobilization network of clinicians, researchers and parents aimed at improving emergency care for children by increasing collaborations between general and pediatric emergency departments (ED). This study aimed to determine patterns of knowledge sharing within the network and identify connections, barriers and opportunities to obtaining pediatric information and training. **Methods:** Social network analysis (SNA) uses network theory to understand patterns of interaction. Two SNAs were conducted in 2014 and 2015 using an online network survey distributed to 37 general EDs. Data was analyzed using UCI Net and Netdraw to identify connections, knowledge sharing and knowledge brokers within the network. Building on these results, we then conducted 22 semi-structured follow-up interviews (2016) with healthcare professionals (HCPs) at General EDs across Canada, purposefully sampled to include individuals from connected and disconnected sites, as identified in the SNA. Interviews were analyzed by 2 reviewers using content and thematic analysis. **Results:** SNA data was analyzed for 135 participants across the network. Results from 2014 showed that the network was divided along provincial lines, with most individuals connecting with colleagues within their own institution. Results from 2015 showed more inter-site interconnectivity and a reduction in isolated sites over time from 17 to 3. Interview participants included physicians (59%) and nurses (41%) from 18 general EDs in urban (68%) and rural/remote (32%) Canada. HCPs sought information both formally and informally, by using guidelines, talking to colleagues, and attending pediatric related training sessions. Network structure and processes were felt to increase connections, support practice change, and promote standards of care. Participants identified personal, organizational and system-level barriers to information and skill acquisition, including resources and personal costs, geography, dissemination, and time. Providing easy access to information at the point of care was promoted through enhancing content visibility and by embedding resources into local systems. There remains a need to share successful methods of local dissemination and implementation across the network, and to leverage local professional champions such as clinical nurse liaisons. **Conclusion:** This study highlights the power of a network to increase connections between HCPs working in general and pediatric EDs. Findings reinforce the critical role of ongoing network evaluation to improve the design and delivery of knowledge mobilization initiatives.

Keywords: knowledge sharing, pediatric emergency care, social network analysis

P025

Are we ready for a gunman in the emergency department? A qualitative study of staff perceptions of risk and readiness to respond

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Introduction: Hospital-based gun violence is devastatingly traumatic for everyone present and recent events in Cobourg, Ontario underscore that an active shooter inside the emergency department (ED) is an imminent threat. In June 2016, the Ontario Hospital Association (OHA) added Code Silver to the list of standardized emergency preparedness colour codes and advised member hospitals to develop policies and train staff on how best to respond. Given that EDs are particularly susceptible to opportunistic breach by an active shooter, the impact of a Code Silver on ED functioning and staff members may be particularly acute. We hypothesized that there may not be a simple, one-size-fits-all-hospital-staff solution about how best to prepare EDs to respond to Code Silver. In order to inform and support future staff training initiatives related to Code Silver and other disaster situations in hospitals, we sought to investigate staff perspectives and behaviour related to personal safety at work and, in particular, an active shooter. **Methods:** We undertook a qualitative interview study of multi-disciplinary ED staff (MDs, RNs, clericals, allied health, administrators) at a single tertiary care centre in Toronto. The primary methods for data collection were in-depth qualitative interviews and focus groups. Participants were recruited using stakeholder and maximum variation sampling strategies. Data collection and analysis were concurrent and standard thematic analysis techniques

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were employed. **Results:** Sixteen (16) staff members participated in interviews and 40 participated in small focus group discussions. Data analysis revealed workplace violence and personal health risks have been normalized as expected, acceptable features of everyday life at work in the ED given that patients are perceived to be sick people in need of help that ED staff are trained for and prepared to provide. In contrast, weapons and active shooters challenge the boundaries of professional responsibility and readiness to respond to Code Silver is perceived by staff as a fallacy. **Conclusion:** Knowledge from this study gives us crucial insight into important areas for targeted training and opportunities for knowledge translation on the topic of implementing Code Silver in EDs across the country. Future interventions must include how to overcome normalization of workplace violence in the ED setting and negotiating competing professional obligations during crisis situations. Attention to these are crucial if we are to truly keep our staff safe during these traumatic events.
Keywords: workplace violence, code silver, qualitative research

P026

Opioid use and dependence three months after an emergency department visit for acute pain

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Introduction: Most studies evaluating prescription opioid dependence or misuse are retrospective and are based on prescription filling rates from pharmaceutical databases. These studies cannot evaluate if opioids are really consumed nor differentiate if used for a new pain, chronic pain, or for misuse/dependence. The aim of this study was to assess the opioid consumption in emergency department (ED) patients three months after discharge with an opioid prescription. **Methods:** This prospective cohort study was conducted in the ED of a tertiary care centre with a convenience sample of patients aged 18 years and older, recruited 24/7, who consulted and were discharged for an acute pain condition (2 weeks). We excluded patients who: did not speak French or English, were using opioid medication prior to their ED visit, with an ED stay >48 hours, or suffering from cancer or chronic pain. Three months post-ED visit, participants were contacted by phone for a structured interview on their past two-week opioid use, their reasons for consuming them, and also answered the Rapid Opioid Dependence Screen (RODS) questionnaire. **Results:** In the 524 participants interviewed at three months (mean age $\pm$ SD: 51 ± 16 years, 47% women), 44 (8.4%) patients consumed opioids in the previous two weeks. Among those, 72% consumed opioids for their initial pain, 19% for a new unrelated pain, and 9% for another reason. In this entire cohort, only five patients (1%) tested positive to opioid dependence from the RODS test. The low dependence incidence could be affected by a social desirability bias. **Conclusion:** This study suggests that opioid use at 3-month, for patients initially treated for acute pain, is associated with opioid dependency in 1% or possible misuse in only 9%. Additional prospective studies using multiple methods to measure opioids consumption, misuse, and dependence are needed.
Keywords: opioids, dependence, misuse

P027

A descriptive needs-based assessment of paramedic continuing education

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Introduction: Objective: To identify self-perceived knowledge deficits of paramedics, barriers to training and desired methods of self-directed continuing education. **Methods:** A written 58 question survey was delivered to all 1262 paramedics under the jurisdiction of a single base-hospital in Ontario, Canada. Respondents were asked to select deficit, no deficit or not applicable from a 37-point, anatomic systems-based list. They were then asked to identify from a 15-point list which educational modalities they would choose to address any knowledge deficits. Finally, they were asked which factors they took into consideration when choosing their self-directed continuing education. **Results:** Seven hundred forty-six of 1262 paramedics (59.11%) completed the surveys. Of these respondents, 82 (10.99%) were advanced care paramedics, while 664 (89.01%) were primary care paramedics. Of the 645 who responded with their primary geographical setting: 136 (21.09%) listed a primary urban practice, 126 (19.53%) listed a primary rural practice and 287 (44.50%) reported a split urban and rural practice. The most common perceived deficits (respondent number, percentage); were electrolyte disturbance (418, 56.03%), neonatal resuscitation (386, 51.74%), pediatric respiratory disorder (381, 51.07%), arrhythmia (377, 50.53%), and pediatric cardiac arrest (317, 42.49%). The top 5 educational opportunities they were most likely to choose included online module (464, 62.20%), in-class lecture (423, 56.70%), web-based review (403, 54.02%), webinar (301, 40.35%) and peer consult (237, 31.77%). The top 3 barriers to choosing continuing education were work scheduling (479, 64.21%), location/ease of attending (382, 51.21%), and cost (305, 40.88%). **Conclusion:** Paramedics in this base hospital system identified pediatric critical care situations, electrolyte abnormalities and cardiac arrhythmia as self-perceived deficits. The most commonly selected educational opportunities included online learning, in-person training and peer consult. These preferred modalities are consistent with the identified barriers of work scheduling, ease of attending and cost. Targeted educational needs based assessments can help ensure that appropriate topics are delivered in a fashion that help overcome identified barriers to self-directed learning.
Keywords: paramedic, prehospital, education

P028

Self-directed learning in advanced care paramedics: perceived deficits and completed activities

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Introduction: In Ontario, Advanced Care Paramedics (ACPs) are required to perform a minimum of 24 educational credits per year of Continuing Medical Education (CME). Of these 24 credits, 12 are chosen by the paramedic, while 12 credits are mandated by the Base Hospital. The combined mandatory and optional CME frame is used so paramedics can target their personal needs appropriately, while ensuring new medical directives and global knowledge deficits identified by Quality Assurance (QA) means can be addressed by the Base Hospital. Objective: To determine if there is a difference between what ACPs identify as their knowledge deficits and what CME they complete. **Methods:** Methods: Request for participation in a written survey was delivered to all ACPs in an Ontario Base Hospital, prior to the CME cycle for the year. Respondents were asked to identify deficits from a 37-point, organ systems-based list, with free-text option for any deficits not itemized. Following the annual cycle, CME credits were evaluated by the Regional Base Hospital education coordinator, and Base Hospital medical directors for content. The deficits identified prior to the CME cycle were then compared to the CME attended for each respondent. In

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order to best represent the individual ACP response to their perceived deficits, a percentage of deficits identified and addressed was chosen. Respondents were not aware that their responses would be compared to the credits obtained for the year, to minimize bias in CME selection. **Results:** Of the 140 ACPs in the region, 42 (30%) completed the survey. From the 37-point list, the median number of perceived deficits identified was 7.00 (IQR 3.00-10.00). The median number of CME events that addressed perceived deficits was 2.00 (IQR 1.00-3.00). The median number of perceived deficits addressed by either paramedic-chosen or mandatory CME were identical at 1.00 (IQR 0.00-2.00). The percentage of perceived deficits identified and addressed via CME was 35.07% (range 0-100%). Paramedic-chosen CME covered 22.48% (range 0-100%) of perceived deficits, while mandatory CME covered 20.14% (range 0-100%) of perceived deficits. **Conclusion:** In the current system, only 35.07% of perceived deficits were addressed through mandatory and paramedic-chosen CME. Further information regarding barriers to paramedics obtaining CME that meets their perceived deficits needs to be elucidated.

Keywords: paramedic, prehospital, education

P029

A descriptive analysis of defibrillation vector change for prehospital refractory ventricular fibrillation

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Introduction: Patients in ventricular fibrillation (VF) who do not respond to standard Advanced Cardiac Life Support treatments are deemed to be in refractory VF (rVF). The ideal prehospital treatment for patients with rVF remains unknown. Double sequential external defibrillation (DSED) has been proposed as a viable option for patients in rVF. Although the mechanism by which DSED terminates rVF remains unknown, one theory is that the change in defibrillation vector that occurs may contribute. The objective of this study was to describe clinical outcomes for patients presenting in rVF during out-of-hospital cardiac arrest (OOHCA) for those who underwent vector change defibrillation, compared to those who received standard treatment. **Methods:** This was a retrospective chart review of adult (18 years) patients presenting in rVF during OOHCA over 15 months beginning in March 2016. Patients who underwent vector change defibrillation had a change in pad position (anterior-anterior to anterior-posterior) after 3 or more consecutive shocks. Termination of rVF was defined as the absence of VF after a vector change or standard shock during the next rhythm analysis. **Results:** There were 372 OOHCA, with 25 (6.7%) patients meeting our definition of rVF. Of these, 16 (64.0%) patients (median age 62 years, 81.3% male) had vector change after a median (IQR) of 3 (3.0-4.0) paramedic defibrillation attempts. Median (IQR) time to vector change defibrillation was 8.8 (7.1-11.1) minutes. Eight (50%) patients had termination of rVF after the first vector change shock, 6 (37.5%) had prehospital return of spontaneous circulation (ROSC) and 5 (31.3%) patients survived to hospital discharge. Of the 9 rVF patients who did not have vector change, median age was 63 years and 88.9% were male. The median (IQR) number of defibrillations within this group was 5 (4.5-7.0). No patients converted after the 4th defibrillation. Prehospital ROSC was achieved in 3 (33.3%) patients and 5 (55.5%) patients were transported while in rVF . Three patients (33.3%) survived to hospital discharge. **Conclusion:** This is preliminary evidence that vector change defibrillation in patients with rVF may result in VF termination. A randomized controlled trial is warranted to test whether or not vector change has a role in the termination of rVF.

Keywords: ventricular fibrillation, prehospital, vector change

P030

Role of scribes in emergency care in the Saskatoon health region

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Introduction: Increasingly, hospitals are adopting electronic charting systems. Recent literature suggests that physicians are spending roughly 2:1 hours on charting as compared to actual patient care raising questions as to whether manual electronic charting is the best use of scarce physician resources. To counter these effects, some hospitals have introduced scribes into their departments. A medical scribe is a person, or paraprofessional, who specializes in charting physician-patient encounters in real time. In this pilot study, we assessed the impact of having a scribe on the mental and physical fatigue, patient and healthcare-team engagement, and overall work satisfaction of emergency physicians at an urban emergency department (St. Paul's Hospital, Saskatoon). **Methods:** Three research participants (emergency physicians) were recruited to the study. Each participant completed a typing test to determine typing skills. The student researcher then provided scribe services for each participant for two shifts. The scribe charted physician-patient interactions in real time and also completed order sets, wrote orders, imaging requisitions, and prescriptions. Physicians completed surveys after each shift with the scribe as well as after 2 shifts without a scribe (for a total of 12 shifts in the study, 6 with the intervention). Physicians were asked to rate their mental and physical fatigue, enjoyment of work, and impact on patient/team engagement on a 10-point Likert scale. Results from the questionnaires were analyzed to determine individual and group mean responses. Given the small sample size, no further statistical calculations were completed. **Results:** Typing test results (in words per minute) were as follows: Scribe 93, Physician A 64, Physician B 40, Physician C 25. In terms of both mental and physical fatigue post shift, all 3 participants recorded being less fatigued after working shifts with a scribe. Mean group scores were as follows: mental fatigue decreased by 33%, physical fatigue decreased by 23%. Physicians work enjoyment improved by 10%. Team and patient interaction did not seem impacted by the intervention. **Conclusion:** It appears that regardless of typing skills, all physician participants noted a measurable benefit from having a scribe on shift. This suggests that off-loading documentation to the scribe has a positive effect on mental and physical endurance. These results warrant further investigations.

Keywords: quality improvement and patient safety, scribes in emergency care

P031

An online video analysis study of out of hospital cardiac arrest: patterns in presentation and opportunities for machine learning

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Introduction: Cameras are a common in public spaces. London England is estimated to have 500,000 and Beijing China over 800,000. Smartphone penetration exceeds 60% of the population in 20 countries worldwide. Hundreds of sudden cardiac arrests are captured on video annually. This study searches publically available cardiac arrest videos with two objectives i) describe sudden cardiac arrest behaviour and ii) explore potential opportunities for machine learning. **Methods:** The search terms: "sudden death," "heart attack," "cardiac arrest" and "public death" were used. English sources included: Youtube.com, Dailymotion, vimeo.com, vidamax.com, LiveLeak.com and documentingreality.com. Whereas, iqiyi.com, youku.com, le.com, fun.tv,

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pptv.com and tudou.com were searched using simplified Chinese. Inclusion criteria required that the subject in the video be completely visible five seconds prior to the event and at least ten seconds after and the quality of the video be adequate to visualize movement. Exclusion criteria included trauma or precipitating event (substance misuse, toxic exposure or asphyxiation). Each video source was searched until 30 consecutive irrelevant videos were obtained. **Results:** Four hundred and eighty eight videos met inclusion criteria. Of those videos, 112 could be confirmed as a "cardiac arrest" by at least two sources (news, or family social media account). In 53 (47%) of these videos the person touches their face or head within five seconds of collapse. Of the 98 videos where the person is upright, in 41 (37%) instances they hip-flexes and with their hands on their upper legs prior to collapse. This pattern of behaviour is combined in 36 (32%) instances. After collapse, 68 (61%) appeared to exhibit extension posturing activity. Agonal breathing was visible in 39 instances (35%). **Conclusion:** Sudden out of hospital cardiac arrest has a recognizable pattern. This represents an opportunity for machine learning, using shape tracking and edge detection, to recognize this event and activate the emergency response system.

Keywords: cardiac arrest, prehospital care, machine learning

P032

Twelve angry medics: a study of bimanual external aortic compression in healthy adult men

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Introduction: Following life-threatening hemorrhage the goal is to temporize blood-loss and expedite definitive-rescue. Junctional (abdominal-pelvic) trauma, between the inguinal ligament and umbilicus; is a leading cause of potentially survivable mortality. Numerous devices such as junctional tourniquets and resuscitative endovascular balloon occlusion of the aorta have been suggested for this injury pattern, but we propose an immediately available and expedient bimanual maneuver that may act as a bridge to device application, proximal external aortic compression (PEAC). Of note, external aortic compression has been used for centuries in life-threatening postpartum hemorrhage. **Methods:** Twelve paramedic volunteers were recruited from a continuing education event. Participant demographics, blood pressure, abdominal circumference, body mass index and procedural discomfort were recorded. In pairs, six participants were taught PEAC and performed the maneuver, then exchanged roles. Training consisted of researcher led demonstration and participant return demonstration with feedback. The duration of training was less than five minutes for all participants. Femoral artery hemostasis was measured by doppler ultrasound. **Results:** Participant mean age was 28.6 (range 22 to 46) and their mean systolic blood pressure was 128.25 mmHg (range 102 to 145). Mean body mass index was 24 (range 22 to 28) and abdominal girth was 80 cm (range 70 to 110). Bilateral common femoral artery blood flow became undetectable in all participants, by doppler ultrasound. Participant discomfort was reported as a mean of 4.4 (range 3 to 6) on a zero to ten scale. No complications were reported with seven and 30 days follow-up. **Conclusion:** This study demonstrates successful PEAC in twelve healthy participants. However, our limitations include a small sample and the relatively modest abdominal circumferences of our participants. If light of these limitations, PEAC may be a potentially life-saving maneuver which is immediately deployable and easy to learn, for patient temporization until device application and/or operative rescue.

Keywords: trauma, hemorrhage, prehospital care

P033

Reducing pantoprazole infusions in ED GI bleed patients by optimizing electronic order sets

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Introduction: Non-variceal upper gastrointestinal bleeding (NVUGIB) is a common presentation to the emergency department (ED) accounting for significant morbidity, mortality and health care resource usage. In Alberta, a provincial care pathway was recently developed to provide an evidence informed approach to managing patients with an UGIBs in the ED. Pantoprazole infusions are a commonly used treatment despite evidence that suggests they are generally not indicated prior to endoscopy in the ED. The goal of this project was to optimize management of patients with a NVUGIB, in particular reduce pre-endoscopy pantoprazole infusions. **Methods:** In July 2016, we implemented a multi-faceted intervention to optimize management of ED patients with NVUGIB including 1) de-emphasizing IV pantoprazole infusions in the ED, 2) clinical decision support (CDS) embedded (for endoscopy, disposition and transfusions) within the order set and 3) educating clinicians about the care pathway. We used a pre/post-order set design, analyzing 391 days pre and 189 days post-order set changes. Data was extracted from our fully integrated electronic health records system. The primary outcome was the % of patients receiving IV pantoprazole infusion ordered by an emergency physician (EP) among all patients with NVUGIB. Secondary outcomes included % transfused with hgb >70g/L and whether using the GIB order set impacted management of NVUGIB patients. **Results:** In the 391 days pre-order set changes, there were 2165 patients included and in the 189 days post-order set changes, there were 901 patients. For baseline characteristics, patients in the post-order set change group were significantly older (64.4 yrs vs. 60.9 yrs, p-value = 0.0016) and had a lower hgb (115 vs. 118, p-value = 0.049) but otherwise for gender, measures of severity of illness (systolic blood pressure, heart rate, CTAS, % admitted) there were no significantly differences. For the primary outcome, in the pre-order set phase, 47.1% received a pantoprazole infusion ordered by an EP, compared to 31.5% in the post-order phase, for an absolute reduction of 15.6% (p-value $\leq$ 0.001). For the secondary outcomes, transfusion rates were similar pre/post (22.08% vs. 22.75%). Significant inter-site variability exists with respect to the reduction in pantoprazole infusion rates across the four sites (-23.3% to +6.12%). **Conclusion:** Our interventions resulted in a significant overall reduction in pantoprazole infusions in ED patients with NVUGIB. Reductions in pantoprazole infusions varied significantly across the different sites, future work in our department will explore and address this variability. Keys to the success of this project included engaging clinicians as well as leveraging the SCM order sets as well as the provincial care pathway. Although there were no changes in transfusion rates, it in unclear if this a function of the CDS not being effective or whether these transfusions were clinically indicated.

Keywords: quality improvement and patient safety, gastrointestinal bleeding, order sets

P034

Audit and feedback for emergency physicians - perceptions and opportunities for optimization

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Introduction: There is a growing interest in providing clinicians with performance reports via audit and feedback (A&F). Despite significant

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evidence exists to support A&F as a tool for self-reflection and identifying unperceived learning needs, there are many questions that remain such as the optimal content of the A&F reports, the method of dissemination for emergency physicians (EP) and the perceived benefit. The goal of the project was to 1) evaluate EP perceptions regarding satisfaction with A&F reports and its' ability to stimulate physicians to identify opportunities for practice change and 2) identify areas for optimization of the A&F reports. **Methods:** EP practicing at any of the four adult hospital sites in Calgary were eligible. We conducted a web survey using a modified Dillman technique eliciting EP perspectives regarding satisfaction, usefulness and suggestions for improvement regarding the A&F reports. Quantitative data were analyzed descriptively and free-text were subjected to thematic analysis. **Results:** From 2015 onwards, EP could access their clinical performance data via an online dashboard. Despite the online reports being available, few physicians reviewed their reports stating access and perceived lack of utility as a barrier. In October 2016, we began disseminated static performance reports to all EP containing a subset of 10 clinical and operational performance metrics via encrypted e-mail. These static reports provided clinician with their performance with peer comparator data (anonymized), rationale and evidence for A&F, information on how to use the report and how to obtain continuing medical education credits for reviewing the report. **Conclusion:** Of 177 EP in Calgary, we received 49 completed surveys (response rate 28%). 86% of the respondents were very/satisfied with the report. 88% of EP stated they would take action based on the report including self-reflection (91%) and modifying specific aspects of their practice (63%). Respondents indicated that by receiving static reports, 77% were equally or more likely to visit the online version of the eA&F tool. The vast majority of EP felt that receiving the A&F reports on a semi-annual basis was preferred. Three improvements were made to the eA&F based on survey results: 1) addition of trend over time data, 2) new clinical metrics, and 3) optimization of report layout. We also initiated a separate, real-time 72-hour bounceback electronic notification system based on the feedback. EP value the dissemination of clinical performance indicators both in static report and dashboard format. Eliciting feedback from clinicians allows iterative optimization of eA&F. Based on these results, we plan to continue to provide physicians with A&F reports on a semi-annual basis.
Keywords: audit and feedback, self-reflection, performance metrics

P035

Continuous intravenous low-dose ketamine infusion for managing pain in the emergency department

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Introduction: To describe dosing, duration, and pre- and post-infusion analgesic administration of continuous intravenous sub-dissociative dose ketamine (SDK) infusion for managing a variety of painful conditions in the emergency department (ED). **Methods:** Retrospective chart review of patients aged 18 and older presenting to the ED with acute and chronic painful conditions who received continuous SDK infusion in the ED for a period over 6 years (2010-2016). Primary data analyses included dosing and duration of infusion, rates of pre- and post-infusion analgesic administration, and final diagnoses. Secondary data included pre- and post-infusion pain scores and rates of side effects. **Results:** 104 patients were enrolled in the study. Average dosing of ketamine infusion was 11.26 mg/hr, the mean duration of infusion was 135.87 minutes with 38% increase in patients not requiring post-infusion analgesia. The average decrease in pain score was 5.04. There were 12 reported adverse effects with nausea being the most prevalent. **Conclusion:** Continuous intravenous SDK infusion has a role in controlling pain of various etiologies in the ED with a potential to reduce need for co-analgesics or rescue analgesic administration. There is a need for more robust, prospective, randomized trials that will further evaluate the analgesic efficacy and safety of this modality across wide range of pain syndromes and different age groups in the ED.
Keywords: ketamine, analgesia, emergency department

P036

Interim analysis of the impact of the emergency department transformation system on flow metrics

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Introduction: Emergency Department Systems Transformation (EDST) is a bundle of Toyota Production System based interventions implemented in two Canadian tertiary care Emergency Departments (ED) between June 2014 to July 2016. The goals were to improve patient care by increasing value and reducing waste. Longer times to physician initial assessment (PIA), ED length of stays (LOS) and times to inpatient beds are associated with increased patient morbidity and potentially mortality. Some of the 17 primary interventions included computerized physician order entry optimization, staff schedule realignment, physician scorecards and a novel initial assessment process ED access block has limited full implementation of EDST. An interim analysis was conducted to assess impact of interventions implemented to date on flow metrics. **Methods:** Daily ED visit volumes, boarding at 7am, time to PIA and LOS for non-admitted patients were collected from April 2014-June 2016. Volume and boarding were compared from first to last quarter using an independent samples median test. Linear regression for each variable versus time was conducted to determine unadjusted relationships. PIA, LOS for non-admitted low acuity (Canadian Triage and Acuity Scale (CTAS) 4,5) and non-admitted high acuity (CTAS 1,2,3) patients were subsequently adjusted for volume and/or boarding to control for these variables using a non-parametric correlation. **Results:** Overall, median ED boarding decreased at University Hospital (UH) (14.0 vs. 6.0, $p < 0.01$) and increased at Victoria Hospital (VH) (17.0 vs. 21.0, $p < 0.01$) from first to last quarter. Median ED volume increased significantly at UH from first to last quarter (129.0 vs. 142.0, $p < 0.01$) but remained essentially unchanged at VH. 90th percentile LOS for non-admitted low acuity patients significantly decreased at UH (adjusted $rs = -0.24$, $p < 0.01$) but did not significantly change at VH. For high acuity patients 90th percentile LOS significantly decreased at both hospitals (UH: adjusted $rs = -0.23$, $p < 0.01$; VH: adjusted $rs = -0.21$, $p < 0.01$). 90th percentile time to PIA improved slightly but significantly in both EDs (UH: adjusted $rs = -0.10$, $p < 0.01$; VH: adjusted $rs = -0.18$, $p < 0.01$). **Conclusion:** Persistent ED boarding impacted the ability to fully implement the EDST model of care. Partial EDST implementation has resulted in improvement in PIA at both LHSC EDs. At UH where ED boarding decreased, LOS metrics improved significantly even after controlling for boarding.
Keywords: emergency department systems transformation, quality improvement, overcrowding

P037

Training first-responders to administer publicly available epinephrine – a randomized study

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Introduction: Improving public access and training for epinephrine auto-injectors (EAIs) can reduce time to initial treatment in anaphylaxis. Effective use of EAIs by the public requires bystanders to respond in a timely and proficient manner. We wished to examine optimal methods for effective training and skill retention for public use of EAIs. **Methods:** In this prospective, stratified randomized study, 154 participants at 15 sites receiving installation of public EAIs were randomized to one of three experimental education interventions: A) didactic poster (POS) teaching; B) poster with video teaching (VID), and C) Poster, video, and simulation training (SIM). Participants were tested by participation in a standardized simulated anaphylaxis scenario at 0-months, immediately following training, and again at follow-up at 3 months. Participants responses were videoed and assessed by blinded raters. Patient recorded experience measures (PREMs) assessed participant-patient interaction for every scenario. Data that was non-normally distributed was analyzed using non-parametric testing (Kruskall-Wallis-Rank Sum-Test). **Results:** Initial analysis showed differences between group baseline characteristics for age and first aid training; with a multivariable analysis providing the effect size of these differences. PREM data and video assessment data were not normally distributed. Analysis of PREM data revealed significantly higher scores in the SIM group at 0-months (median = 6.5, IQR = 5; $p = 0.05$) and 3-months (median = 5, IQR = 3; $p < 0.01$), compared to those groups that did not receive SIM. Video assessment performance scores show trends in higher skills and knowledge retention for SIM participants at 3-months; full data analysis will be performed at a later date. Final video assessment analysis will involve a weighted scoring system, using a consensus process, and an inter-rater agreement analysis. **Conclusion:** Simulation training improves interaction, essential skills, and retention of knowledge in simulated anaphylaxis response with public EAIs compared to non-simulation-based training.

Keywords: anaphylaxis, simulation training, epinephrine auto-injectors

P038

Emergency medicine interest group: evaluation of a student led organization at Memorial University

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Introduction: Interest groups have become increasingly popular as students explore potential career paths earlier in their undergraduate experience. Emergency medicine (EM) has grown as a specialty and the match has become quite competitive. Attractive features of EM cited by learners (diversity, procedural skills and flexible schedule) appeal broadly to the undergraduate population. Learners at Memorial University recognized this leadership opportunity and worked with faculty to reach this wide target audience through a streamlined iterative evaluation of their EM Interest Group (EMIG). **Methods:** The local EMIG was formed in 2010. Yearly, EMIG executive work with outgoing members using prior experiences, contacts and best practices to facilitate handover and progress. From 2015 to present, 305 surveys were collected, giving an 81.9% response rate. 59.7% of respondents were first year students, and 40.3% were second year. The survey consisted of Likert scale and open-response questions. The Likert scale questions yielded favorable responses. 304 students (99.6%) felt presenters were knowledgeable, 301 (98.6%) would recommend the sessions to others and 301 (98.6%) were satisfied they attended. Surprisingly, 133 students (43.6%) said they were not interested in Emergency Medicine, likely attending due to the appeal of session topics and transferrable of EM skills. 232 (76.0%) stated that attendance did increase their interest in EM. Top responses for aspects of EM most interesting to them included: ability to find a work/life balance, ability to work urban or rural, variety of cases seen, and the non-routine shifts. **Results:** Survey feedback is used to inform refinement of the content, delivery and format of EMIG activities, delivered by EM faculty. Hands-on sessions (e.g. suturing & airway management) have been popular. Informational sessions, on specific medical topics (ECG, resuscitation cases) or broader topics (EM streams) have also been very well received. Inclusion of all interested students, particularly large numbers for hands-on sessions, has presented challenges. Beyond current survey results, it will be interesting to consider if EMIG participation translates to learning or behavioral changes relevant to later clinical encounters; a question that will be difficult to quantify. **Conclusion:** The EM interest group is one of the most active at Memorial University. Survey results indicate that participants enjoy the EMIG session content and the structured iterative approach used by the group has been successful in maintaining an effective student led organization.

Keywords: innovations in emergency medicine education, student lead interest group, survey evaluation

P039

Application of the Delphi method to refine key components in the iterative development of a mobile tele-simulation unit (MTU)

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Introduction: Safe and efficient provision of quality healthcare requires maintenance of knowledge and skills relevant to daily practice. This is particularly relevant in rural and remote locations where high-acuity low-occurrence procedures and clinical scenarios present even less frequently. Simulation based training is widely used to supplement clinical exposure and practice but effective delivery of this approach to the rural/ remote practitioner must address barriers of time, cost and geographical separation. Mobile tele-simulation is an innovative approach that may help in bridging the gap through delivery of effective mentoring using telemedicine technologies and tailored educational content. **Methods:** To help direct the iterative design cycle for the mobile tele-simulation unit, input from potential future users was felt to be essential. The Delphi method was employed to reach consensus among study participants on four key questions: 1) What applications would the MTU be best suited for?, 2) What technical requirements and teaching tools would be needed to make the MTU successful?, 3) Which fields, besides EM/medical education, may benefit from partnerships with the final MTU?, 4) What research studies could be developed using the MTU? It was decided in advance that two rounds would be the maximum due to time constraints of the larger MTU projects. The first questionnaire focused on demographics and the four questions above. Independent reviewers analyzed, compiled and compared responses. Participants were sent the updated list, asked to confirm their responses and then to rank the responses highest to lowest priority. **Results:** Fifteen of 17 first round participants completed the questions, giving an 88.2% response rate. All shared a simulation background. 66% were physicians, 13.3% medical students, and 20% staff at Memorials Simulation Center. 66% had been involved with simulation-based education less than 5 years, and the others greater than 5 year. 13 of 15 (86.7%) responded in round 2. Consensus was not reached statistically using Kendalls W test for each of the four questions. However, there were several responses that showed higher median ranks than the others under each question. Application use: rural healthcare training, and medical professional training Technical factors: reliable learner-mentor connection, and competent technical support Non-technical factors: knowledgeable mentor and content relevant to locations practice, Research studies: training needs assessment from rural sites, and

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learners experience compared to stationary simulation center **Conclusion:** Input from a heterogeneous group of simulation users was sought to help prioritize key features in the development of the Mobile Telesimulation Unit. Although statistically the study did not reach consensus, valuable feedback was compiled and pragmatically applied in the iterative development cycle.
Keywords: simulation-based medical education, simulation education, telemedicine

P040

Describing antibiotic utilization and uptake of the chronic obstructive pulmonary disease order set in Saskatoon emergency departments

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Introduction: Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality in Canada. The Anthonisen criteria utilizes the cardinal symptoms of acute exacerbations of COPD (AECOPD), increased shortness of breath, increased sputum production, and increased sputum purulence, to determine which patients should receive antibiotics. In July 2015, a COPD Order Set Pilot was implemented in Saskatoon emergency departments (ED). The order set utilizes the Anthonisen criteria to optimize AECOPD patient management and ensure appropriate antibiotic usage. By January 2019, we aim to optimize AECOPD patient management in Saskatoon ED. We aim to increase physician uptake of the order set to 50% and to increase appropriate antibiotic prescription to 90%. **Methods:** Our project was designed following the Plan-Do-Study-Act method. Our primary outcome was to measure the rate of appropriate antibiotic prescription when managing AECOPD patients. Our secondary outcome was to measure physician uptake of the order set. We believed that a standardized order set would optimize patient care. We hypothesized that 80% of AECOPD patients would be managed with antibiotics appropriately and that 25% of emergency physicians would utilize the order set. A chart review was conducted examining AECOPD patient management in Saskatoon ED. The study period included the 6 months following the implementation of the order set. Our inclusion criteria were patients diagnosed with AECOPD and managed in the ED. Our exclusion criteria were patients currently prescribed antibiotics or patients requiring inpatient admission. A convenience sample of 125 charts was selected for review, enabling an accurate representation of order set utilization and antibiotic usage. A secondary reviewer abstracted a random 15% sample of the charts to ensure validity of the data. **Results:** Our results showed that, during our study period, none of the AECOPD patients were managed with the order set. Of the patients receiving antibiotic therapy, only 32 of the 53 (60.38%) met the Anthonisen criteria and were appropriately prescribed antibiotics. Of the patients not given antibiotics, 15 of the 42 (35.71%) met the Anthonisen criteria and should have been managed with antibiotics. These results refuted both of our hypotheses. **Conclusion:** As COPD is one of the leading causes of morbidity and mortality in Canada, proper management is crucial. Our results state that uptake of the order set is low and that antibiotic utilization is not optimized. These results demonstrate the need to modify and promote the current order set. We believe that by encouraging the use of the order set and streamlining the management guidelines, we can increase physician uptake. This will subsequently increase appropriate antibiotic prescription and improve AECOPD patient care. A second identical chart review for 2017 has been completed. Data analysis will be finalized prior to the conference.
Keywords: quality improvement and patient safety, acute exacerbation of chronic obstructive pulmonary disease, antibiotics

P041

Patient perspectives on emergency department use for acute atrial fibrillation: a qualitative study using the theoretical domains framework

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Introduction: Acute atrial fibrillation (AAF) is the most common arrhythmia managed in the Emergency Department (ED). Direct costs of AAF are primarily attributed to ED visits and subsequent admission to hospital. A better understanding of patients attitudes regarding ED attendance is necessary to develop strategies to improve the patient care experience while simultaneously reducing ED presentation and inappropriate hospital admissions. This study aims to describe patient perspectives on ED use for AAF using in-depth qualitative interviews. **Methods:** An interview template designed to explore why patients attend the ED for AAF was constructed based on the Theoretical Domains Framework, a theory-informed approach that utilizes 14 domains to describe influencers of behavior. We conducted audio-recorded, semi-structured interviews of patients following their presentation to the ED for management of AAF. Interviews were anonymized, transcribed and imported into NVivo for coding and analysis. Two independent reviewers used a direct approach to code participant statements. Discrepancies were resolved by a third party. Belief statements were generated and relevant domains identified based on high frequency scores, conflicting belief statements or evidence of strong influencing beliefs. **Results:** 12 patient interviews, mean age 63.1 years, 91.7% male, 75.0% recurrent AAF, were completed. Patients stated that they attended the ED because: 1) symptom severity; 2) they were instructed by physicians to attend the ED should their AAF recur; and 3) they were encouraged by family members to attend. Their primary goal was to have relief of their symptoms. There was no expectation of specialist consultation or admission to hospital. Even though most patients stated they were open to managing these episodes independently, they reported that they did not have the knowledge or tools to do so. **Conclusion:** Patients with AAF present to the ED because of their symptom burden, social influences (physician and family) and lack of other management options. This study demonstrates the need for development of patient self-management strategies which will empower patients in their disease management and may decrease future ED visits.
Keywords: acute atrial fibrillation

P042

Resuscitative endovascular balloon occlusion of the aorta (REBOA) in trauma: a systematic review

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Introduction: Trauma leading to uncontrolled hemorrhage of the torso in the critically injured patient can rapidly progress to decreased cerebral and cardiovascular perfusion and carries a significant morbidity and mortality. Given the non-compressible nature and difficult anatomic access of these injuries, obtaining hemostasis is often a challenge and non-surgical options are sparse. Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) is a rapidly administered emergency department intervention that allows transient source control of caudal

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torso hemorrhage while arranging definitive surgical management. Although initially postulated in the 1950s, limited research regarding its therapeutic use in trauma has been available until recently. Here, we present a systematic review of the literature pertaining to the use of REBOA in severe trauma. **Methods:** An experienced medical librarian searched electronic databases for terms relating to REBOA, aortic balloon occlusion, hemorrhage, trauma and shock. Articles were identified, screened, retrieved and reviewed in accordance with PRISMA systematic review guidelines. English case reports, case series, cohort studies, randomized-controlled trials, systematic reviews and meta-analyses pertaining to the use of REBOA in human trauma patients were included. Customized inclusion and data extraction forms were created and used to form an electronic database of relevant studies. **Results:** After exclusion of duplicates, 2147 potentially relevant articles were identified and screened by title/abstract and 136 articles meeting inclusion criteria were retrieved for full-text review. Final analysis of 26 articles included 5 case reports, 13 case series, 7 observational cohort studies and 1 systematic review. Data spanning 771 patients undergoing REBOA were collected (weighted average age: 49.5, gender: 67.7% male, injury severity score: 35.1). Where data available, REBOA increased systolic blood pressure by a weighted average of 54.7mmhg and overall survival was 32.6%. **Conclusion:** Limited evidence pertaining to the use of REBOA in severe trauma exists with the majority of available data coming from individual case studies and case series. By extension, quantitative analysis regarding outcome data of this intervention requires further research in the form of larger studies with subgroup analysis to identify the subset of patients for which REBOA may benefit and to further delineate the risks of implementing this intervention.
Keywords: resuscitative endovascular balloon occlusion of the aorta

P043

Standards for change: developing international minimum standards for the care of older people in the emergency department

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Introduction: Emergency departments (ED) across Canada acknowledge the need to transform in order to provide high quality care for the increasing proportion of older patients presenting for treatment. Older people are more complex than younger ED users. They have a disproportionately high use of EDs, increased rates of hospitalization, and are more likely to suffer adverse events. The objective of this initiative was to develop minimum standards for the care of older people in the emergency department. **Methods:** We created a panel of international leaders in geriatrics and emergency medicine to develop a policy framework on minimum standards for care of older people in the ED. We conducted a literature review of international guidelines, frameworks, recommendations, and best practices for the acute care of older people and developed a draft standards document. This preliminary document was circulated to interdisciplinary members of the International Federation of Emergency Medicine (IFEM) geriatric emergency medicine (GEM) group. Following review, the standards were presented to the IFEM clinical practice group. At each step, verbal, written and online feedback were gathered and integrated into the final minimum standards document. **Results:** Following the developmental process, a series of eight minimum standard statements were created and accepted by IFEM. These standards utilise the IFEM Framework for Quality and Safety in the ED, and are centred on the recognition that older people are a core population of emergency health service users whose care needs are different from those of children and younger adults. They cover key areas, including the overall approach to older patients, the physical environment and equipment, personnel and training, policies and protocols, and strategies for navigating the health-care continuum. **Conclusion:** These standards aim to improve the evaluation, management and integration of care of older people in the ED in an effort to improve outcomes. The minimum standards represent a first step on which future activities can be built, including the development of specific indicators for each of the minimum standards. The standards are designed to apply across the spectrum of EDs worldwide, and it is hoped that they will act as a catalyst to change.
Keywords: quality improvement and patient safety, geriatric emergency medicine, international standards

P044

Register to donate while you wait: assessing public acceptability of utilizing the emergency department waiting room for organ and tissue donor registration

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Introduction: Our study objectives were to assess the acceptability of using the emergency department (ED) waiting room to provide knowledge on, and offer opportunities for organ and tissue donor registration; and to identify barriers to the donor registration process in Ontario. **Methods:** We conducted a paper based in-person survey over nine days for eight hour blocks in March and April 2017. The survey instrument was created in English using existing literature and expert opinion, pilot tested and then translated into French. The study collected data from patients and visitors in an urban academic Canadian tertiary care ED waiting room. All adults in the waiting room were approached to participate during the study periods. Individuals waiting in clinical care areas were excluded, as well as those who required immediate treatment. **Results:** The number of attempted surveys was 324; 67 individuals (20.7%) refused to partake. A total of 257 surveys were distributed and five were returned blank. This gave us a response rate of 77.8% with 252 completed surveys. The median age group was 51-60 years old with 55.9% female. Forty-six percent were Christian (46.0%) and 34.1% did not declare a religious affiliation. Nearly half of participants (44.1%) were registered organ donors. The majority of participants agreed or were neutral (83.3%) that the ED waiting room was an acceptable place to provide information on organ and tissue donation. Further, 82.1% agreed or were neutral that the ED was an acceptable place to register as an organ donor. Nearly half (47.2%) agreed that they would consider registering while in the ED waiting room. A number of barriers to registering as an organ and tissue donor were identified. The most common were: not knowing how to register (22.0%), a lack of time to register (21.1%), and having unanswered questions regarding organ and tissue donation (18.7%). **Conclusion:** Individuals waiting in the ED are supportive of using the ED waiting room for distributing information regarding organ and tissue donation, and facilitating organ and tissue donation registration. Developing such a practice could help to reduce some of the identified barriers, including a lack of time and having unanswered questions regarding donation.
Keywords: organ and tissue donation

P045

Impact of post-intubation hypotension on mortality of patients in the emergency department (ED)

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Introduction: Endotracheal intubation is frequently used in emergency departments and is often life saving, but it is also known to cause adverse events that can potentially lead to death. The main objective of this study is to evaluate mortality rates and duration of hospitalisation in patients who experienced post-intubation hypotension (PIH). **Methods:** A historical cohort of patients admitted between 07/2011 and 11/2014 at the ED of a level-one trauma centre. Patients were included if they were aged 16 years old or more, were intubated in the resuscitation room,had less than 3 intubation attempts, no need of surgical airway access, and had recorded vital signs prior to intubation. All clinical data including vitals were prospectively collected using ReaScribe®. PIH was defined by one measure or more of systolic arterial blood pressure <90 mm Hg. We retrospectively analysed the occurrence of PIH at 4 time points: 5, 15, 30 minutes, and at any moments after intubation. Study outcomes were in-hospital death and hospital length of stay in days (LOS). Univariate and multivariate analyses assessed the relation between PHI and outcomes. **Results:** 261 patients were included in the analyses. Amongst patient who experienced PIH, incidence of mortality was, respectively for each time estimate, of 31.0%, 33.3%, 28.6% and 26.9% compared to 25.4% ($p = 0.5$), 24.2% ($p = 0.1$), 24.9% ($p = 0.5$), and 25.4% ($p = 0.8$) in the normotensive group. The mean duration of hospitalisation in the group exposed to PIH was respectively of 26 (12.9-53.3), 22 (13.5-35.5), 19 (13.6-27.8), and 18 days (13.5-24.8) compared to 15.6 (12.9-18.9), 15.4 (12.6-18.8), 15.3 (12.3-19.1), and 15.5 (12.1-19.7) days ($p = 0.4$). **Conclusion:** There was no association between the presence of post-intubation hypotension at 4 different time estimates and the in-hospital mortality nor the hospital length of stay. Further evaluation in specific sub-group should be foreseen to prevent adverse events from endotracheal intubation.

Keywords: endotracheal intubation, hypotension, mortality

P046

A quality improvement initiative for improving integration of resource stewardship concepts into undergraduate medical education

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Introduction: It is estimated that up to 30% of medical services in Canada are potentially unnecessary, not supported by current evidence or may cause patient harm. This type of practice negatively impacts patients and the healthcare system. Evidence suggests that medical education strongly impacts resource utilization in future practice. Our objective was to integrate Choosing Wisely (CW) recommendations into the undergraduate medical education curriculum to improve students understanding of resource stewardship in their pre-clerkship training. **Methods:** Post-course survey data and written feedback were collected from the Cumming School of Medicines 2019 class. Qualitative analysis of written feedback was used to identify perceived strengths and areas of improvement to inform additional changes for the 2020 class through a Plan-Do-Study-Act (PDSA) cycle. **Results:** The post-course survey was completed by 143 students. 60% reported the inclusion of CW improved their ability to develop a clinical management plan. Using the information gathered from the qualitative analysis, we made the following changes for the 2020 class: create an introductory lecture on resource stewardship, incorporate relevant CW recommendations into case study learning objectives, and create standardized slides on CW recommendations for lecturers. Feedback from the 2020 class revealed that the changes were well received and students reported feeling more comfortable with resource stewardship concepts. **Conclusion:** This data reveals that our efforts have increased students confidence in creating a management plan that integrates resource stewardship and patient safety, and elicited strong faculty support. We will continue to integrate these changes and to obtain student and faculty feedback to help inform additional iterative changes for the subsequent cohort. Our findings are valuable for other medical schools across Canada seeking to incorporate CW material.

Keywords: quality improvement and patient safety, medical education, curricular change

P047

Prevalence and severity of hypertension presenting to Calgary area emergency departments

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Introduction: Hypertension is common and a major cause of morbidity and mortality. Because it is asymptomatic, its diagnosis is often delayed. For many Canadians the Emergency Department (ED) is the only point of entry to the health care system, and therefore the recognition of undiagnosed and untreated hypertension in the ED is increasingly important. This study sought to evaluate the prevalence and severity of hypertension in patients presenting to Calgary area EDs, as well as to determine whether medical therapy was initiated and if patients had primary care providers for follow-up. **Methods:** Multi-centre electronic medical record (EMR) review of all adult patients presenting to Calgary area EDs from January 1, 2016 to December 31st, 2016. Hypertension was coded electronically by triage nurses and defined as systolic blood pressure SBP 140 mmHg and/or diastolic blood pressure DBP 90 mmHg. Hypertensive urgency was defined as SBP 180 mmHg and/or DBP 120 mmHg. Descriptive data was used to show patient demographics and hypertension prevalence. Primary care provider status, previous diagnosis of hypertension, chief complaint, and ED diagnoses were extracted and the EMRs were manually searched to determine whether treatment was initiated in the ED. **Results:** Of 304392 patients presenting to all Calgary sites, 43055 (14%) were found to have hypertension; mean age 52 (range 18 to 104), female 42%. Of these, 32986 (77%) had no known previous hypertension and 31% lacked a primary care provider. 0.2% had documentation of treatment initiated in the ED. 16% met criteria for hypertensive urgency. **Conclusion:** Many patients presenting to the ED have hypertension, often previously undiagnosed and at times severe. Many lack access to primary care. EDs may play an important role in the early recognition of hypertension. Dedicated management and follow-up pathways are indicated for this high-risk population.

Keywords: hypertension, hypertensive urgency, emergency department

P048

Interprofessional airway microskill checklists facilitate the deliberate practice of surgical cricothyrotomy with 3-D printed surgical airway trainers

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Introduction: Deliberate practice (DP) is the evolution of practice using continually challenging and focused practice on a particular task. DP involves immediate feedback, time for problem-solving and evaluation, and opportunities for repeated performance. Microskills training breaks down larger tasks into multiple smaller subtasks and then adds opportunities for feedback and adjustment for each subtask. Microskills

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training is routinely used to achieve excellence in competitive sports, martial arts, military operations, and music. Surgical cricothyrotomy is a rarely performed safety critical task. **Methods:** Two doctors and three nurses developed stepwise team microskills checklists from case review, simulations and published evidence. The checklist was tested, evaluated and developed during four days of simulation faculty team training. The final 30 item checklist was used to facilitate skills training for doctors, nurses, respiratory therapists and ACPs in one level 2, and two level 3 trauma centers from April 2017 to October 2017. Commonly available airway trainers were retrofitted with the 3-D printed larynx. The microskills checklist was used in four phases: 1. Group discussion of each microskill step; 2. Groups of three team members; operator, assistant and microskill facilitator (using the checklist) to enable the deliberate analysis of the teams current performance. Each subtask is performed with immediate peer and where necessary faculty feedback - changes are recorded; 3. Total task run through without interruption - changes are recorded; 4. Repetition and feedback using different team members, manikins, including time pressure. User satisfaction surveys were collected after the skills training session **Results:** Teams were composed of Registered Nurses (8), Physicians (9), and Respiratory Therapists (2). All of the teams experienced a change in practice. The median number of microskills changed for MDs 12/21, RNs 6/12. The commonest changes in practice were equipment preparation (all teams). All professions agreed strongly that the approach produces a positive change in practice (median score 5/5). **Conclusion:** Microskills checklists facilitate cricothyrotomy skill development in interprofessional teams in this provisional analysis.

Keywords: innovations in emergency medicine education, airway management, deliberate practice

P049

Changes in situational awareness of emergency teams in simulated trauma cases using an RSI checklist

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Introduction: Situational awareness (SA) is the team understanding patient stability, presenting illness and future clinical course. Losing SA has been shown to increase safety-critical events in multiple industries. SA can be measured by the previously validated Situational Awareness Global Assessment Tool (SAGAT). Checklists are used in many safety-critical industries to reduce errors of omission and commission. An RSI checklist was developed from case review and published evidence.The New Brunswick Trauma Program supports an inter-professional simulation-based medical education program **Methods:** Simulations were facilitated in three hospitals in New Brunswick from April 2017 to October 2017. Learner profiles were collected. The SAGAT tool was completed by a research nurse at the end of each scenario. SAGAT scores were non-normally distributed, so results were expressed as medians and interquartile ranges. Mann Whitney U tests were used to calculate statistical significance. To understand the effect of the of an RSI checklist a comparison was made between SAGAT scores at baseline in scenario 1, and the same first scenario completed after a washout period. A Poisson regression analysis will be used to account for the effect of confounding variables in further analyses. **Results:** The group was composed of Registered Nurses (8), Physicians (7), and Respiratory Therapists (2). Situational awareness increased significantly with the use of an RSI checklist after 1 day of 4 simulations. The washout period ranged between 5 weeks and 8 weeks. The baseline situational awareness of the whole group during scenario 1 was 9 +/−0.5 (median, IQR), and with the RSI checklist was 12 +/−1 (median, IQR). The difference was highly statistically significant, $p \leq 0.001$. This level of situational awareness using checklist is comparable to the SAGAT scores after 10 scenarios. **Conclusion:** In this provisional analysis, the use of an RSI checklist was associated with an increase in measured situational awareness. Higher levels of situational awareness are associated with greater patient safety. A Poisson regression model will be used to understand the confounding effects of user expertise and the likely interaction with simulation exposure.

Keywords: quality improvement and patient safety, airway management, checklist

P050

How aware is safe enough? Situational awareness is higher in safer teams doing simulated emergency airway cases

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Introduction: Situational Awareness is the ability to identify, process, and comprehend the critical elements of information about the patient condition, stability, the operational environment and an appropriate clinical course. The Situational Awareness Global Assessment Tool (SAGAT) is a validated tool for measuring situational awareness. The SAGAT tool was measured during a series of standardized high fidelity advanced airway management simulations in multidisciplinary teams in New Brunswick Emergency Departments delivered by two simulation programs **Methods:** Thirty eight simulated emergency airway cases were performed in situ in Emergency Departments and in learning centers in Southern New Brunswick from September 2015 to October 2017. Eight standardized cases were used whose educational objectives were to develop the optimization of critically ill patients prior to induction, to deliver patient-centered anesthesia and to choose an appropriate airway strategy. Learner profiles collected. Cases were divided into two groups; those that contained critical errors and those that did not based on video assessment. Critical errors were defined as failure of 1) Oxygenation, 2) Shock correction, 3) Induction dose estimation, 4) Choice of airway management paradigm. The SAGAT has a maximum score of 13 and was assessed by research nurses after each case for all participants. SAGAT scores were non-normally distributed, so results were expressed as medians with interquartile ranges. Mann Whitney U tests were used to calculate statistical significance. **Results:** Results. Of the 38 cases, 14 contained one more critical errors. The median SAGAT score in the group that contained critical errors was 8 +/−2 (IQR). The median SAGAT Score in the group that contained no critical errors was 11 +/−2 (IQR). The median scores we significantly different with a p-value of 0.02. **Conclusion:** In this study in simulated emergency cases, higher SAGAT scores were associated with teams leaders that did not commit safety critical errors. This work is the initial analysis to develop standards for Simulated team performance in Emergency Department teams.

Keywords: innovations in emergency medicine education, simulation, human factors

P051

Management of subcutaneous abscesses in the emergency department

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Introduction: We sought to characterize the management of uncomplicated subcutaneous abscesses (SA) by Canadian emergency physicians (EPs). **Methods:** Cross-sectional study of CAEP membership. Subjects were emailed an invitation to an online survey, and two biweekly reminders. Wilcoxon rank sum test was used for association with age, and Chi Square and Fischers exact test were used for binary variables. **Results:** Response rate was 21.2 % (392 Reponses/1850 surveyed). Duration of practice ranged from 30.2 % practising ≤ 5 years, to 25.7% practising ≥ 20 years. Teaching setting was described in 89.1% of responses. Irrigation with saline is performed by 57.1 % of EPs, tap water 2.1 %, or disinfectant 2.1% of EPs, with 39.1% not doing any irrigation. Approximately half (49.2%) typically do not pack or close wounds, while 40.6 % employ ribbon or gauze packing, and 1.6 % primary closure. Antibiotics are generally not prescribed by 16.8%. EPs prescribe antibiotics when suspecting surrounding cellulitis (84.2%), immunocompromised host (51.6%), MRSA (28.9%), or recurrence within 30 days (27.5 %). Cultures are taken almost always by 28.2%, half the time or less by 33.9%, never by 11.6%, and if MRSA is suspected by 33.9%. Follow-up instructions are with FP (56.7%), ED at 24 hours (5.91 %) or 48 hours (17.74 %), or not required (24.7%). Most EPs (90.9%) report having no standardized protocol for abscess management in their ED. EPs with fewer years in practice are more likely to make cruciate incisions ($p = 0.009$), to generally not irrigate incisions ($p = 0.02$), to culture if MRSA is suspected ($p = 0.02$), and to prescribe antibiotics when suspecting MRSA ($p = 0.02$) immune-compromised host ($p = 0.03$), and in case of spontaneous treatment failure or recurrence ($p = 0.0004$). EPs with more years in practice are more likely to pack with ribbon gauze ($p = 0.06$), and to almost always swab for C&S ($p = 0.04$) **Conclusion:** Practice variability and deviations from practice guidelines (i.e. IDSA, Choosing Wisely Canada) are noted. A knowledge translation exercise based on the guidelines for Canadian EPs would be useful.

Keywords: abscess, incision, methicillin-resistant staphylococcus aureus

P052

Utility of data captured by transition referral forms for program evaluation and research

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Introduction: Increase in functional decline of older adults after discharge from the emergency department (ED) has been reported; however, evaluations of interventions to mitigate this problem are infrequent. Data collected in the ED on older adults may document functional status, yet their utility for research is unknown. This study aimed to assess the usability of data collected by ED Transition Coordinators (EDTC) during routine assessments for functional decline research. **Methods:** EDTCs assess all patients 75 years old presenting to the ED and complete a standardized Transitional Assessment Referral (TAR) form that documents patients independence and daily functioning. To measure the utility of these forms for research purposes, trained research staff evaluated the TARs completed in April 2017 by TCs in the University of Alberta Hospital ED by extracting data from the TARs into a purpose-built REDCap database. Researchers selected and assessed for completeness and clarity the following variables unique to the TARs: facility vs. non-facility living, goals of care and personal directive, fall history, falls in the past 90 days, independence in 14 activities of daily living (ADLs)/instrumental activities of daily living (IADLS), community services in place, and homecare referrals for discharged patients. The proportion of TARs with data for each variable and the proportion of forms with unambiguous responses in each section are reported. **Results:** Overall, 500 forms were analysed; patients were 41% male with a mean age of 82 (SD = 11.2). Homecare referrals, facility vs. non-facility living, and independence with 14 ADLs/IADLs were the most frequently documented variables (81%, 78%, and 79%, respectively); however for ADLs/IADLs, 59% of the 79% had one or more missing components. While fall history was reported in 301 forms (60%), only 107/301 (36%) reported the number of falls in the last 90 days. The referral to homecare variable was complete in 217/268 (81%) forms; however, 99% of files were missing data about goals of care, personal directives, and receipt of community services. **Conclusion:** Although some information on elderly patients is consistently reported, many of the social service/human factors associated with functional decline are not recorded. While data on the TARs may be useful for studying functional decline in the ED, exploring the barriers to form completion may improve adherence thereby increasing their research utility.

Keywords: transitions in care, elderly, secondary data usage

P053

Characteristics and outcomes of patients seen by transition coordinators in the emergency department

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Introduction: Emergency Department (ED) Transition Coordinators (TC) have been introduced to many EDs. In Alberta, the EDTC role was designed to evaluate the home needs of senior patients (75 years of age) to enable safe return home after an ED visit, thereby mitigating admissions and return ED visits. The effectiveness of this role at achieving its objectives has received limited evaluation. **Methods:** TCs assess all ED patients 75 years old, and physicians request TC assessment for patients <75 years. The TC assessment includes completing a Transitional Assessment Referral (TAR) form that collects information on comorbidities, living arrangements, connections to community and homecare services, independence in activities of daily living (ADLs), and referrals, and disposition. Trained research staff extracted data from consecutive TARs for patients presenting during April 2017 into a REDCap database. The proportions of patients seen by TCs who were admitted, had an unplanned return to the ED within the study period, or received a new homecare referral were assessed. Categorical variables are reported as proportions; continuous variables are reported as mean and standard deviation (SD) or median and interquartile range (IQR), as appropriate. **Results:** In April 2017, there were 9849 visits to the ED; of these, TCs assessed 478 patients during 500 visits. The mean age was 82 (SD = 11.2) and 41% were male; 22 patients presented twice during April 2017. Patients had a median of 2 (IQR: 1, 5) co-morbidities and 40 (8%) patients reported falls in the past 90 days (median = 1; IQR: 1, 2). Overall, 144 (29%) patients lived in a care facility, while 204 (41%) lived at home; residence was unclear or not documented for 152 (30%). Patients reported being independent in a median of 9/14 (IQR: 3, 13) ADLs. An existing homecare connection or receipt of homecare services was documented for 185 patients (37%). Finally, 59 (12%) visits included a new or updated homecare referral, while 200 (33%) ED visits ended in admission. **Conclusion:** Elderly patients seen in the ED assessed by EDTCs are complex, and despite being well connected, they frequently need hospitalization. In a small proportion of cases,

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additional or new home care resources are required prior to ED discharge; however, few patients returned to the same ED during the one month study period. Given the high proportion of patients assessed, further evaluation of outcomes is warranted.
Keywords: transitions in care, elderly

P054

Interventions aimed at improvement in emergency department related transitions in care for adult patients with atrial fibrillation and flutter: a systematic review

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Introduction: Introduction: Transitions in care (TiC) interventions have been proposed to improve the management and outcomes of patients in emergency departments (ED). The objective of this review was to examine the effectiveness of ED-based TiC interventions to improve outcomes for adult patients presenting to an ED with acute atrial fibrillation or flutter (AFF). **Methods:** Methods: A comprehensive search of eight electronic databases and various grey literature sources was conducted. Comparative studies assessing the effectiveness of interventions to improve TiC for patients presenting to the ED with acute AFF were eligible. Two independent reviewers completed study selection, quality assessment, and data extraction. When applicable, relative risks (RR) with 95% confidence intervals (CIs) were calculated using a random effects model and heterogeneity was reported among studies using I-square (I2) statistics. **Results:** Results: From 744 citations, seven studies were included, consisting of three randomized controlled trials (RCT), three before-after (B/A) studies, and one cohort study. Study quality ranged from unclear to low for the RCTs according to the risk of bias tool, moderate in the BA trials according to the BA quality assessment tool, and high quality of the cohort study according to the Newcastle Ottawa scale. The majority of interventions were set within-ED (n = 5), including three clinical pathways/management guidelines and two within-ED observation units. Post-ED interventions (n = 2) included patient education and general practitioner referral. Four studies reported a decreased overall hospital length of stay (LoS) for AFF patients undergoing TiC interventions compared to control, ranging from 26.4 to 53 hours; however, incomplete and non-standardized outcome reporting precluded meta-analysis. An increase in conversion to normal sinus rhythm among TiC intervention patients was noted, which may be related to increased utilization of electrical cardioversion among the RCTs (RR = 2.16; 95% CI: 1.42, 3.30; I2 = %), B/A studies (RR = 2.69, 95% CI: 2.17, 3.33), and cohort study (RR = 1.39; 95% CI: 1.24, 1.56). **Conclusion:** Conclusions: Within-ED TiC interventions may reduce hospital LoS and increase use of electrical cardioversion. However, no clear recommendations to implement such interventions in EDs can be generated from this systematic review and more efforts are required to improve TiC for patients with AFF.
Keywords: atrial fibrillation, transitions in care

P055

An international, interprofessional investigation of the podcast listening habits of emergency clinicians: a METRIQ study

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Introduction: Emergency medicine clinicians (physicians, nurses, paramedics, physician assistants) utilize podcasts for learning. However, their versatility produces variability in the ways they are used (e.g. their speed can be increased or decreased, unrelated activities can be performed simultaneously, or they can be accompanied by active learning methods). This study investigated how and why podcasts are used by an international cohort of clinicians. **Methods:** An international sample of medical students, residents, physicians, nurses, physician assistants, and paramedics was recruited to complete a survey hosted on FluidSurveys software using social media (Twitter and Facebook), direct contact from our international authorship group, infographics, and a study website (https://METRIQstudy.org/). Participants who indicated interest in the study were sent an email containing the study survey. Reminder emails were sent every 5-10 days a maximum of three times. **Results:** 462 clinicians expressed interest and 397 completed the survey (86.0% completion rate). Participants hailed from 34 countries (38.8% Canada, 30% United States, 31.2% outside of North America) and a majority (61.9%) were physicians. Approximately half (45.8%) of the participants listened to podcasts weekly. Podcasts were used to learn core material (75.1%), refresh memory (72.3%), or review new literature (75.8%). Most listened on iPhones (61%) and the native Apple App (66.1%). The preferred Android apps were Pocket Casts (22.8%) and Google Play (18.5%). Many listened to podcasts while driving (72.3%). Active learning techniques such as pausing, repeating segments, taking notes, or listening to a podcast more than once were rarely used (1/4 of the time or less) by the majority of participants. **Conclusion:** This study describes how and why medical education podcasts are used by emergency medicine clinicians and should inform both podcast producers and future research investigating the impact of various listening habits on retention. Further analysis of the data will elucidate differences in listening habits.
Keywords: podcasts, online educational resources, medical education

P056

Non-invasive measurement of the central venous pressure using near-infrared spectroscopy versus point-of-care ultrasound

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Introduction: A fundamental hemodynamic parameter, the central venous pressure (CVP) is rarely available in the emergency patient due the delay and risks inherent to central vein cannulation. Recently, two non-invasive strategies have emerged: a) point-of-care ultrasound to supplement traditional inspection the internal jugular waveform ; or b) near-infrared spectroscopy (NIRS) of the external jugular vein. **Methods:** Five medical students underwent standardized training on both NIRS device (Venus 2000 CVP; Mespere Life Sciences, Waterloo ON) and ultrasound-assisted CVP assessment. During prescheduled, randomly permuted and balanced shifts, a pair of students obtained blinded independent measurements using each device within 10 minutes of each other. High priority subjects likely to have abnormal CVP (e.g. vomiting, dehydrated, heart failure, sepsis) were approached preferentially, followed by a convenience sample of other eligible patients in the emergency department. Secondary outcomes were stopwatch-recorded time from device ready to stable measurement, as well as operator ease, operator confidence and patient discomfort. The blinded treating physician rated each subjects volume status on an ordered scale: depleted, neutral and overloaded. **Results:** We enrolled 104 patients (median [IQR] age 68 [53, 78] years; 50% male; BMI 27.6 [17.0, 47.7] kg/m2; admission rate 27%) in June-August 2017. Treating physicians classified 17 as volume depleted and 12 overloaded. CVP measurements differed widely between techniques: ultrasound 8 [7, 9] cmH2O (3 cases

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unobtainable) vs. NIRS 12 [8, 17] cmH2O (13 unobtainable). Agreement and correlation between the two devices was extremely low ($R2 = 0.04$). While neither technique demonstrated a strong association with the treating physicians estimate of volume status, only the ultrasound values increased monotonically with physician estimate. With regards to secondary outcomes, ultrasound measurements took less time (paired difference 50 seconds [95% CI 7, 93]), and operators were more confident (0.63 [0.02, 1.23] out of 10) and at ease (0.78, [0.13, 1.43]) with ultrasound; patients rated discomfort equally (-0.06 [-0.30, 0.18]). **Conclusion:** Non-invasive measurement of CVP remains a challenge in the emergency department. The external jugular pressure by NIRS has very high variability and poor agreement with ultrasound-enhanced inspection of the internal jugular, suggesting that this technique is not yet practical for use by non-experts.

Keywords: central venous pressure, ultrasound, preload

P057

A systematic review of the efficacy of opioid analgesics for the management of acute pain in older adults in the emergency department

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Introduction: Emergency department (ED) providers are frequently challenged with how best to treat acute pain in older patients, specifically when non-opioid analgesics are insufficient or contraindicated. Studies have documented older patients presenting to the ED with painful conditions are less likely to receive pain medications than younger patients, and this inadequate pain control has been associated with increased risk of delirium and longer hospital stays. As there are no guidelines informing best practice of analgesia in the older adult population, emergency physicians often report uncertainty regarding the ideal choice of opioid analgesic. The objective of this study was to compare the efficacy of opioid analgesics for acute pain in older adults (70 years) in the ED. **Methods:** Electronic searches of Medline, EMBASE, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews and CINAHL were conducted and reference lists were hand-searched. Randomized controlled trials (RCTs) comparing the efficacy of 2 or more opioid analgesics for acute pain in older patients (70 years) in ambulatory settings (i.e., EDs, clinics) were included. Two reviewers independently screened abstracts, assessed quality of the studies, and extracted data. **Results:** After screening titles and abstracts of 1297 citations, the full-texts of 63 studies were reviewed, and 1 study met the inclusion criteria. This study allocated patients to receive either single dose of 0.0075-mg/kg IV hydromorphone versus 0.05-mg IV morphine and found no clinical or statistical difference between the two treatments in older adults presenting to an urban academic ED with acute, severe pain. **Conclusion:** The lack of published research in this area demonstrates a significant gap in the existing knowledge of the comparative efficacy of opioid analgesics in this growing patient population and that well-designed RCTs are urgently needed.

Keywords: analgesia/opioids, elderly, systematic review

P058

Paramedic recognition and management of anaphylaxis in the prehospital setting

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Introduction: Anaphylaxis is a life-threatening condition that paramedics are equipped to treat effectively in the field. Current literature suggests improvements in paramedic recognition and treatment of anaphylaxis could be made. The aim of this study was to compare the proportion of cases of anaphylaxis appropriately treated with epinephrine by paramedics before and after a targeted educational intervention. **Methods:** This was a retrospective medical records review of patients with anaphylaxis managed by primary or advanced care paramedics in five Emergency Medical Service areas in Ontario, before and after an educational module was introduced. This module included education on anaphylaxis diagnosis, recognition, treatment priorities, and feedback on the recognition and management from the before period. All paramedic call records (PCRs) coded as local allergic reaction or anaphylaxis during 12-month periods before and after the intervention were reviewed by trained data abstractors to determine if patients met an international definition of anaphylaxis. The details of interventions performed by the paramedics were used to determine primary and secondary outcomes. **Results:** Of the 600 PCRs reviewed, 99/120 PCRs in the before and 300/480 in the after period were included. Of the charts included, 63/99 (63.6%) in the before and 136/300 (45.3%) in the after period met criteria for anaphylaxis ($p = 0.002$). Of the cases meeting anaphylaxis criteria, 41/63 (65.1%) in the before and 88/136 (64.7%) in the after period were correctly identified as anaphylaxis ($p = 0.96$). Epinephrine was administered in 37/63 (58.7%) of anaphylaxis cases in the before period and 76/136 (55.9%) in the after period ($p = 0.70$). Anaphylactic patients with only two-system involvement received epinephrine in 20/40 (50.0%) cases in the before period and 45/93 (48.4%) in the after period ($p = 0.86$). **Conclusion:** There are gaps in paramedic recognition and management of anaphylaxis, particularly in cases of two-system involvement. These gaps persisted after the implementation of an educational intervention. Other quality interventions and periodic refreshers may be necessary to improve prehospital treatment of anaphylaxis. Limitations include an increase in overall cases and decrease in rate of true anaphylaxis in the after period, which may relate to better case identification after electronic PCR implementation and changes in paramedic recognition.

Keywords: anaphylaxis, prehospital, paramedic

P059

Who will be ready to fly? Characteristics of successful and unsuccessful geriatric discharges from the Nanaimo Regional General Hospital emergency department through the ED2Home program

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Introduction: As the baby-boomer generation ages, the number of elderly patients with complex health issues visiting emergency departments (EDs) will continue to increase. Evidence suggests elderly patients often have better health outcomes if they can be managed at home with appropriate community and primary care supports in place, rather than being admitted to hospital. ED2Home is a program that launched March 1, 2016 in the Nanaimo Regional General Hospital (NRGH) ED. It aims to assess admitted patients aged 70 and over and discharge them with community supports and follow-up. The aim of this Quality Improvement project was to evaluate how many patients were successfully discharged by the ED2Home program in its first few months, and to characterize which patients were more likely to be successfully discharged versus bounce back to the ED. **Methods:** This Quality Improvement project audited the charts of 87 patients discharged by ED2Home from June-Sept. 2016. Variables examined included the following: age, gender, chief complaint, mobility status,

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living situation, which ED2Home health care provider (RN vs. MD) to facilitate discharge, whether patient had a family physician, and resources used (ex. pharmacy, physiotherapy, occupational therapy, etc.) to help facilitate discharge. Our evaluation was conducted by means of a retrospective chart review. Descriptive statistics were derived for variables of interest. **Results:** There were 87 patients discharged home by the ED2Home whose charts were reviewed. 48 (55%) of these patients were successfully discharged home without revisit to the NRGH ED within 30 days of discharge. 29 patients returned to the NRGH ED within 30 days of original discharge for the same original chief complaint. Patients successfully discharged were similar to those who bounced back in terms of gender and mean age. Patients who bounced back to the ED were more likely to have chief complaints of dyspnea and confusion compared to those successfully discharged. Patients who were successfully discharged had a higher proportion of patients with social admissions compared to those who bounced back to the ED within 30 days. A higher proportion of patients successfully discharged had been evaluated by the ED2Home physician (versus nursing alone) compared to patients who bounced back within 30 days. **Conclusion:** ED2Home appears to be successful at discharging patients and preventing revisit to the ED and re-hospitalization, similar to other transitional programs for the elderly that have been reviewed in the literature. Patients presenting with more complex issues, such as dyspnea and confusion, may not be as suitable for rapid discharge from the ED through this program as patients presenting with issues helped by additional allied health care supports, such as failure to thrive/social admission. Additional Quality Improvement iterations of the ED2Home program should be undertaken in the future, using these suggestions.

Keywords: quality improvement and patient safety, geriatrics, patient discharge

P060

Incidence of child and youth presentations to the emergency department for addictions and mental health

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Introduction: As reported by the Canadian Institute for Health Information, the rate of child and youth emergency department (ED) visits for mental health complaints increased by 50% between 2007 and 2015. Improving care for these patients has been identified as a major priority of Alberta Health Services As part of a multi-phased approach to improving care, the Emergency and the Addiction and Mental Health Strategic Clinical Networks undertook an analysis of administrative data to define incidence in Alberta and changing trends. **Methods:** The data analyzed included 5 different clinical information systems encompassing the 17 highest volume hospitals in Alberta, from April 2013 to March 2016. Patient encounters were included if the patient was under 25 years of age at the time of visit, and if the encounter included a CEDIS Presenting Complaint and/or an ICD-10 Primary Diagnosis relating to Addiction and/or Mental Health (AMH). A total of 54,810 patient encounters were included. Data was analyzed using descriptive statistics. Sub-group analysis was undertaken based upon age, presenting complaint, and primary diagnosis. **Results:** The incidence of children and youth presenting to an ED with an AMH complaint and an AMH primary diagnosis increased 22% and 7%, respectively, from 2013/14 to 2015/16. Admissions of patients were constant throughout this period. The largest increase in ED visits occurred among children aged 7-10, with a 60% increase in visits defined by presenting complaint and a 21% increase in primary diagnosis. The second largest increase was in young adults aged 18-21 with a 26% increase defined by presenting complaint, and a 12% increase in primary diagnosis. Analyzed by age group, the largest increase in primary diagnosis between 2013/14 and 2015/16 was seen in Depression/Suicidal/Self Harm with a 667% increase among ages 0-6, and a 79% increase among ages 7-10. The second highest increase was for Anxiety/Situational Crisis with a 223% increase among ages 0-6, and 74% among children aged 7-10. **Conclusion:** Within Alberta there has been a substantial increase in the incidence of child and youth visits to the ED for issues of mental health and addictions. It is clear is that these changing trends are placing an increased burden on our healthcare system and necessitate strategic planning to ensure the health and wellness of our patients.

Keywords: child and youth, addiction and mental health

P061

Implementing CBME in emergency medicine: lessons learned from the first 6 months of transition at Queen's University

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Introduction: The specialist Emergency Medicine (EM) postgraduate training program at Queen's University implemented a new Competency-Based Medical Education (CBME) model on July 1 2017. This occurred one year ahead of the national EM cohort, in the model of Competence By Design (CBD) as outlined by the Royal College of Physicians and Surgeons of Canada (RCPSC). This presents an opportunity to identify critical steps, successes, and challenges in the implementation process to inform ongoing national CBME implementation efforts. **Methods:** A case-study methodology with Rapid Cycle Evaluation was used to explore the lived experience of implementing CBME in EM at Queens, and capture evidence of behavioural change. Data was collected at 3- and 6- months post-implementation via multiple sources and methods, including: field observations, document analysis, and interviews with key stakeholders: residents, faculty, program director, CBME lead, academic advisors, and competence committee members. Qualitative findings have been triangulated with available quantitative electronic assessment data. **Results:** The critical processes of implementation have been outlined in 3 domain categories: administrative transition, resident transition, and faculty transition. Multiple themes emerged from stakeholder interviews including: need for holistic assessment beyond Entrustable Professional Activity (EPA) assessments, concerns about the utility of milestones in workplace based assessment by front-line faculty, trepidation that CBME is adding to, rather than replacing, old processes, and a need for effective data visualisation and filtering for assessment decisions by competency committees. We identified a need for administrative direction and faculty development related to: new roles and responsibilities, shared mental models of EPAs and entrustment scoring. Quantitative data indicates that the targeted number of assessments per EPA and stage of training may be too high. **Conclusion:** Exploring the lived experience of implementing CBME from the perspectives of all stakeholders has provided early insights regarding the successes and challenges of operationalizing CBME on the ground. Our findings will inform ongoing local implementation and higher-level national planning by the Canadian EM Specialty Committee and other programs who will be implementing CBME in the near future.

Keywords: innovations in emergency medicine education, competency-based medical education, program evaluation

P062

The feasibility of pertussis immunization in a Canadian emergency department

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Introduction: Despite clear health benefits, and Public Health Agency of Canada recommendations, vaccination rates among Canadian adults are low. Frequent patient contacts, wait times, and the availability of trained staff make the emergency department (ED) a potential location to target specific populations and administer vaccinations. We evaluated the feasibility of two strategies to administer the Tdap vaccine to adult patients presenting to a single referral ED. **Methods:** Two immunization strategies and a control group were randomly ordered from one to three. Data collection for group one started on study day one with data collection for groups two and three on study days two and three respectively. This sequence was repeated over 15 consecutive weekdays (Monday-Friday, 0730-1530), evenly assigning each group to 5 different days. On intervention days, adult patients were screened during the triage process for eligibility to receive the Tdap vaccine. An ED based (EDB) strategy offered patients vaccination during that visit. The second strategy offered eligible patients a public health referral (PHR) to receive the vaccine at a later date. On all study days, patient triage times (TT), as well as markers of ED efficiency (number of patient registrations, time to physician, length of stay, left without being seen, number of admissions, number of boarded patients) were recorded. **Results:** The primary outcome, the proportion of eligible adults immunized, was significantly higher at 66% (n = 81) for the EDB strategy (228 screened, 122 eligible), compared with 21% (n = 20) for the PHR strategy (217 screened, 94 eligible; x2 (2, n = 216) = 43.41, $p < 0.00001$). In addition, 10 participants in the PHR group received a second vaccine (Pneumococcal (7), Influenza (2), Human Papillomavirus (1)). Reasons for vaccine ineligibility included having an up-to-date Tdap (EDB n = 47 (21%), PHR n = 46 (21%)) and being considered in too much distress by the triage nurse (EDB n = 26 (11%), PHR n = 19 (9%)). Triage time was less for the control group (M = 5:55 [mins:secs], SD = 2:48) than for the EDB (M = 6:47, SD = 3:12) and PHR (M = 7:25, SD = 2:45) strategies. **Conclusion:** An ED based screening and immunization strategy was highly effective in providing eligible adult patients with the Tdap vaccine. A resulting small increase in triage time was not clinically significant. Further studies are required to generalize these results.

Keywords: vaccination strategy, public health, emergency medicine

P063

Ultrasound-guided peripheral intravenous access in the emergency department: a randomized controlled trial comparing single and dual-operator technique

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Introduction: Ultrasound-guided intravenous (UGIV) insertion performed by nurses has been shown to be more effective than the blind approach for patients with difficult intravenous (IV) access in the emergency department (ED). While both the single-operator (SO) (where a single operator holds the IV and probe) and dual-operator (DO) (where a second operator holds the probe) techniques have been described, the DO is more resource-intensive, requiring a second operator to be present. The objective of this study is to compare the first-attempt cannulation success rates between a SO and DO technique in ED patients with predicted difficult access. **Methods:** We conducted a randomized controlled non-inferiority trial using a convenience sample of adult ED patients. Participating ED nurses received a one-hour UGIV training session including didactic and practical training on simulated arms. Patients were enrolled if they met any of three criteria for difficult access: (1) history of difficult access, (2) no visible or palpable veins, or (3) two failed blind attempts. Patients requiring active resuscitation, lack of suitable veins on US, or those unable to consent or comply with the procedure were excluded. Eligible patients were randomized to the SO or DO technique and a maximum of two UGIV attempts were allowed. The primary outcome was first-attempt success rate. Additional outcomes included overall success rate, number of attempts, time to successful cannulation, patient pain scores, operator ease of use scores, and complications 30 minutes after insertion. The chi-square test was used to compare success rates between groups and t-tests used for all other secondary outcomes. **Results:** 42 eligible patients have been approached for our study. 14 were excluded due to lack of visible veins on US or due to ongoing resuscitation. A total of 33 UGIV attempts were performed on 28 patients (17 in SO group, 16 in DO group). There was no statistically significant difference in first attempt success rates between the SO group of 76.5% (95% CI [50.1% to 93.2%]) and the DO group of 68.8% (95% CI [41.3% to 89%]) (p = 0.62). There were also no statistically significant differences between the SO and DO groups in time to cannulation (140 vs. 165 seconds, p = 0.36), patient preference on a 10-point scale (7.0 vs. 7.9, p = 0.49), patient pain score (6.3 vs. 6.6, p = 0.87) or nursing ease of use (5.3 vs. 6.5 p = 0.23) respectively. There were no complications noted in either arm of the study. **Conclusion:** To date, the SO technique appears to be non-inferior to the DO technique for successful UGIV cannulation. Our results support the use of the SO technique, reducing the need for additional nursing resources when performing this procedure.

Keywords: point-of-care ultrasound, intravenous access

P064

Characteristics of physical space that optimize clinical learning in the emergency department: implications for design

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Introduction: Over the last few decades, health care facility design has been studied to look at its effect on many patient-centred outcomes. However, limited data exists on the impact that specific physical features of a clinical space may have on learning and the educational experience. The aim of this study is to develop a set of characteristics which clinicians, clinical teachers and residents believe should be present in a clinical space to maximize trainees learning, using an emergency department (ED) as a context. **Methods:** A qualitative methodology used semi- structured interviews with a purposive sample of twelve attending physicians and residents who work in EDs of varying age and design at several sites of a quaternary university hospital. We explored their perceptions of the physical features in the clinical and learning environment that supported or impeded teaching and learning. The interviews were transcribed and thematically analyzed. **Results:** Preliminary results show that many physical characteristics of the clinical space are perceived to have an impact on trainees learning experience. A design with separation between clinician-learner dyads and the patients, with a visual access; shared clinical space among different health care professionals within a reasonable distance; availability of enough clinical space for specific emergency presentations; features such as adequate size, appropriate light, and control of sound were all perceived to enhance and augment clinical learning. Not surprisingly, non-design factors such as the presence of a functioning team and the availability of adequate equipment and

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technology was considered as important as the characteristics of physical space to optimize learning. **Conclusion:** This study demonstrates the importance and the impact of physical space design on trainees learning in a dynamic clinical environment. It provides teachers and policy-makers with a basis for developing criteria of the physical characteristics of a healthcare facility to maximize learning.

Keywords: clinical learning environment, emergency department, health care facility design

P065

Development and implementation of a postpartum hypertension recognition and management protocol for use in the emergency department.

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Introduction: Hypertensive disorders of pregnancy (HDP), including preeclampsia, can develop or worsen in the early postpartum period, often following discharge from hospital, resulting in severe preventable maternal morbidity and mortality. Due to a lack of routine early out-patient follow-up, many women with postpartum HDP present to the emergency department (ED) with severe hypertension or symptoms of preeclampsia (e.g., headache). In the ED, postpartum HDP can be difficult for clinicians to recognize (due to vague presenting symptom) and manage (due to lower blood pressure targets and concern of medication safety). ED clinicians recognized a need for timely recognition and effective treatments for postpartum HDP in the ED to improve maternal outcomes. As such, as part of a multi-step quality improvement initiative, an interdisciplinary team developed and implemented a postpartum HDP management protocol (consisting of nursing and physician protocols and an electronic order set embedded in the electronic medical record). The aims of this specific project were to assess: 1) the use of this clinical management protocol in the ED; and 2) its impacts on clinical care. **Methods:** This quality improvement project used electronic medical records to identify: 1) ED visits for postpartum HDP for postpartum women ages 20-50; 2) utilization of the postpartum HDP order set; and 3) clinical care outcomes (consultation and admission). Patient population characteristics and clinical care measures were summarized with descriptive statistics and compared using a before and after design. Changes in the utilization of the protocol were assessed using run charts. **Results:** 540 women with postpartum HDP were seen in the four Calgary EDs in the 16-month period following protocol implementation compared with 335 women in the preceding 12 months. The protocol was used in 46% of these 540 women, and increased over the 16 month follow-up period. We found an increase in the frequency of consultation of specialists (47% to 52%) and admissions (26% to 29%) amongst these women after protocol implementation. **Conclusion:** This initial assessment demonstrated good uptake of a postpartum HDP management protocol including referral for consultation and admission to hospital for blood pressure management. Future steps include evaluation of the impacts of this management protocol on important patient outcomes.

Keywords: quality improvement and patient safety, postpartum hypertension, preeclampsia

P066

Methotrexate in the management of suspected ectopic pregnancy

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Introduction: Early detection of ectopic pregnancy and careful management is critical to prevent adverse clinical outcomes, including fallopian tube rupture and future decreased fertility, in patients presenting to the ED with symptoms suggestive of ectopic pregnancy. Methotrexate therapy is widely accepted as a first line treatment of ectopic pregnancy, with success rates greater than 90% if used according to published guidelines. This study aims to determine the outcomes of pregnant women who presented to the ED with suspected ectopic pregnancy whom received methotrexate as first line treatment. **Methods:** This was a retrospective chart review of pregnant (<12 week gestational age) women from an academic tertiary care ED with a diagnosis of ectopic pregnancy, rule out ectopic pregnancy, or pregnancy of unknown location (PUL) over a 7 year period. **Results:** Of 612 included patients, 30 (4.9%) were diagnosed with a ruptured ectopic pregnancy at the index ED visit. Of the remaining 582 patients, 256 (44.0%) were diagnosed with an ectopic pregnancy at the index ED visit, the Early Pregnancy Clinic, or a subsequent ED visit. Of these patients diagnosed with ectopic pregnancy, their initial treatments at time of discharge from the index ED visit were as follows: 102 (39.8%%) received methotrexate, 132 (51.6%) underwent expectant management, and 22 (8.6%) underwent surgical management. Of the 132 patients discharged with an expectant management plan, only 42 (31.8%) had a final outcome of expectant management; the others went on to be treated surgically or with methotrexate. Of the 165 patients treated with methotrexate at index visit or in follow-up, 30 (18.2%) went on to require surgical management with 17 (10.3%) documented as having ruptured on surgical evaluation. Clinical characteristics of patients treated with methotrexate include the following: mean age 32.8 years (SD 5.7), gestational age of 6.2 weeks (SD 1.2) and serum beta human chorionic gonadotropin level of 2702 mIU/mL (SD 8800). **Conclusion:** The proportion of patients receiving methotrexate as first-line treatment that resulted in rupture or required further surgical management is higher than reported literature at this institution. Further investigation is needed to determine if there was a relationship between methotrexate failure and non-adherence to recommended guidelines. Given the risk of a possible rupture, patient education of these risks is critical on discharge from the ED.

Keywords: ectopic pregnancy, patient outcomes, emergency department

P067

Ectopic pregnancy outcomes in patients discharged from the emergency department

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Introduction: The objective of this study was to determine the proportion of women who had a ruptured ectopic pregnancy after being discharged from the ED where ectopic pregnancy had not yet been excluded. **Methods:** This was a retrospective chart review of pregnant (<12 week gestational age) women discharged home from an academic tertiary care ED with a diagnosis of ectopic pregnancy, rule out ectopic pregnancy, or pregnancy of unknown location (PUL) over a 7 year period. **Results:** Of the 550 included patients, 83 (15.1%) had a viable pregnancy, 94 (17.1%) had a spontaneous or missed abortion, 230 (41.8%) had an ectopic pregnancy, 72 (13.1%) had unknown outcomes and 71 (12.9%) had other outcomes which included therapeutic abortion, molar pregnancy or resolution of HCG with no location documented. Of the 230 ectopic pregnancies, 42 (7.6%) underwent expectant management, 131 (23.8%) were managed medically with

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methotrexate, 29 (5.3%) were managed with surgical intervention, and 28 (5.1%) patients had a ruptured ectopic pregnancy after their index ED visit. Of the 550 included patients, 221 (40.2%) did not have a transvaginal US during their index ED visit, 73 (33.0%) were subsequently diagnosed with an ectopic pregnancy. **Conclusion:** These results may be useful for ED physicians counselling women with symptomatic early pregnancies about the risk of ectopic pregnancy after they are discharged from the ED.

Keywords: ectopic pregnancy, emergency department, patient outcomes

P068

Predictors of admission in unscheduled return visits to the emergency department

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Introduction: The 72-hr unscheduled return visit (URV) of an emergency department (ED) patient is often used as a key performance indicator in Emergency Medicine. Patients with unscheduled return visits and admission to hospital (URVA) may represent a distinct subgroup of URVs compared to unscheduled return visits with no admission (URVNA). **Methods:** A retrospective cohort study of all 72-hr URVs in adults across nine EDs in the Edmonton Zone (EZ) over a one-year period (Jan 1 2015 Dec 31 2015) was performed using ED information system data. URVA and URVNA populations were compared and a multivariable analysis identified predictors of URVA. **Results:** Analysis of 40,870 total URV records, including 3,363 URVAs, revealed predictors of URVA on the index visit including older age (>65 yrs, OR 3.6), fewer annual ED visits (<4 visits, OR 2.0), higher disease acuity (CTAS 2, OR 2.6), gastrointestinal presenting complaint (OR 2.2), presenting to a large referral hospital (OR 1.4), and more hours spent in the ED (>12 hours, OR 2.0). A decrease in CTAS score (increase in disease acuity) upon return visit was also a risk factor (-1 CTAS level, OR 2.6). ED crowding at the index visit, as indicated by occupancy level, was not a predictor. **Conclusion:** We demonstrate that URVA patients comprise a distinct subgroup of 72-hr URVs across an entire health region. Risk factors for URVA are present at the index visit suggesting that patients at high risk for URVA may be identifiable prior to admission.

Keywords: unscheduled return visit, performance metrics, triage risk stratification

P069

Hardened tendencies: persistence of initial appraisals following simulation-based stress training

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Introduction: Stress has been shown to impair performance during acute events. The goal of this pilot study was to investigate the effects of two simulation-based training interventions and baseline demographics (gender, age) on stress responses to simulated trauma scenarios. **Methods:** Sixteen (16) Emergency Medicine and Surgery residents were randomly assigned to one of two groups: Stress Inoculation Training (SIT) or Crisis Resource Management (CRM). Residents served as trauma team leaders in simulated trauma scenarios pre and post intervention. CRM training focused on non-technical skills required for effective teamwork. The SIT group focused on cognitive reappraisal, breathing and mental rehearsal. Training lasted 3 hours, involving brief didactic sessions and practice scenarios with debriefing focused on either CRM or SIT. Stress responses were measured with the State Trait Anxiety Inventory (anxiety), cognitive appraisal (degree to which a person interprets a situation as a threat or challenge) and salivary cortisol levels. **Results:** Because the pre-intervention stress responses were different between the two groups, the results were analyzed with stepwise regression analyses. The only significant predictor of anxiety and cortisol responses were the residents appraisal responses to that scenario, explaining 31% of the variance in anxiety and cortisol. Appraisals of the post-intervention scenarios were predicted by their appraisals of the pre-intervention scenario and gender, explaining 73% of the variance. Men were more likely than women to appraise the scenarios as threatening. There were no differences in subjective anxiety, cognitive appraisal or salivary cortisol responses as a result of either intervention. **Conclusion:** Male residents, as well as those who appraised an initial simulated trauma scenario as threatening, were more likely to interpret a subsequent scenario as threatening, and were more likely to have larger subjective (anxiety) and physiological (cortisol) responses a subsequent scenario. Both CRM and SIT training were not effective in overcoming initial appraisals of potentially stressful events.

Keywords: stress, crisis resource management, simulation

P070

Excluding ectopic pregnancy in patients presenting to a community emergency department with first trimester bleeding

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Introduction: Current guidelines recommend patients with first trimester bleeding without previously documented intrauterine pregnancy undergo urgent transvaginal ultrasound (TVUS) to exclude ectopic pregnancy. However, in Canadian practice to receive urgent TVUS, particularly out of daytime hours is difficult, if not impossible. Thus, when TVUS is not available to exclude ectopic pregnancy, providers use point of care ultrasound (POCUS) or their best clinical judgment to determine if the patient can be safely discharged home while awaiting outpatient follow-up. The objective of this study was to determine what proportion of first trimester patients presenting to a community hospital emergency department (ED) with vaginal bleeding undergo either TVUS or POCUS to exclude ectopic pregnancy. **Methods:** This is an ongoing retrospective chart review of pregnant women gestational age (GA) less than 20 weeks presenting to a community hospital ED (103,000 visits/year) with a discharge diagnosis of vaginal bleed, first trimester bleed, threatened abortion, spontaneous abortion, missed abortion, rule out ectopic pregnancy, and ectopic pregnancy from January 2016 - January 2017. Patients are excluded if they are diagnosed with a ruptured ectopic pregnancy during their index ED visit. To date, 98 patient charts have been reviewed. **Results:** Of the 98 included patients, 13 (13.3%) had a viable pregnancy, 37 (37.8%) had a spontaneous or missed abortion, 4 (4.1%) had an ectopic pregnancy, and 45 (45.9%) had unknown outcomes. Of included patients, 4 (4.1%) only had POCUS, 66 (67.4%) only had a radiologist-interpreted TVUS, and 3 (3.1%) had both POCUS and radiologist-interpreted TVUS during their ED index visits. Thus, 73 (74.5%) had either a radiologist-interpreted TVUS or ED provider-performed POCUS during their index ED visit. After their index ED visits, 2 (2.0%) patients returned with ruptured ectopic pregnancies, 1 of whom had not undergone initial US investigations. **Conclusion:** Although TVUS is standard of care to exclude ectopic pregnancy in patients presenting with first trimester

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bleeding or abdominal pain, our preliminary results show some patients are not receiving this diagnostic modality nor POCUS during their index ED visit. Particularly in a setting, such as this ED, without rapid access to an early pregnancy clinic, patients should be counselled about their risk of ectopic pregnancy at the time of ED discharge.
Keywords: pregnancy, ectopic, ultrasound

P071

Content of clinical informatics in international training standards for emergency medicine specialists

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Introduction: The field of Clinical Informatics (CI) and specifically the electronic health record, has been identified as a key facilitator to achieve a sustainable evidence-based healthcare system for the future. International graduate medical education programs have been challenged to ensure their trainees are provided with appropriate skills to deliver effective and efficient healthcare in an evolving environment. This study explored how international Emergency Medicine (EM) specialist training standards address training in relevant areas of CI. **Methods:** A list of categories of CI competencies relative to EM was developed following a thematic review of published references documenting CI curriculum and competencies. Publically available, published documents outlining core content, curriculum and competencies from international organizations responsible for specialty graduate medical education and/or credentialing in EM for the United States, Canada, Australasia, the United Kingdom and Europe. These EM training standards were reviewed to identify inclusion of topics related to the relevant categories of CI competencies. **Results:** A total of 23 EM curriculum documents were included in the thematic analysis. Curricula content related to critical appraisal/evidence based medicine, leadership, quality improvement and privacy/security were included in all EM curricula. The CI topics related to fundamental computer skills, computerized provider order entry and patient-centered informatics were only included in the EM curricula documents for the United States and were absent for each other organization. **Conclusion:** There is variation in the CI related content of the international EM specialty training standards which were reviewed. Given the increasing importance of CI in the future delivery of healthcare, organizations responsible for training and credentialing specialist emergency physicians must ensure their training standards incorporate relevant CI content, thus ensuring their trainees gain competence in essential aspects of CI.
Keywords: clinical informatics, competency-based medical education, curriculum

P072

The effect of infographic promotion on research dissemination and readership: a randomized control trial

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Introduction: With the increasing volume of medical literature published each year, it is difficult for clinicians to translate the latest research into practice. Awareness is the first step of knowledge translation and journals have begun using social media to increase the dissemination and awareness of their publications. Infographics can describe research findings visually, are shared broadly on social media, and may be a more effective way to convey information. We hypothesized that infographic abstracts would increase the social media dissemination and online readership of research articles relative to traditional abstracts. **Methods:** In this randomized controlled trial, 24 original research articles were chosen from the six issues of the Canadian Journal of Emergency Medicine (CJEM) published between July 2016 and May 2017 (4 articles per issue). Half were randomized to the infographic and control groups within each issue. Infographic articles were promoted using a visual infographic outlining the findings of the article. Control articles were promoted using a screen capture image of each articles abstract. Both were disseminated through the journals social media accounts (Twitter and Facebook) along with the link to the selected article. Infographics were also published on CanadiEM.org. Abstract views, full text views, and the change in Altmetric score were tracked for 30 days and compared between groups. Unpaired two-tailed t-tests were used to detect significant differences. **Results:** Abstract views (mean, SD) were significantly higher for infographic articles (378.9, 162.0) than control articles (175.5, 69.2, $p < 0.001$). Mean Altmetric scores were significantly higher for infographic articles (26.4, 13.8) than control articles (3.4, 1.7, $p < 0.0001$). There was no statistically significant difference in full-text views between infographic (49.7, 90.4) and control articles (25.3, 12.3). **Conclusion:** CJEM articles promoted on social media using infographics had higher abstract viewership and Altmetric scores than those promoted with traditional abstracts. Although there was no difference in full-text readership, our results suggest that infographic abstracts may have a role in increasing the dissemination of medical literature.
Keywords: infographics, social media, knowledge translation

P073

The GridlockED board game: using serious games for medical education

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Introduction: The management of patient flow in the emergency department (ED) is crucial for the practice of emergency medicine (EM). However, this skill is difficult to teach didactically and is learned implicitly in the latter half of residency training. To help expedite the learning process, we developed the GridlockED board game as an educational tool to simulate ED patient flow. By having junior medical trainees play this game, we believe that they will develop a greater understanding of patient flow and resource management in the ED. Additionally, since GridlockED is a cooperative game, players may also benefit by improving their communication and teamwork skills. **Methods:** GridlockED was developed over twenty months of iterative gameplay and review. Feedback from attending emergency physicians, residents, and medical students was integrated into the game through a Plan-Do-Study-Act (PDSA) model. Emergency medicine nurses, physicians and residents at McMaster University were recruited to play GridlockED. Each player completed a pre-survey to collect demographic data and to assess their prior experience with playing board games. All play sessions were recorded for data collection purposes. Following each game session, a member of the research team conducted an exit interview with the players to gather information about their play experience and the educational value of the game. A post-survey was also sent to each participant for further feedback. **Results:** Eighteen gameplay sessions were conducted from June to August 2017. A total of

thirty-two participants played the game (13 emergency physicians, 15 residents, and four nurses). Overall responses to the post-gameplay survey showed that players endorsed GridlockED as a useful potential teaching tool (75%, n = 24/32) and the majority felt that it had the potential to improve patient flow in the ED (56%, n = 18/32). Most participants found that the game was easy to play (91%, n = 27/29), and that the instructions were clear (87.5%, n = 28/32). Respondents also felt that the game reflected real life scenarios (56%, n = 18) and that cases reflected the types of patients that they saw in the ED (78%, n = 25). **Conclusion:** Our results have shown an overall positive response to GridlockED, with most participants supporting it as both an engaging board game and potential teaching tool. We believe that future studies with larger sample sizes and medical students will further validate the use of serious games in medical education.

Keywords: simulation, education, serious games

P074

Comparison of unmanned aerial vehicle technology versus standard practice in triaging casualties by paramedic students in a mass casualty incident scenario

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Introduction: The proliferation of unmanned aerial vehicle (UAV) technology has the potential to change the way medical incident commanders respond to mass casualty incidents (MCI) in triaging victims. The aim of this study was to compare UAV technology to standard practice (SP) in triaging casualties at a MCI **Methods:** A randomized comparison study was conducted with forty paramedic students from the Holland College Paramedicine Program. Using a simulated motor vehicle collision with moulaged casualties, iterations of twenty students were used for both a day and a night trial. Students were randomized to an UAV or a SP group. After a brief narrative participants either entered the study environment or used UAV technology where total time to triage completion, green casualty evacuation, time on scene, triage order and accuracy was recorded **Results:** A statistical difference in the time to completing of 3.63 minutes (95% CI: 2.45, 4.85, p = 0.002) during the day iteration and a difference of 3.49 minutes (95% CI: 2.08,6.06, p = 0.002) for the night trial with UAV groups was noted. There was no difference found in time to green casualty evacuation, time on scene or triage order. One hundred percent accuracy was noted between both groups. **Conclusion:** This study demonstrated the feasibility of using an UAV at a MCI. A non clinical significant difference was noted in total time to completion between both groups. There was no increase in time on scene by using the UAV while demonstrating the feasibility of remotely triaging green casualties prior to first responder arrival.

Keywords: disaster medicine, unmanned aerial vehicle, emergency medical services

P075

Discovering the unknown: using storytelling to identify emergent learning needs for the intrinsic competencies within an online needs assessment

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Introduction: Free Open Access Medical education (FOAM) resources have been developed using various needs assessment methods. We describe a storytelling exercise used to identify unperceived medical expert learning needs, which also resulted in the emergence of unknown learning needs within intrinsic physician roles. **Methods:** A FOAM curriculum was created for thrombosis based on an online needs assessment comprised of a topic listing, case scenarios, and a storytelling exercise. In the storytelling exercise, learners described i) a difficult case in thrombosis, and ii) why that case was difficult. In this qualitative description study, we performed a secondary thematic analysis of this storytelling data, coded for CanMEDS 2015 intrinsic roles. Two investigators independently coded transcripts to iteratively generate a coding framework. **Results:** 143 respondents completed the storytelling exercise. All responses yielded a gap in medical expertise, while 25 (17.5%) described an additional intrinsic theme. Learning needs in all six intrinsic roles were identified. The most commonly cited learning needs were in the Leader (recognizing how resource allocation impacts healthcare), Communicator (communicating expert knowledge with patients), and Collaborator (unclear communication between providers) domains. Participants who described an intrinsic learning need were primarily from emergency medicine (21/25, 84.0%). These excerpts were notable for how they expressed the complexity and affective components of medicine. **Conclusion:** Storytelling exercises can highlight context, attitudes, and relationships which provide depth to needs assessments. These narratives are a novel method of capturing emergent learning needs, which may be unknown to learner and faculty (Johari window). These intrinsic learning needs may ultimately be used to enrich learner-centered curricula.

Keywords: needs assessment, free open access medicine, storytelling

P076

Choosing Wisely: hemoglobin transfusions and the treatment of iron deficiency anemia

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Introduction: Choosing Wisely Canada has identified blood transfusions as a priority area for improving clinical appropriateness. Relevant recommendations include Dont transfuse blood if other non-transfusion therapies or observation would be just as effective. In parallel with this recommendation, the Alberta division of Towards Optimized Practice (ToP) has developed guidelines for the treatment of iron deficiency anemia (IDA) that emphasize the use of non-transfusion therapies (i.e. parenteral or oral iron, in appropriate patients). Choosing Wisely also emphasizes strategies to better engage patients in shared decision making. **Methods:** In order to better engage patients in shared decision making about their treatment options, both physician and patient handouts were developed using an iterative process. The development of the patient-facing documents began with a synthesis of educational materials currently available to patients with IDA. Clinical leaders from nine different specialties (Emergency Medicine, Family Medicine, Day Medicine, Hematology, and others) were continually engaged in the development of content using a consensus model. A focus group of ESCN patient advisors was assembled to review materials with an emphasis on: (1) Are the patient materials easily understood? (2) Are intended messages resonating while avoiding unintended messaging? (3) What information do patients require that has not been included? Following the focus group, revisions were made to patient materials and a subsequent online survey confirmed that the final version addressed any issues they had raised. **Results:** A four-page patient handout/infographic was developed utilizing best practices in information design, and in physician and patient engagement. Content includes the causes and symptoms of IDA, progressive treatment options from dietary

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changes to transfusion, and the four Choosing Wisely questions to discuss with your doctor. **Conclusion:** Patient education materials can be developed according to best practices in information design and stakeholder engagement. Patient focus groups demonstrate that such materials are easier to understand, and better equip patients to engage in shared decision making.

Keywords: innovations in emergency medicine education, shared decision making, knowledge translation

P077

The health inequalities among foreign patients visiting the emergency room with injury: a nationwide population-based study in South Korea, 2013-2015

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Introduction: Foreign patients often do not receive appropriate treatment in the emergency room as compared to locals. This is due to various causes such as language, insurance, and cultural differences. The purpose of this study was to investigate whether there is a wide range of health inequalities among foreigners who visited the emergency room with injury and to find out what causes it. **Methods:** We analyzed clinical data from the National Emergency Department Information System (NEDIS) database, which visited the emergency room from January 1, 2013 to December 31, 2015, in all age groups. Foreigners are classified based on the personal information described in the NEDIS. We analyzed the number of injuries, serious cases (death, operation, ICU admission), length of stay in ER, and transfer ratio. **Results:** A total of 4,464,603 cases of injured patients were included, of whom 67,683 were foreign patients. The incidence rate per 100,000 people per year was 2960.5 from locals and 1659.8 from foreigners. Serious outcomes were higher for foreigners than for locals (31.0% versus 23.2%, $p < 0.001$). There was a further difference in the rural region. Length of stay was longer for foreigners (72 vs. 69 minutes, median, $p < 0.001$). The transfer rate was also higher for foreigners (1.9% versus 1.6%, $p < 0.001$). Daegu had the highest ratio of foreigners' injury compared to locals (ratio = 0.998). Jeonnam (0.073) was the highest serious outcome rate in Korea, and Jeonbuk (0.070) was the second. The area with the longest length of stay in the Emergency department was the median 139 minutes for locals and 153 minutes for foreigners in Daegu. The more patients per day, the shorter the time spent in the emergency rooms (Spearman correlation coefficient = -0.388). This phenomenon was more prominent in locals (-0.624 vs. -0.175). Multivariable logistic regression was used as a dependent variable for the serious outcomes of foreign patients. The foreign patients (OR = 1.413, $p < 0.001$), intention, no insurance, age, sex, urban area, low blood pressure, decreased consciousness, transfer, acuity, and length of stay were statistically significant. **Conclusion:** This study showed that there is a health inequality for foreigners who came to the emergency room due to injury in Korea. Also, serious outcomes from injury in foreigners have been shown to be related to various causes including factors of the foreigner.

Keywords: foreign patient, emergency, outcomes

P078

If you build it they will come: use of live actor patients during a hospital-wide mass casualty simulation exercise to garner institutional commitment to long term drills

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Introduction: BACKGOUND In the modern era of terrorism and senseless violence, it is essential that hospital staff have expertise in implementation of a mass casualty incident (MCI) plan. OBJECTIVES 1. To assess current gaps in implementation of an academic urban hospital code orange plan using live simulation and tabletop exercise. 2. To identify and educate front-line staff to champion a hospital-wide MCI plan. INNOVATION Historically, in order to limit resource utilization and impact on patient care, disaster response training of front-line staff involved tabletop exercises only. The tenets of experiential learning suggest that learner engagement through realistic active practice of skills achieves deeper uptake of new knowledge. We enhanced the traditional tabletop approach through novel use of live actor patients presenting to an academic, urban emergency department (ED) during a hospital-wide MCI simulation. **Methods:** To assess the current code orange plan, an interprofessional, committee comprising expert leaders in trauma, emergency preparedness, emergency medicine and simulation integrated tabletop and live simulation to stage a MCI based on a mock incident at a new subway station. ED staff, the trauma team and champions from medicine, surgery and critical care participated along with support departments such as Patient Flow, Patient Transport, Environmental Services and the Hospital Emergency Operations Centre. Ten live actor patients and eight virtual patients presented to the ED. The exercise occurred in situ in the ED. Other participating departments conducted tabletop exercises and received live actor patients. **Results:** CURRICULUM Staff decanted the ED and other participating units using their current knowledge of hospital code orange policy. Live and virtual patients were triaged and managed according to severity of injuries. Live actor patients were assessed, intervened and transported to their designated unit. Virtual patients were managed through verbal discussion with the simulation controllers. An ED debrief took place using a plus/delta approach followed by a hospital-wide debrief. **Conclusion:** CONCLUSION An interprofessional hospital-wide MCI simulation revealed important challenges such as communication, command and control and patient-tracking. The exercise ignited enthusiasm and commitment to longitudinal practice and improvement for identified gaps.

Keywords: innovations in emergency medicine education, mass casualty incident, simulation

P079

Transition to practice: evaluating the need for formal training in supervision and assessment techniques among senior emergency medicine residents and new to practice emergency physicians

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Introduction: Final year emergency medicine residents may be transitioning to practice with little to no training on how to effectively supervise and assess trainees. It remains unclear how comfortable final year residents and new-to-practice physicians are with these competencies. The goal of our study was to examine physician comfort with supervision and assessment, whether there was a perceived need for formal training in these areas, and what gaps, barriers and enablers would exist in implementing it. **Methods:** Qualitative data were collected in two phases during September 2016-November 2017 through interviews of PGY5 emergency residents and new-to-practice staff at the University of Toronto and McMaster University in Ontario, Canada. A semi-structured interview guide was developed and used

during the first round of interviews at the University of Toronto during phase one. Results from phase one were used to refine the interview guide, to be used in phase two, to ensure that all potential areas of thematic generation were touched upon. Phase two occurred at the University of Toronto and McMaster University using the refined interview guide. All transcripts were coded, analyzed, and collapsed into themes. Data analysis was guided by a constructivist grounded theory based in a relativist paradigm. **Results:** Thematic analysis revealed five themes. Residents and staff alike described acquiring the skills of supervision and assessment passively, primarily through modeling the behaviours of others; the training that is available in these areas is variably used, creating a diversity of physician comfort levels within these two competencies; the many competing priorities in the emergency department represent significant barriers to improving supervision and assessment; providing negative feedback is universally difficult and often avoided, sometimes resulting in struggling trainees not being identified until late in residency; the move towards competency based education (CBE) will act as an impetus for more formal curriculum being required in these areas. **Conclusion:** As residency programs transition to a CBE model, there will be a greater need for formal training in supervision and assessment to achieve a standard level of comfort and competence among senior residents physicians in independent practice. These competencies will also need an emphasis on how to identify struggling trainees, and how to approach negative and constructive feedback.

Keywords: supervision, assessment, competency-based education

P080

Clinical lead nurse practitioner Strathcona Community Hospital

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Introduction: Prior to opening Strathcona Community Hospital (STCH) site leadership were tasked to develop an innovative care model. The central aim was quality improvement and patient safety optimization in the emergency department (ED) utilizing a nurse practitioner (NP) model. They developed 3 pillars: collaboration, multidisciplinary approach, and integration with the plan of improving patient satisfaction and ensuring no patient gets lost to follow up. NPs work in the STCH ED and the NP led Emergency Department Transition (EDT) Clinic in Ambulatory Care. In the ED NPs provide direct clinical care, judicious review of DI and microbiology reports, and care coordination for patients at risk of lost to follow up. The EDT clinic is an innovative NP lead clinic with the purpose of providing timely, high-quality follow up care for ED patients. **Methods:** Data for the service delivery indicators came from data repository and manual data collection looking at the following outcomes: timely review of DI/micro results; decreased ED visits for non-urgent/emergent issues; safe transitions in care and improved patient satisfaction. Quantitative data from service delivery, patient and surveys were analyzed using Microsoft Excel and SPSS 19. **Results:** From June 2016 to January 2017 ED NPs at STCH reviewed 3000 positive microbiology reports and made 517 f/u calls to those patients, and reviewed 3181 DI results. This has freed up approximately 2 hrs per day of ED physician time. When NPs were working in the ED, the number of patients who left without treatment (LWT) was approximately 50% less, and improved STCH ED wait times to be among the lowest in the Edmonton Zone. From June 2016 to January 2017, EDT NPs completed 837 patient visits; 371 letters to family physicians (FPs); 215 referrals; and connected 520 patients to a new FP. Patient satisfaction survey show 88-90% of the patients were satisfied with their care. **Conclusion:** NPs are integral members of the ED team at STCH, providing direct clinical care and several valuable follow up services for ED patients. The EDT clinic provides urgent follow up for ED patients unable to get a timely appointment with their FP or no access to primary care. The clinic also prevents unnecessary returns to ED, and aids to bridge ED services to family physicians or specialist. NPs are the common thread through all departments at STCH, contributing to quality improvement and high patient satisfaction.

Keywords: quality improvement and patient safety, judicious review of DI and microbiology reports, NP led emergency transition clinic

P081

ICD-10 coding of free text diagnoses is not reliable for the diagnosis of PE in Calgary zone emergency department patients

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Introduction: Administrative data are attractive for research, policy and quality improvement initiatives as large amounts of data can often be obtained quickly and at low cost. Unfortunately, administrative data often have significant limitations owing to how they were collected and coded. In many cases, free text, often hand written, diagnoses provided by physicians are converted into ICD-10 (International Statistical Classification of Diseases and Related Health Problems, 10th Revision) codes by trained nosologists for administrative purposes. However, because of the large data sets often obtained from administrative sources, it is difficult to verify the accuracy of the data, which may lead researchers to misleading or false conclusions. The objective of this study was to evaluate the accuracy of ICD-10 codes for the diagnosis of pulmonary embolism (PE) in emergency department (ED) patients. **Methods:** As part of a larger study examining the effectiveness of a clinical decision support intervention on CT utilization and diagnostic yield for ED patients with suspected PE, all patients with an ICD-10 code corresponding to PE (126.0 and 126.9) on ED discharge were obtained from four adult urban EDs and one urgent care center from August 2016 to March 2017. PE diagnosis was confirmed by reviewing electronic medical records and imaging reports for all patients. Discrepancies between coded ICD-10 diagnoses and actual imaging findings were quantified. This study was REB approved. **Results:** Of 584 ED patients with ICD-10 codes identifying PE as a discharge diagnosis, 535 had imaging that could be reviewed. Of these, 225 (42.1%) did not have clinical diagnoses of PE, and thus were incorrectly coded, resulting in false positive ICD-10 codes. Common coding errors included physician free text diagnoses of rule out PE or query PE being coded as positive for PE. **Conclusion:** Administrative data are subject to errors in coding. In this study ICD-10 codes were not reliable for the diagnosis of PE, with 42.1% of PE diagnoses being false positives. Similar coding errors are likely for other diagnoses that require waits for confirmatory imaging (e.g. appendicitis). Nosologist coding of physician free text diagnoses is challenging and prone to errors. Consequently, validation of ICD-10 coding prior to analysis of administrative datasets is crucial for meaningful results.

Keywords: pulmonary embolism, miscoding, administrative data

P082

Kingston emergency department utilization of adults who have experienced adverse childhood experiences

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Introduction: It is critical for planning, clinical care and resource optimization to understand patterns of emergency department (ED) utilization. Individuals who have experienced adverse childhood experiences (ACE) are known to have more unhealthy behaviors and worse health outcomes as adults and therefore may be more frequent ED users. Adverse childhood experiences include physical, sexual and emotional abuse or neglect, substance abuse in the family, witnessing violence, having a parent incarcerated or parents getting divorced or separated. To date there are few studies exploring the relationship between ACE and ED utilization. **Methods:** This a mixed qualitative and quantitative study. It includes analysis of data collected through a survey, a retrospective chart review and focus group discussions. The survey was administered to a convenience sample of adult patients (CTAS 2-5) presenting to EDs in Kingston Ontario, and consisted of two validated tools that measured exposure to ACE and resiliency. Demographic data and ED utilization frequency for 12 months prior to the index visit were extracted from an electronic medical record for each patient completing the survey. A sample of participants with a high ACE burden (ACE score >4) were invited to participate in focus groups to explore their experiences of care in the ED. Demographic, ED utilization and health status data were summarized and statistically significant patterns between high ACE and lower ACE patients were determined using Chi2t or t-tests. Transcripts from the focus groups were thematically analyzed using NVivo software by 2 independent researchers. **Results:** 1693 surveys were collected, 301 (18%) were deemed to have a high ACE score, data analysis is ongoing. The primary outcome is the relationship between ACE and the frequency of ED utilization among adult patients presenting to EDs in Kingston, ON. Secondary outcomes include evaluating the role of resilience as a potential mitigating factor, describing the demographics of high ACE burden frequent ED visitors, and the experiences of care for individuals with high ACE burden in the ED. These outcomes will be utilized to inform hypotheses for future studies and potential interventions aimed at optimizing ED utilization and patient care experience. **Conclusion:** This study provides novel insight into the relationship between ACE burden and ED utilization while also describing the demographics and experiences of care for ED patients with a high ACE score. Data analysis is on-going.

Keywords: abuse, utilization, resilience

P083

Developing an interview guide to explore physicians perceptions about unmet palliative care needs in Albertas emergency departments

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Introduction: Many patients with advanced or end-stage diseases spend months or years in need of optimal physical, spiritual, psychological, and social care. Despite efforts to provide community care, those with severe illness often present to emergency departments (EDs). This abstract presents preliminary results on the qualitative component of an ED-based mixed methods pilot study. The objective of this qualitative component is to develop and test an interview guide to collect qualitative data on physicians perceptions about unmet palliative care (PC) and end of life care (EOLC) needs in EDs. **Methods:** A scan of the literature on PC and EOLC in EDs was conducted to develop propositions about what might be expected through the clinician interviews, as well as an interview guide. The interview guide will be piloted with up to four ED physicians. During the interview each physician will describe a case where a PC patient had unmet care needs and the impacts they believe these unmet needs had on patients and families. Interview transcripts will be coded descriptively and then conceptually themed by the researcher who conducted the interview. Interpretations drawn from the interview data, with supporting quotations and comparison to initial propositions, will be presented to members of the research team with experience providing ED care, for further interpretation. Advice of a second trained qualitative researcher will be sought on the richness and relevance of data obtained and how the interview guide could be improved to elicit richer and/or more relevant data. A revised interview guide will be produced alongside rationales for why the proposed revisions will elicit richer data. **Results:** After reviewing 27 articles on PC and EOLC, propositions and an initial interview guide were developed based on themes from the literature and the study groups experiences. One of the primary results of this pilot work will be an enhanced understanding of PC and EOLC in our local ED context, as reflected in an interview guide revised to elicit richer data than achieved through the initial interview guide. **Conclusion:** The comparison between our propositions and the study findings will help identify how biases may have influenced interview questions and/or the interpretation of the data. This pilot work to develop an interview guide enhances the rigour of this qualitative work on unmet PC and EOLC needs in EDs.

Keywords: palliative care, end of life, emergency department

P084

Substituting capillary blood for urine in point-of-care pregnancy tests

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Introduction: When a female presents with abdominal pain and vaginal bleeding, a positive b-hcg level helps in the diagnosis of an ectopic pregnancy. A timely diagnosis as well as management is required for these cases. In many emergency departments, there can be delays in laboratory processing of quantitative b-hcg levels as well as qualitative urine pregnancy tests. In others, especially in rural hospitals in Canada, the laboratory closes at night and these tests cannot be processed until the morning. This may also help decrease length of stay for some patients in the emergency department. There are currently new point-of-care b-hcg tests on the market using capillary blood, but these are expensive and not readily available. The purpose of the study is to validate the most inexpensive point of care urine pregnancy tests readily available on the market for use with capillary blood samples. These point-of-care tests have only been studied with urine and whole blood. If validated with capillary blood, it would allow for a very practical, rapid, and inexpensive test which could help doctors and nurses to triage patients in a timely and more efficient fashion. **Methods:** In our emergency department, 385 patients between the ages of 18-50 with possible pregnancy, abdominal pain or vaginal bleeding will be included in the study. A capillary blood sample will be taken and applied to a cassette point-of-care pregnancy test with four drops of saline. Two independent investigators will assess the test. The results will be compared to a quantitative serum hCG assay and urine. If these tests are not done as part of the patients medical care, the patient will be contacted one month after to enquire if the patient is pregnant or not. The sensitivity, specificity, positive and negative predictive values will be calculated. **Results:** Data colleciton will begin in January 2018. **Conclusion:** No conclusions can yet be drawn.

Keywords: ectopic pregnancy, point-of-care testing, triage

P085

Potential benefits of incentive spirometry following a rib fracture: a propensity-score analysis.

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Introduction: Incentive spirometry (IS) is commonly used in post-operative patients for respiratory recovery. Literature suggest that it can possibly improve lung function and reduce post-operative pulmonary complication. There is no recommendation about the use of IS in the emergency department (ED). However, rib fractures, a common complaint, increase the risk of pulmonary complications. There is heterogeneous ED practice for the management of rib fractures. The objective of this study is to assess the benefits of IS to reduce potential delayed complications in ED discharged patients with confirmed rib fracture. **Methods:** This is a prospective observational planned sub-study in 4 canadians ED between November 2006 and May 2012. Non-admitted patients over 16 y.o. with a main complaint of minor thoracic injury and at least one suspected/confirmed rib fracture on radiographs were included. Discharge recommendations of IS use was left to attending physician. IS training was done by ED nurses. Main outcomes were pneumonia, atelectasis and hemothorax within 14 days. Analyses were made with propensity score matching. **Results:** 450 patients with at least one rib fracture were included. Of these, 182 (40%) received IS with a mean age of 57.0 y.o. Patients with IS seem to have worse condition. 61 (33.5%) had 3 fractures comparatively to 56 (20.9) for patient without IS. Although, the groups were similar for mean age, sex and mechanism of injury. There were in total 76 cases of delayed hemothorax (16.9%), 69 cases of atelectasis (15.3%) and five cases of pneumonia (1.1%). The use of IS was not protector for delayed hemothorax (RR = 0.80, 95% CI [0.45 1.36]) and nor for atelectasis or pneumonia (RR = 0.74, 95% CI [0.45 1.36]) **Conclusion:** Our results suggest that unsupervised and broad incentive spirometry use does not seem to add a protective effect against the development of delayed pulmonary complications after a rib fracture. Further study should be made to assess the usefulness of IS in specific injured population in the ED.

Keywords: intensive spirometry, rib fracture, pulmonary complication

P086

Emergency department visits for upper gastrointestinal bleeding: a population-based Alberta cohort

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Introduction: Upper gastrointestinal bleeding (UGIB) is a common medical condition presenting to emergency departments (ED) and associated with substantial morbidity, mortality, and healthcare expenditures. Our aim was to evaluate the incidence of patients presenting to ED with UGIB in a large population-based surveillance cohort. **Methods:** The National Ambulatory Care Reporting System (NACRS) was used to identify all presentations to emergency departments for UGIB in Alberta from fiscal year 2010 to 2015 (n = 56,519) using the International Classification of Diseases Codes (ICD-10) in any diagnostic position. Baseline characteristics and UGIB incidence were calculated using descriptive statistics. Joinpoint regression models were used to calculate the average annual percent change (AAPC) with 95% confidence intervals (CI). **Results:** The median age of 56519 UGIB presentations was 56 years (interquartile range: 41 to 74 years), 56% were male, and 245% had at least one comorbidity. At time of disposition from the ED, 48.3% were admitted to or transferred to another hospital, 51.4% discharged, and 0.3% died in the emergency department. Further, 10.8% underwent upper endoscopy during their admission to the emergency department. The annual incidence of UGIB were 230.6 (2010), 232.8 (2011), 241.0 (2012), 242.2 (2013), 244.6 (2014), and 242.2 (2015) per 100,000 person-years. Between 2010 and 2015 the incidence of UGIB presenting to ED significantly increased overtime (AAPC = 1.1; 95% CI: 0.3 to 2.0). **Conclusion:** UGIB is a common presentation to emergency departments and has been increasing overtime. Future studies are necessary to evaluate the underlying cause of UGIB and to determine its burden to Albertas healthcare system.

Keywords: epidemiology, upper gastrointestinal bleeding

P087

Procedural sedation in Canadian emergency departments a national survey of pharmacological agent selection and practice variation

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Introduction: Emergency department (ED) physicians strive to provide analgesia, amnesia and sedation for patients when performing painful procedures through the use of procedural sedation (PS). Examination of the literature suggests that the application of PS appears to be variable with institutional influences and clinician disagreement on pharmacology, airway management, and monitoring. The primary goal of this research project was to describe the variability of practice with respect to pharmacologic choices and clinical applications of PS among Canadian ED physicians. **Methods:** An electronic survey was distributed through the Canadian Association of Emergency Physicians (CAEP). Practicing physician members of CAEP were invited to complete the survey. The 20 question survey encompassed various aspects of PS including physician choices regarding PS indications and pharmacology. The primary outcome was the quantification of practice variability among ED physicians with respect to the above listed aspects of PS. The data was presented with simple descriptive statistics. **Results:** To date, 278 ED physicians responded to our survey (response rate 20.3%). Respondents were primarily academic hospital (53.2%) or community hospital based (38.2%). With emergency medicine training as: CCFP-EM (55.2%), FRCPC (30.1%), and CCFP (9.0%). There was relative agreement on the following interventions requiring PS: 98.4% applied PS for electrical cardioversion and 98.1% for brief (<10 mins) orthopedic manipulations. However, only 36.3% utilized PS for burn debridement in the ED. PS was utilized less frequently (78.1%) for prolonged (>10mins) orthopedic manipulations than brief manipulations. For all procedures aggregated, in hemodynamically stable patients with an American Society of Anesthesiology (ASA) score of 1, ED physicians utilized propofol 76.3% of the time. Additional agents were utilized at the following rates: fentanyl-propofol (7.6%), ketamine (7.6%), and fentanyl (4%). This inclination towards propofol alone appears to be consistent across modality of ER training, type of ER setting (rural vs. academic), and volume of PS performed. **Conclusion:** This study demonstrates that Canadian ED physicians have a clear preference for propofol as a first line pharmacologic agent when administering PS in hemodynamically stable, ASA1 patients. Conversely, there appears to be more variation amongst ED physicians with respect to second line pharmaceutical choices for PS.

Keywords: procedural sedation, pharmacology, survey

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P088

Procedural sedation in Canadian emergency departments a national survey of airway management, patient monitoring, and adverse events

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Introduction: Emergency department (ED) physicians strive to provide analgesia, amnesia and sedation for patients undergoing painful procedures through the use of procedural sedation (PS). While, PS is generally safe and effective in the ED, there is institutional variability and clinician disagreement with respect to the bedside equipment required for airway management and the monitoring of adverse events. The primary goal of this research project was to describe the variability of the bedside setup utilized by Canadian ED physicians preforming PS in conjunction with self-reported adverse events. **Methods:** An electronic survey was distributed through the Canadian Association of Emergency Physicians (CAEP). Practicing physician members of CAEP were invited to complete the survey. The 20 question survey encompassed various aspects of PS including physician choices regarding bedside setup of airway equipment, and prevalence of self-reported adverse events. The primary outcome was the quantification of variability among ED physicians with respect to the above listed aspects of PS. Data was presented with simple descriptive statistics. **Results:** 278 ED physicians responded to our survey (response rate 20.9%). Respondents were primarily academic (53.2%) or community hospital based (38.2%). With emergency medicine training as: CCFP-EM (55.2%), FRCPC (30.1%), and CCFP (9.0%). The ED area in which PS was carried out varied; bedside (30.5%), procedure room (37.1%), resuscitation area (31.2%). The basic equipment set utilized appears to be a bag valve mask, suction, and an oral airway. These 3 items were present 95.4%, 95.9%, and 86.3% of the time respectively. The preparation of other items such as capnography and difficult airway equipment is highly variable and appears to be physician specific rather than clinical situation specific. The most common physician self-reported adverse events associated with PS appear to be hypoxia (Spo2 < 90%), hypotension (sBP < 90), and prolonged sedation which occurred in 10.7%, 8.3%, and 8.1% of PS performed. **Conclusion:** There appears to be significant practice variability with respect to the clinical setting as well as the equipment ED physicians prefer when administering PS. Given that causal relationships cannot be inferred between airway/monitoring equipment preferences and adverse events, future studies should be targeted at identifying optimal bedside set ups which minimize adverse events.

Keywords: procedural sedation, airway management, survey

P089

The effect of patient positioning on ultrasound landmarking for cricothyrotomy

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Introduction: The cricothyroid membrane is used as a landmark for emergent surgical airway access. Ultrasound identification of the cricothyroid membrane is more accurate than landmarking by palpation. The objective of this study was to determine whether head of bed elevation affects the position of the cricothyroid membrane as identified by ultrasound. **Methods:** This was a prospective, observational study on a convenience sample of adult patients presenting to the emergency department. Participants underwent ultrasound scans by trained physicians at 0, 30 and 90 degrees head of bed elevation to identify the cricothyroid membrane. The cricothyroid membrane position identified at 0 degrees was used as a reference, and the change in position of the external landmark of the cricothyroid membrane with the patient at 30 and 90 degrees was measured. Additionally, the patients gender, age, body mass index (BMI) and Mallampati score were recorded for comparison. Linear mixed effects models with 95% confidence intervals were used to determine the effect of head of bed elevation, age, BMI and Mallampati score on the differences between measured distances. **Results:** One hundred and two patients were enrolled in the study. The average change in position from reference was statistically significant for both 30 degrees [2.72 ± 0.77mm ($p < 0.01$)] and 90 degrees [4.23 ± 0.77mm ($p < 0.01$)] head of bed elevation. The adjusted linear mixed effects model showed age greater than 70, BMI over 30 and higher Mallampati score were associated with greater change in distance between cricothyroid membrane landmarks. **Conclusion:** There was a statistically significant difference in the position of the cricothyroid membrane comparing 0 degrees to 30 and 90 degrees head of bed elevation. However, the relatively small differences suggest that this finding is not clinically relevant. Further study is required to evaluate if these differences impact the actual successful performance of cricothyrotomy.

Keywords: cricothyrotomy, ultrasound, position

P090

The use of a pediatric pre-arrival and pre-departure trauma checklist to improve clinical care in a simulated trauma resuscitation: a randomized trial.

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Introduction: The purpose of this study is to determine if the introduction of a pre-arrival and pre-departure Trauma Checklist as a cognitive aid, coupled with an educational session, will improve clinical performance in a simulated environment. The Trauma Checklist was developed in response to a quality assurance review of high-acuity trauma activations. It focuses on pre-arrival preparation and a pre-departure review prior to patient transfer to diagnostic imaging or the operating room. We conducted a pilot, randomized control trial assessing the impact of the Trauma Checklist on time to critical interventions on a simulated pediatric patient by multidisciplinary teams. **Methods:** Emergency department teams composed of 2 physicians, 2 nurses and 2 confederate actors were enrolled in our study. In the intervention arm, participants watched a 10-minute educational video modelling the use of the trauma checklist prior to their simulation scenario and were provided a copy of the checklist. Teams participated in a standardized simulation scenario caring for a severely injured adolescent patient with hemorrhagic shock, respiratory failure and increased intracranial pressure. Our primary outcome of interest was time measurement to initiation of key clinical interventions, including intubation, first blood product administration, massive transfusion protocol activation, initiation of hyperosmolar therapy and others. Secondary outcome measures included a Trauma Task Performance score and checklist completion scores. **Results:** We enrolled 14 multidisciplinary teams ($n = 56$ participants) into our study. There was a statistically significant decrease in median time to initiation of hyperosmolar therapy by teams in the intervention arm compared to the control arm (581 seconds, [509-680] vs. 884 seconds, [588-1144], $p = 0.03$). Time to initiation of other clinical interventions was not statistically significant. There was a trend to higher Trauma Task Performance scores in the intervention group however this did not reach statistical significant ($p = 0.09$). Pre-arrival and pre-departure checklist scores were higher in the intervention group (9.0 [9.0-10.0] vs. 7.0 [6.0-8.0], $p = 0.17$ and 12.0 [11.5-12.0] vs. 7.5 [6.0-8.5], $p = 0.01$). **Conclusion:** Teams using the Trauma Checklist

did not have decreased time to initiation of key clinical interventions except in initiating hyperosmolar therapy. Teams in the intervention arm had statistically significantly higher pre-arrival and pre-departure scores, with a trend to higher Trauma Task Performance scores. Our study was a pilot and recruitment did not achieve the anticipated sample size, thus underpowered. The impact of this checklist should be studied outside tertiary trauma centres, particularly in trainees and community emergency providers, to assess for benefit and further generalizability.
Keywords: checklist, trauma, simulation

P091

Emergency Critical Care Ultrasound (ECCU) paramedical course: a novel curriculum for training paramedics in ultrasound

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Introduction: Ultrasonography (US), performed in the Emergency Department (ED) by Emergency Physicians, is well established. Educational studies have shown some promise in training paramedics in US use. We have developed and piloted a novel curriculum for paramedic US education. **Methods:** Based on an informal needs assessment, an US curriculum for paramedics was developed to include: Basic principles, Focused assessment with sonography for trauma (FAST), cardiac, and vascular access. Participants included ED-based and pre-hospital paramedics including all paramedics with critical care training who routinely perform vascular access and procedural sedation within our ED. Comparisons were made using paired non-parametric tests (GraphPad). **Results:** Participants (N = 9) were provided pre- reading materials prior to completing a 6-hour course, consisting of a mix of didactic and practical sessions with live models and vascular access phantoms. Each module was introduced with a 30 minute didactic session, led by an Emergency Physician trained in US, followed immediately by a 1 hour hands-on session lead by either an Emergency Physician or an Emergency Medicine Resident at a learner to instructor ratio of 3:1. At the end of the course, participants were asked to complete a short 10 minute survey that included (1) an assessment of the course quality with regard to preparatory material and course content/delivery (4 point Likert scale; excellent, good, fair, poor); (2) self reported US knowledge pre and post course on a scale of 1-10 (10 high, 1 low); (3) general yes/no questions related to the future of ECCU paramedical and (4) a subjective written section for additional comments. All participants rated the content favourably: 97% scoring it as excellent, and 3% as good. The participants median self-reported US knowledge score increased from 2/10 (IQR 2-3) to 8/10 (IQR 7.25-8; p = 0.009) post- course. All comments from the text field were positive in nature. **Conclusion:** We report a paramedic US course curriculum, which when piloted resulted in high learner satisfaction and a high rate of self reported improvement in US knowledge. Further study will include an assessment of knowledge acquisition and practical performance. Future modifications in our curriculum will be based on needs assessment and may include additional modules.
Keywords: paramedic, point-of-care ultrasound, education

P092

Combatting sedentary lifestyles; can exercise prescriptions in the emergency department lead to a behavioural change in patients?

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Introduction: Patients with chronic diseases are known to benefit from exercise. Such patients often visit the emergency department (ED). There are few studies examining prescribing exercise in the ED. We wished to study if exercise prescription in the ED is feasible and effective. **Methods:** In this pilot prospective block randomized trial, patients in the control group received routine care, whereas the intervention group received a combined written and verbal prescription for moderate exercise (150 minutes/week). Both groups were followed up by phone at 2 months. The primary outcome was achieving 150 min of exercise per week. Secondary outcomes included change in exercise, and differences in reported median weekly exercise. Comparisons were made by Mann-Whitney and Fishers tests (GraphPad). **Results:** Follow-up was completed for 22 patients (11 Control; 11 Intervention). Baseline reported median (with IQR) weekly exercise was similar between groups; Control 0(0-0)min; Intervention 0(0-45)min. There was no difference between groups for the primary outcome of 150 min/week at 2 months (Control 3/11; Intervention 4/11, RR 1.33 (95% CI 0.38-4.6; p = 1.0). There was a significant increase in median exercise from baseline in both groups, but no difference between the groups (Control 75(10-225)min; Intervention 120(52.5-150)min;NS). 3 control patients actually received exercise prescription as part of routine care. A post-hoc comparison of patients receiving intervention vs. no intervention, revealed an increase in patients meeting the primary target of 150min/week (No intervention 0/8; Intervention 7/14, RR 2.0 (95% CI 1.2-3.4); p = 0.023). **Conclusion:** Recruitment was feasible, however our study was underpowered to quantify an estimated effect size. As a significant proportion of the control group received the intervention (as part of standard care), any potential measurable effect was diluted. The improvement seen in patients receiving intervention and the increase in reported exercise in both groups (possible Hawthorne effect) suggests that exercise prescription for ED patients may be beneficial.
Keywords: exercise prescription, emergency department, prevention

P093

Performing the balancing act: emergency medicine physicians' multifaceted roles and their influence on trainee assessment

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Introduction: Competency-based workplace assessments are important in clinical training. However, feedback and assessment are still often perceived as unsatisfactory, particularly in busy settings such as emergency departments. Currently, little is known about how attending staff physicians sense of self may interface with the processes they use to assess and give feedback to trainees. We aimed to understand how attendings perceive their roles when tasked with conducting assessments and providing feedback to trainees. **Methods:** We conducted semi-structured, individual interviews with attendings (n = 16) who used McMAP (McMaster Modular Assessment Program), a workplace-based assessment system at McMaster Universitys Royal College Emergency Medicine program. Attendings were recruited using snowball sampling. Data were interpreted using thematic analysis, sensitized to the dramaturgical lens and rater cognition frameworks. **Results:** Attendings identified themselves using three distinct but intimately connected roles when assessing trainee performance: the doctor that ensures the safety and well-being of patients; the coach (educator) that empowers, guides, and supports the next generation of medical doctors; and the assessor that formally assesses a trainees progression through the residency program. These roles are influenced by clinical training and experience, teaching experience and context. **Conclusion:** The ways in which attendings assess and provide feedback to trainees involve a complex

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and dynamic process that is influenced by their perceived roles as a doctor, coach, and assessor. Understanding the way attendings view and juggle their roles may provide insight into potentially new approaches to assessment and feedback. Results and implications will be discussed.
Keywords: medical education, qualitative, emergency department

P094

A computerized provider order entry strategy to improve the quality of clinical information on neuroimaging requisitions from the emergency department: an interim analysis

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Introduction: Clinical context is critical for accurate radiologic interpretation of neuroimaging investigations. The aim of this study was to determine the impact of a change in the Emergency Department (ED) computerized provider order entry (CPOE) interface on the quality of clinical information conveyed in ED neuroimaging requisitions for suspected stroke patients. **Methods:** Four local EDs utilizing a common CPOE ED Stroke order set were studied before and after the introduction of a mandatory blank free text field requiring clinical information for the radiologist before a computed tomography angiography (CTA) request could be submitted. Prior to this modification, the indication (acute stroke) was pre-filled in the CTA request for convenience with the option of providing additional information at the discretion of the ordering physician. ED physicians were informed of the change as well as the rationale for its implementation. A retrospective pre (90 days) post (30 days) analysis was conducted across four local EDs to evaluate the impact of the CPOE user interface change on the quality of clinical information provided on neuroimaging orders. Patients aged 18 with CTA head and/or neck orders submitted from the order set were included. Patients were excluded if the CTA order was submitted outside of the ED Stroke order set, if order entry was by non-physician personnel, or if the order was modified by the diagnostic imaging department after ED submission. Clinical information from CTA orders were scored as complete, partial, or absent/uninformative based on a standardized rubric of critical elements, including: description of neurological deficit(s), lateralization, and timing of symptom onset or duration. Results were analyzed using chi square analysis. **Results:** Pre-implementation data from Oct 1, 2015 Jan. 1, 2016 ($N = 652$) was compared to post-implementation data from Nov. 1 30, 2016 ($N = 227$). The proportion of complete, partial, and absent/uninformative clinical histories were: 45.3%, 31.4%, and 23.3% in the pre-implementation period and 62.6%, 37.4%, and 0% in the post-implementation period respectively. There was a 38.2% relative increase in complete clinical histories, a 19.1% relative increase in partial clinical histories, and a 100% reduction in absent/uninformative clinical histories ($p < 0.001$). **Conclusion:** The introduction of a mandatory free text field significantly increased the overall quality of clinical information provided on ED neuroimaging orders. This CPOE strategy has the potential to improve diagnostic accuracy and reduce unnecessary delays to imaging interpretation caused by lack of clinical information.
Keywords: quality improvement and patient safety, computerized provider order entry, diagnostic imaging

P095

Do resident as teacher programs increase emergency medicine residents comfort level with teaching junior learners?

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Introduction: At academic hospitals, it is a residents responsibility to teach junior learners. Residents endorse that there is limited education on how to effectively teach junior learners, and suggest a more formal curriculum on how to teach would be beneficial. Emergency Medicine (EM) residencies in North America may have a resident as teacher (RAT) curriculum, however, no Canadian EM study has characterized the impact of a RAT curriculum on residents. Our educational concept was to implement a formalized RAT workshop for residents in an EM residency. We assessed residents attitudes and comfort levels towards teaching in response to the curriculum. **Methods:** A formal RAT curriculum, provided at a single center in a 6-hour session, was provided for both Royal College and College of Family Physician EM residents. Residents completed a survey evaluating attitudes and behaviours regarding their ability to teach and give feedback as part of their roles as teachers, consistent with Kirkpatricks second level of program evaluation. The surveys were administered pre-workshop, immediately post-workshop, and at 3 and 6 months following the RAT workshop. **Results:** Residents were surveyed in terms of their attitudes towards teaching on a 5-point likert scale. Our educational concept was delivered through a 6-hour workshop with emphasis on practical teaching skills that residents could incorporate into their practice. Lecture topics included orientation of the learner, giving effective feedback, teaching within a short time frame, as well as an introduction to theory of learning. Lectures were geared to be interactive, and included breakout sessions and group discussions. 21 residents participated in the workshop. Of 18 pre-survey respondents, 89.8% ($n = 16$) had no previous formal training in how to teach, yet 72.21% ($n = 13$) 'sometimes' or 'often' have a learner on shift with them. There were 15 post survey respondents. 53.33% ($n = 8$) respondents somewhat agreed or agreed they were more likely to teach in response to the workshop, and 56.25% ($n = 8$) responded that they somewhat agreed or agreed they were more comfortable with teaching while in the Emergency Department in an immediate post workshop survey. **Conclusion:** After a formal RAT curriculum, residents reported that they had increased comfort and were more likely to teach junior learners. Although small and single-centered, our study will help provide a basis for larger RAT studies, evaluating the effect on both residents and junior learners.
Keywords: innovations in emergency medicine education, resident as teacher, medical education

P096

Real-time 72 hour readmission alert

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Introduction: Hospital admission within 72 hours of emergency discharge is a widely accepted measure of emergency department quality of care. Patients returning for unplanned admission may reveal opportunities for improved emergency or followup care. Calgary emergency physicians, however, are rarely notified of these readmissions. Aggregate site measures provide a high level view of readmissions for managers, but dont allow for timely, individual reflection on practice and learning opportunities. These aggregations may also not correctly account for variation in planned readmissions and other workflow nuances. There was a process in place at one facility to compile and communicate readmission details to each physician, but it was manual, provided limited visit detail, and was done weeks or months following discharge. **Methods:** A new, realtime 72 hour readmission notification recently implemented within the Calgary Zone provides direct and automated email alerts to all emergency physicians and residents

involved in the care of a patient that has been readmitted. This alert is sent within hours of a readmission occurring and contains meaningful visit detail (discharge diagnosis, readmit diagnosis, patient name, etc) to help support practice reflection. An average of 15 alerts per day are generated and have been sent since implementation in April 2017. Although an old technology, the use of email is a central component of the solution because it allows physicians to receive notifications at home and outside the hospital network where they routinely perform administrative tasks. A secondary notification is sent to personal email accounts (Gmail, Hotmail, etc) to indicate an unplanned admission has occurred, but without visit detail or identifiable information. It also allowed implementation with no new hardware or software cost. **Results:** A simple thumbs up/down rating system is used to adjust the sensitivity of the alert over time. More than 66% of those providing feedback have indicated the alert is helpful for practice reflection (i.e., thumbs up). And of those that indicated it was not helpful, comments were often entered indicating satisfaction with the alert generally, or suggestions for improvement. For example, consulted admitting physicians are often responsible for discharge decisions and should be added as recipients of the alert. **Conclusion:** Many physicians have indicated appreciation in knowing about return patients, and that they will reflect on their care, further review the chart, or contact the admitting physician for further discussion. Most are accepting of some 'expected' or 'false positive' alerts that aren't helpful for practice reflection. Further tuning and expansion of the alert to specialist and consult services is needed to ensure all physicians involved in a discharge decision are adequately notified.

Keywords: quality improvement and patient safety, readmission, analytics

P097

Making emergency room crash carts useful

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Introduction: Human factors are a neglected when it comes to crash cart design and function. Using observational assessments and in-house surveys, the process improvement team found that staff use of the crash carts in the University of Alberta ED had significate redundancy, inefficiency and often leading to confusion during use. The process improvement team assessed the layout of the adult crash cart and redesigned the cart format based on observational problems/inefficiencies staff had during resuscitations. It was hoped that staff found the new design more efficient and effective during resuscitations when compared to the old cart. **Methods:** To effect change, the Rapid result change theory method was utilized to implement the new crash cart prototype. The model was used to evoke excitement and staff participation in front line process improvement. With input from senior staff, the cart was redesigned and placed in resus area where it stood the greatest chance of being used frequently. Once a prototype crash cart had gone live, surveys, based on a 7 point Likert scale compared the old and new cart systems. The resus area housed both old and new carts to facilitate the comparison. The survey assessed 6 domains; visibility of the medications, locating medications, overall organization, time savings, mixing medications and comfort level of using each cart. **Results:** After the trial, the surveys were collected and analyzed using T-test; the results were significant. There was an overwhelming positive result within all domains when comparing the two carts. There was mean difference ranging from 1.7 to 3.5 comparing when comparing the two carts to each domain. **Conclusion:** The results were so positive; all seven carts were changed to the same format. The overall impact of the new cart design saved time in both application and turnaround time in restocking.

Keywords: crash cart, resuscitation, redesign

P098

Solid organ donation from the emergency department - a systematic review

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Introduction: There is a significant gap between the number of organ donors and people awaiting an organ transplant; therefore it is essential that all potential donors are identified. Given the nature of Emergency Medicine it is a potential source of organ donors. The purpose of this study is to determine what percent of successful donors come from the Emergency Department (ED) and whether there are any missed potential donors. **Methods:** Electronic searches of EMBASE, MEDLINE, and CINAHL were performed July 7, 2017 using PRISMA guidelines. Primary literature in human adults were included if they described identification of patients in the ED who went on to become successful solid organ donors, or described missed potential donors in the ED. Data on the total population of actual or missed donors was required to allow calculation of a percentage. Studies describing non-solid organ donation, consent, ethics, survey of attitudes, teaching curricula, procurement techniques, donation outside the ED, and recipient factors were excluded. 2 authors independently screened articles for inclusion and discrepancies were resolved through consensus. Quality was assessed using STROBE for observational studies. Heterogeneity of patient populations precluded pooling of the data to conduct a meta-analysis. **Results:** 1058 articles were identified, 17 duplicates were removed, 800 articles were excluded based on title and abstract, and 217 full text articles were excluded, yielding 24 articles for the systematic review. For neurologic determination of death (NDD), ED patients comprised 4 44% of successful donors. ED death reviews revealed 0 84% of patients dying in the ED are missed as potential donors and hospital-wide death reviews revealed 13 80.9% of missed donors die in the ED. For donation after cardiac death (DCD), 4 20% of successful donors came from the ED and studies investigating potential donors suggest 2 36% of patients dying the in the ED could be potential DCD donors. The most common population of successful DCD organ donors was in traumatic cardiopulmonary arrest (TCPA), with 3.6 8.9% of TCPA patients presenting to the ED becoming successful donors. **Conclusion:** Patients dying in the Emergency Department are a significant source of both successful organ donors and missed potential donors. Emergency physicians should be familiar with their local organ donation protocol to ensure potential organ donors are not missed.

Keywords: organ donation, systematic review

P099

Evaluating the potential impact of an ECPR program at The Ottawa Hospital: a retrospective health records review

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Introduction: Extracorporeal Life Support in the context of cardiac arrest (ECPR) is an emerging resuscitative therapy which has shown promising results for patients who may not otherwise survive. As a resource-intensive intervention, ECPR requires carefully selected patients to maximize its potential benefits and mitigate undue harm. This retrospective health records review sought to identify the characteristics of cardiac arrest patients presenting to two academic tertiary care Emergency Departments (EDs) in order to assess the feasibility and impact of an ECPR program. **Methods:** We reviewed charts for all patients aged 18-75 years old presenting to two Academic Teaching

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Hospitals with out-of-hospital or in-ED refractory cardiac arrest from January 2015 to December 2016. Based on a review of existing ECPR literature, we defined two sets of liberal and restrictive criteria associated with survival and applied these to our cohort for possible initiation of ECPR. The chart review was completed by one of the principal investigators, with 10% of charts randomly reviewed by a second investigator to ensure good inter-agreement. Any discrepancies or ambiguities found in the review were resolved collaboratively between both investigators. **Results:** A total of 220 charts were identified and 191 deemed eligible for inclusion in the study. The median age was 59 (IQR: 49.5-67) years and the cohort was 72% male. The initial presenting rhythm was identified as VT/VF in 47% of patients. 65% of arrests were witnessed, with immediate bystander CPR performed on 50% patients and an additional 12% receiving CPR within 10 minutes of collapse. 60% of patients had cardiac arrest lasting less than 75 minutes. 69% of patients were identified as having a reversible cause of cardiac arrest. A favorable premorbid status was identified in 76% of patients. Application of our two sets of ECPR inclusion criteria revealed that 17% and 3% of patients for the liberal and restrictive criteria respectively, would have been candidates for ECPR. **Conclusion:** At our centre, we identified that in a two-year period, 3% to 17% of cardiac arrest patients presenting to the ED would have met inclusion criteria for ECPR, translating to an additional 0.2-1.4 patients per month admitted for critical care. These findings would suggest that the implementation of an ECPR program at our institution has the potential to have a positive impact for patients with only a relatively low volume of patients requiring additional resources.

Keywords: extracorporeal life support, cardiac arrest, resuscitation

P100

Exploring First Nations members emergency department experiences and concerns through participatory research methods

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Introduction: Emergency Departments (EDs) are frequently the first point of entry to access health services for First Nation (FN) members. In Alberta, FN members visit EDs at almost double the rate of non-FN persons. Furthermore, preliminary evidence demonstrates differences in ED experience for FN members as compared to the general population. The Alberta First Nations Information Governance Centre, Maskwacis Health Services, Yellowhead Tribal Council, Treaty 8 First Nations of Alberta, and Alberta Health Services are working together to research FN members ED experiences and concerns. **Methods:** This is participatory research guided by a two-eyed seeing approach that acknowledges the equal value of both Western and Indigenous worldviews. FN and non-FN leaders researchers are full partners in the development of the research project. Six sharing circles will be held in February 2018 across Alberta, with Elders, FN patients, FN and non-FN clinicians and FN and non-FN administrators. Sharing circles are similar to focus groups, but emphasize everyone having a turn to speak and demonstrating respect among participants in accordance with FN protocols. Elders will select the questions for discussion based on topics that arose in initial team meetings. Sharing circle discussions will be audio recorded and transcribed. Analysts will include both Western and Indigenous worldview researchers, who will collaboratively interpret findings. Elders will review, discuss, contextualize and expand upon study findings. The research is also guided by FN principles of Ownership, Control, Access, and Possession of FN information. It is through these principles that First Nation research projects can truly be classified as FN lead and driven. **Results:** Based on initial team meeting discussions, results of sharing circles are expected to provide insights on issues such as: healing, patient-provider communication (verbal and non-verbal), shared decision making, respect for patient preferences, experiences leading to trust or distrust, understandings of wait times and triage, times when multiple (repeat) ED presentations occur, distances travelled for care, choosing specific EDs when seeking care, impacts of stereotypes about FN patients, and racism and reconciliation. **Conclusion:** Understanding FN ED experience and bringing FN perspectives to Western conceptions of the goals and provision of ED care are important steps toward reconciliation.

Keywords: First Nations, participatory research methods, patient experience

P101

Sex-specific Troponin T cutoffs for ruling out acute myocardial infarction at ED arrival

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Introduction: ex-specific diagnostic cutoffs may improve the test characteristics of high-sensitivity troponin assays for the diagnosis of myocardial infarction. Sex-specific cutoffs for ruling in MI improve the sensitivity of the assay for MI among women, and improve the specificity of diagnosis among men. We hypothesized that the use of sex-specific high-sensitivity Troponin T (hsTnT) cutoffs for ruling out MI at the time of ED arrival would improve the classification efficiency of the assay by enabling more patients to have MI ruled out at the time of ED arrival while maintaining diagnostic sensitivity. The objective of this study was to quantify the test characteristics of sex-specific cutoffs of an hsTnT assay for acute myocardial infarction (AMI) when performed at ED arrival in patients with chest pain. **Methods:** This retrospective study included consecutive ED patients with suspected cardiac chest pain evaluated in four urban EDs were, excluding those with ST-elevation AMI, cardiac arrest or abnormal kidney function. The primary outcomes was AMI at 7 days. Secondary outcomes included major adverse cardiac events (MACE: all-cause mortality, AMI and revascularization) and the individual MACE components. We quantified test characteristics (sensitivity, negative predictive value, likelihood ratios and proportion of patients ruled out) for multiple combinations of sex-specific rule-out cutoffs. We calculated net reclassification improvement compared to universal rule-out cutoffs of 5ng/L (the assays limit of detection) and 6ng/L (the FDA-approved limit of quantitation for US laboratories). **Results:** 7130 patients, including 3931 men and 3199 women, were included. The 7-day incidence of AMI was 7.38% among men and 3.78% among women. Universal cutoffs of 5 and 6 ng/L ruled out AMI with 99.7% sensitivity in 33.6 and 42.2% of patients. The best-performing combination of sex-specific cutoffs (8g/L for men and 6ng/L for men) ruled out AMI with 98.7% sensitivity in 51.9% of patients. **Conclusion:** Sex-specific hsTnT cutoffs for ruling out AMI at ED arrival may achieve substantial improvement in classification performance, enabling more patients to be ruled out at ED arrival, while maintaining acceptable diagnostic sensitivity for AMI. Universal and sex-specific rule-out cutoffs differ by only small changes in hsTnT concentration. Therefore, these findings should be confirmed in other datasets.

Keywords: myocardial infraction, cardiology, Troponin

P102

A quality improvement project: identifying and managing latent safety threats though a zone wide emergency department in-situ multidiscipline simulation program

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Introduction: High fidelity in-situ simulation has been found to detect system deficiencies, equipment failures, and conditions predisposing to medical errors, also known as latent safety threats (LST). What is not well reported is whether these LSTs are effectively managed. As a part of an ongoing quality improvement project, multidisciplinary, in-situ simulations were conducted across emergency departments (ED) in the Edmonton zone with the aim to identify LST and subsequently manage them to improve patient care. **Methods:** In 2017 simulations were conducted at EDs in the Edmonton Zone (N = 10). Following each simulation, a cross sectional, survey based assessment tool, was completed by participants to identify LST. These LST were shared with the site clinical nurse educator and/or site manager and a management plan made. Two to six months follow-up was made to track progress. For reporting, LST were grouped into themes, progress on LST were coded as either resolved, ongoing, or not managed. **Results:** A total of 112 LST were identified through 18 separate simulations. The most commonly identified LTS were: resuscitation resource required (n 23), lack of staff training (21), equipment not immediately available (20), IT resource required (8), medication not immediately available (6), staff requiring familiarization (5), medication resource required (5), IT issue (4), large equipment needed (4), small equipment needed (4), lack of staff resource (3), medication needed, (3), equipment malfunction (2), Environment cluttered (2), non-appropriate resource removed (2). Site follow-up identified a total of 52 LST that where resolved, and 60 LST that had ongoing work to manage them. No occurrences of LST not being managed were identified. **Conclusion:** Simulation was used to effectively identify LST. Creating a structured plan and follow up allowed many LST to be resolved and effectively managed. In 2018 simulation will reassess if LST remain.

Keywords: quality improvement and patient safety, simulation, latent threats

P103

Performance characteristics of the modified Sgarbossa criteria for diagnosis of acute coronary occlusion in emergency department patients with ventricular paced rhythm and symptoms of acute coronary syndrome

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Introduction: The ECG diagnosis of acute coronary occlusion (ACO) in the setting of ventricular paced rhythm (VPR) is purported to be impossible. However, VPR has a similar ECG morphology to LBBB. The validated Smith-modified Sgarbossa criteria (MSC) have high sensitivity (Sens) and specificity (Spec) for ACO in LBBB. MSC consist of 1 of the following in 1 lead: concordant ST Elevation (STE) 1 mm, concordant ST depression 1 mm in V1-V3, or ST/S ratio < -0.25 (in leads with 1 mm STE). We hypothesized that the MSC will have higher Sens for diagnosis of ACO in VPR when compared to the original Sgarbossa criteria. We report preliminary findings of the Paced Electrocardiogram Requiring Fast Emergency Coronary Therapy (PERFECT) study **Methods:** The PERFECT study is a retrospective, multicenter, international investigation of ED patients from 1/2008 - 12/2016 with VPR on the ECG and symptoms suggestive of acute coronary syndrome (e.g. chest pain or shortness of breath). Data from four sites are presented. Acute myocardial infarction (AMI) was defined by the Third Universal Definition of AMI. A blinded cardiologist adjudicated ACO, defined as thrombolysis in myocardial infarction score 0 or 1 on coronary angiography; a pre-defined subgroup of ACO patients with peak cardiac troponin (cTn) >100 times the 99% upper reference limit (URL) of the cTn assay was also analyzed. Another blinded physician measured all ECGs. Statistics were by Mann Whitney U, Chi-square, and McNemars test. **Results:** The ACO and No-AMI groups consisted of 15 and 79 encounters, respectively. For the ACO and No-AMI groups, median age was 78 [IQR 72-82] vs. 70 [61-75] and 13 (86%) vs. 48 (61%) patients were male. The median peak cTn ratio (cTn/URL) was 260 [33-663] and 0.5 [0-1.3] for ACO vs. no-AMI. The Sens and Spec for the MSC and the original Sgarbossa criteria were 67% (95% CI 39-87) vs. 46% (22-72; $p = 0.25$) and 99% (92-100) vs. 99% (92-100; $p = 0.5$). In pre-defined subgroup analysis of ACO patients with peak cTn >100 times the URL ($n = 10$), the Sens was 90% (54-100) for the MSC vs. 60% (27- 86) for original Sgarbossa criteria ($p = 0.25$). **Conclusion:** ACO in VPR is an uncommon condition. The MSC showed good Sens for diagnosis of ACO in the presence of VPR, especially among patients with high peak cTn, and Spec was excellent. These methods and results are consistent with studies that have used the MSC to diagnose ACO in LBBB.

Keywords: Sgarbossa's criteria, acute coronary occlusion, ventricular paced rhythm

P104

Evaluating the use of the pulmonary embolism rule-out criteria in the emergency department

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Introduction: Diagnosing pulmonary embolism (PE) can be challenging because the signs and symptoms are often non-specific. Studies have shown that evidence-based algorithms are not always adhered to in the Emergency Department (ED), which leads to unnecessary CT scanning. The pulmonary embolism rule-out criteria (PERC) can identify patients who can be safely discharged from the ED without further investigation for PE. The purpose of this study is to evaluate the use of the PERC rule in the ED and to compare the rates of testing for PE if the PERC rule was used. **Methods:** This was a health records review of ED patients investigated for PE at two emergency departments over a two-year period (April 2013-March 2015). Inclusion criteria were ED physician ordered CT pulmonary angiogram, ventilation-perfusion scan, or D-dimer for investigation of PE. Patients under the age of 18 were excluded. PE was considered to be present during the emergency department visit if PE was diagnosed on CT or VQ (subsegmental level or above), or if the patient was subsequently found to have PE or deep vein thrombosis during the next 30 days. Trained researchers extracted anonymized data. The rate of CT/VQ imaging and the negative predictive value was calculated. **Results:** There were 1,163 patients that were tested for PE and 1,097 patients were eligible for our analysis. Of the total, 330/1,097 (30.1%; 95% CI 27.4-32.3%) had CT/VQ imaging for PE, and 48/1,097 (4.4%; 95% CI 3.3-5.8%) patients were diagnosed with PE. 806/1,097 (73.5%; 95% CI 70.8-76.0%) were PERC positive, and of these, 44 patients had a PE (5.5%; 95% CI 4.1-7.3%). Conversely, 291/1,097 (26.5%; 95% CI 24.0-29.2%) patients were PERC negative, and of these, 4 patients had a PE (1.4%; 95%

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CI 0.5-3.5%). Of the PERC negative patients, 291/291 (100.0%; 95% CI 98.7-100.0%) had a D-dimer test done, and 33/291 (11.3%; 95% CI 8.2-15.5%) had a CT angiogram. If PERC was used, CT/VQ imaging would have been avoided in 33/1,097 (3%; 95% CI 2.2-4.2%) patients and the D-dimer would have been avoided in 291/1,097 (26.5%; 95% CI 24.0-29.2%) patients. **Conclusion:** If the PERC rule was used in all patients with suspected PE, fewer patients would have further testing. The false negative rate for the PERC rule was low.
Keywords: pulmonary embolism, D-dimer, diagnosis

P105

Transforming emergency stroke care through innovation: Canada's first stroke ambulance

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Introduction: A two-year Stroke Ambulance (SA) pilot project was implemented at the University of Alberta Hospital (UAH) in February, 2017, the first in the world to utilize this specialized technology in a rural setting. The primary objective is to evaluate clinical and economic implications of timely SA assessment and treatment of hyperacute stroke patients who present to non-stroke centres in rural Alberta and might otherwise have received delayed treatment, or not at all, due to prolonged transfer times. **Methods:** A steering committee and seven working groups were established, with representation from Alberta Health Services (AHS) programs impacted, to ensure comprehensive project development and implementation. The SA portable CT scanner, point of care laboratory, and videoconference system facilitate diagnosis of stroke in the field. The multidisciplinary team includes a stroke fellow, advanced & primary care paramedics, registered nurse, CT technologist, and telestroke physician. When not dispatched, the team provides stroke expertise and patient care in the emergency department (ED) and diagnostic imaging. The service model includes suspected stroke patients presenting to non-stroke centres within a 250 Km radius of Edmonton (Phase I); patients presenting to Edmonton Zone (EZ) hospitals without CT capability and/or tPA protocols (Phase 2); and expedited transport from EZ hospitals to the UAH for urgent endovascular therapy (EVT) (Phase 3). A health economic analysis will compare stroke ambulance care with standard care. **Results:** The SA has responded to 54 dispatches, 13 patients thrombolyzed and 3 patients receiving EVT. Median rendezvous to CT time was 10 minutes, median rendezvous to tPA time was 21 minutes, and mean time from symptom onset to tPA was 180 minutes. There were no complications. After SA imaging and assessment, 18 patients were repatriated back to their local community hospital, avoiding unnecessary admission to tertiary care. **Conclusion:** Our preliminary experience demonstrates that the SA offers a novel approach to performing timely evaluation and treatment of suspected stroke from non-stroke centres and may serve as an excellent triage mechanism, reducing avoidable admissions to overcapacity tertiary care EDs. The SA team provides added value to the ED with stroke expertise and patient care. A comprehensive health economic analysis will determine cost-effectiveness and whether spread is feasible.
Keywords: stroke, innovation, transforming

P106

Systemic thrombolysis for suspected high-risk pulmonary embolism: a retrospective medical record review

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Introduction: Current treatment guidelines advocate for the aggressive management of both high-risk and subsets of moderate-risk pulmonary embolism (PE) with fibrinolytic therapy. However, there is limited evidence on the risks and benefits of fibrinolytic therapy in PE, with mortality improvement still to be proven. This study aimed to report the incidence of major bleeding and death after thrombolysis for PE. **Methods:** A health records review was performed on data from two hospitals between 2007 and 2017. Pharmacy identified all patients who had received either alteplase or tenecteplase. Trained abstractors reviewed each chart to determine the indication for thrombolytic therapy. Patients were included if they received systemic thrombolysis for diagnosed or presumed PE. Data was extracted on 30-day mortality, International Society of Thrombosis and Hemostasis defined major bleeding within 30 days, premorbid anticoagulant and antiplatelet prescription, age, sex, comorbidities, renal function, history of bleeding, type and dose of thrombolytic and category of PE (high or moderate risk). **Results:** 1,534 patients were identified, of which 72 received systemic thrombolysis for PE. The median age was 57, 34 were male, 17 with a history of venous thrombosis and 12 with cancer. Fifty-four were classified as having high-risk PE, of whom 39 received cardiopulmonary resuscitation (CPR) when thrombolysis was administered. Formal confirmatory imagining for PE was obtained in only 23/39 patients who were in cardiac arrest. Eighteen patients were classified as moderate-risk PE. The incidence of major bleeding was 28/54 (52%, 95% CI 39-65%), and 3/18 (17%, 95% CI 6-39%) for the high and moderate risk groups respectively. There were 4 intracranial bleeds, all in the high-risk PE group. The only significant predictor of major bleeding was the need for CPR at the point of administration of the thrombolytic agent (OR 2.6, 95% CI 1.0-7.5, adjusted for age). Thirty-four patients died within 30 days (47%, 95% CI 36-59%), all in the high-risk PE group. Death was not associated with any demographic variable on univariate analysis. Death occurred in 28/39 (72%, 95% CI 56-83%) patients who received CPR and 6/33 (18%, 95% CI 9-34%) who did not. **Conclusion:** We found a high incidence of 30-day major bleeding and death following administration of thrombolysis for PE which will help inform future prognostic discussions in our institution.
Keywords: pulmonary embolism, thrombolysis, bleeding

P107

The development of a mentorship based, near-peer simulated resuscitation training program for medical trainees

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Introduction: High quality Cardiopulmonary Resuscitation (CPR) saves lives, however skill retention after standard Basic Life support (BLS) courses has been shown to be poor. Our goal was to develop a student-run, mentorship based program to allow repetitive practice of BLS skills while minimizing resource commitment and time requirements. **Methods:** We developed a top down training program that relied on online teaching resources, regular simulation training and near-peer feedback. First year medical students were given the opportunity to participate in the program and baseline CPR quality was documented. They were then divided into intervention and control groups. The intervention group participated in bimonthly 40-minute small group training sessions directed by senior medical students and monitored by a staff physician. The control group received no further training. At the end of the 8-month study period CPR quality was documented for all participants. **Results:** We included data from 54 medical students. Overall compression depth and rate were monitored using Laderall SimMan 3G(TM) high-fidelity CPR mannequins. Average rate and depth of compression were significantly improved in the intervention group relative to both the control group that did not

receive training, as well as relative to the intervention groups own pre intervention values (both with p values below 0.05 using Mann-Whitney tests and an intention to treat analysis for loss to follow up). **Conclusion:** Our study demonstrated a significant improvement in CPR quality as a result of our intervention. Survey data also indicated positive feedback from participants in relation to comfort with in-hospital CPR. As such we intend to continue to run this program, identifying participants each year whom can move into training and leadership roles to help foster CPR and basic resuscitation in our medical community.

Keywords: innovations in emergency medicine education, near-peer, cardiopulmonary resuscitation

P108

Cannabis hyperemesis syndrome within emergency department users in the Calgary health region: a retrospective analysis

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Introduction: Cannabis hyperemesis syndrome (CHS) is associated with long-term, regular use of marijuana. CHS patients typically present to emergency departments (ED) during a hyper-emetic phase of paroxysmal nausea and vomiting. Despite extensive investigations as well as frequent ED presentations, CHS patients have a delayed time to diagnosis, and many are often missed. To date, there is a paucity of research examining CHS in emergency departments. Our objective was to identify CHS cases presenting to EDs within the Calgary health region, and to quantify the number of patients and frequency of ED visits for CHS. **Methods:** A retrospective chart review was performed on all patients who presented to any Calgary ED or urgent care center between January 1, 2015 and December 31, 2016 (ages 18 55 years) who had an ED discharge diagnosis of either nausea or vomiting alone, nausea with vomiting, or poisoning by cannabis, as identified in administrative data. Data abstraction from medical records was performed by trained personnel using standardized forms with comprehensive inclusion criteria for CHS. **Results:** The search strategy yielded a total of 320 ED visits from 156 individual patients. 55% of visits were by males, and 45% by females. The average age was 29.5 years. Of the 156 patients, 53% had cannabis use documented in the chart, with 51% reporting daily and/or regular cannabis use. Relief of symptoms from use of hot showers (a pathognomonic finding) was found in 17% of patients. 18% of patients (n = 28) met criteria for CHS, and 28% (n = 44) met partial criteria for CHS (having documented regular cannabis use, cyclic vomiting and abdominal pain) but no record of symptom resolution with cessation of cannabis use or from the use of hot showers. Patients meeting CHS criteria had an average of five repeat ED visits during the study period with 16% (n = 12) of ED visits resulting in hospital admission. **Conclusion:** We identified a large cohort of patients with confirmed or suspected CHS. Given that nearly one third of the sample met partial criteria for CHS highlights the need for improved patient screening, as it is possible that this cohort may include missed cases. Further, many CHS patients are not responsive to first-line antiemetics and accurate diagnosis is crucial for managing these patients effectively in the ED. This is of particular importance given the admission rate for CHS and resulting burden on the health system.

Keywords: cannabis hyperemesis syndrome, cannabis, vomiting

P109

Education innovation: pediatric emergencies curriculum for emergency physicians

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Introduction: Tertiary care emergency departments (EDs) in large urban environments may have a low volume of high acuity pediatric presentations due to their proximity to dedicated childrens hospitals or large community centres. This may lead to discomfort among emergency physicians (EPs) and registered nurses (RNs) in managing these patients and a waning of knowledge and skills for this unique population. Among the EP group at our institution, 68% indicated they managed pediatric patients in less than 25% of their shifts, 68% also indicated they were uncomfortable managing an undifferentiated critically unwell neonate and only 32% indicated they would be comfortable teaching pediatric topics to emergency medicine residents. At our institution, our innovation was to create a useful curriculum for certified EPs and RNs to improve the interdisciplinary teams comfort level, knowledge and skill set when managing pediatric emergencies. **Methods:** A needs assessment was undertaken of the EPs and RNs working in our centre. This information was used to develop intended learning outcomes in a collaborative manner with the clinical nursing educator and physician curriculum leads. The team further collaborated with the local simulation centre and a pediatric emergency physician from the local childrens hospital. **Results:** A one-year, three-module curriculum was developed to cover the areas felt to be highest yield by the EP group: febrile illness, respiratory disease and critically ill neonates and infants. Each module contains three components: an in person interactive lecture delivered by an EP who routinely manages pediatric patients, either at a childrens hospital or large community centre; an online component with e-mail blasts of high yield pediatric content; and, culminating in an interdisciplinary interdepartmental simulation held in situ. This latter is particularly important so that all members of the interdisciplinary team can practice finding and using equipment based on its actual location within the ED. Each component of each module is then evaluated by the participants to ensure improvement for subsequent delivery. **Conclusion:** Well delivered continuing professional development (CPD) will become increasingly important as competence by design becomes the model for maintenance of certification. Maintaining skills for pediatric patients is an important component of CPD for physicians working in general emergency departments that see a low volume of high acuity pediatric presentations. Our curriculum seeks to address this identified need in an innovative manner using a modular and interdisciplinary approach with a diversity of teaching methods to appeal to the learning styles among our health care team.

Keywords: innovations in emergency medicine education, pediatric emergency medicine, continuing professional development

P110

A prospective cohort study to evaluate sex differences in presentations and management for patients presenting to emergency departments with atrial fibrillation and flutter

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Introduction: Atrial fibrillation and flutter (AFF) represent the most common arrhythmia presentations to emergency departments (EDs). Some research suggests that women with AFF experience different symptoms, receive different treatment and have worse outcomes than men. This study explored sex differences in risk factors, medication, and outcomes before and after ED visits for acute AFF. **Methods:** Adult patients presenting to the one of three hospitals affiliated with the

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University of Alberta with acute AFF were enrolled. Following informed consent, each patient completed a survey administered by a trained researcher, administrative ED information (e.g., ED times) was collected from the ED information system, a chart review on treatments was conducted and patients were contacted for follow-up at 7 days via telephone. Descriptive (median and interquartile range {IQR} and proportions) and simple (Wilcoxon-Mann-Whitney, chi-square, z-proportion) statistics are presented for continuous and dichotomous outcomes. **Results:** Overall, 217 patients were enrolled; the median age was 64 years (IQR: 55, 73) and 39% were female. Males presenting to the ED with AFF were 10 years younger than females ($p < 0.001$); however, females weighed significantly less (median weight 69 vs. 95 kg; $p < 0.001$), consumed less alcohol (12 vs. 60 drinks/year; $p < 0.001$) and were less likely to be ex-smokers ($p = 0.022$) than men with AFF. Women arrived by Emergency Medical Services (EMS) ($p = 0.037$), experienced palpitations ($p = 0.042$), and reported a history of hypertension ($p = 0.022$) more frequently than men. Females were more often prescribed oral anticoagulants before ($p = 0.041$) and after ($p = 0.011$) the ED visit, and females with a history of AFF were less likely to present without anticoagulant/antiplatelet therapy ($p = 0.015$). Overall, both sexes had similar attempts at cardioversion (59.4% vs. 61.3%) and hospitalizations (12.5% vs. 8.6%), respectively. If initial chemical cardioversion failed, females were more likely to receive subsequent electrical cardioversion (60.0% vs. 26.7%, $p = 0.036$) than men. **Conclusion:** Overall, both women and men present frequently to the ED with AFF. Compared to men with AFF, women present with symptoms 10 years later, have different risk factors, experience more severe symptoms and use EMS more commonly; however, outcomes were similar. Unexplained sex-based variations in-ED and post-ED management are evident and these differences warrant further scrutiny.
Keywords: atrial fibrillation, anticoagulation, sex differences

P111

Burnout among emergency physicians working at a large tertiary center in London, Ontario

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Introduction: Emergency medicine (EM) is known to be a high-stress specialty. Work related stress and burnout have been reported to negatively impact physician-patient interactions, collaboration and ultimately overall physician mental and physical health. We sought to assess the rates of burnout among emergency physicians working at a single large Canadian tertiary care center and to identify higher risk groups. We hypothesized burnout rates to be uniformly high. **Methods:** We conducted a local cross-sectional study to assess burnout among adult and pediatric emergency physicians, fellows and residents at London Health Sciences Centre (LHSC). A total of 118 participants were invited to complete an anonymous online survey encompassing demographics, the validated MBI tool (Maslach Burnout Inventory) with additional questions aimed at identifying determinants of emergency physician burnout at LHSC. Each respondents three MBI scale scores for Emotional Exhaustion, Depersonalization and Personal Accomplishment were recorded with a possible range of 0-6. Descriptive statistics were calculated and relationships between risk factors (age, gender, years of practice, marital status, and credentials) and burnout scores were examined using t-tests, one-way ANOVAs, and/or regression analyses where appropriate. **Results:** To date the survey had a 50% (59/118) response rate. Of the 59 respondents 24 (40%) were female, the mean (SD) age was 40.6 years (10.5) and years of practice ranged from 1 to 35, with a mean of 13. Survey results indicated a high degree of burnout among LHSC EM physicians with a mean (SD) Emotional Exhaustion Score of 2.9 (1.3) and Depersonalization score of 2.4 (1.3), indicating that physicians felt burnt out from work between once a day to once a week. Inversely, the protective variable of Personal Accomplishment, with a score of 4.7 (0.9), indicated daily to weekly feelings of accomplishment. Female physicians (independent samples t-test, $p = 0.003$) and those having fewer years of practice (linear regression, $R2 = 0.188$, $p = 0.04$) were identified to have higher burnout. We did not identify any factors associated with Personal Accomplishment. **Conclusion:** Consistent with previous literature, LHSC emergency physicians were shown to be at risk for moderate to severe burnout. High risk groups identified included gender (female) and fewer years of practice. We did not identify any factors to be protective. Despite this, LHSC emergency physicians showed a high degree of personal accomplishment. While all physicians experience burnout, targeted interventions to newer female staff could have the highest benefit.
Keywords: wellness, burnout, emergency medicine consultant

P112

FLO on flow: front line ownership of emergency department, hospital, and health system patient flow a novel approach to ED overcrowding (Part 1)

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Introduction: Hospital access block, often called Emergency Department (ED) overcrowding when it manifests there, is an important public health issue and seemingly intractable problem in our evolving Health Care system. The multiple, dynamic, and inter-dependent factors influencing its cause (and potential solutions) may best fit a complex adaptive systems analysis and approach. One technique described in similar contexts is Front Line Ownership (FLO) based on the theoretical framework of positive deviance. The aim of this study is to discover where pragmatic bottom-up insights and adaptive work-arounds can be elicited, described, iterated, and potentially implemented at a broader scale to catalyze systems change, in service of improving patient flow. **Methods:** This is a qualitative study which identified, convened, and surveyed stakeholders representing three components of the system. Purposive sampling was used to gather a full range of perspectives from three groups: 1) patients and or families, 2) front-line providers, and 3) management/leaders. Interviews were recorded and transcribed by a third party, then each transcription was coded independently by two investigators (at least one of which was the PI). Informed consent was obtained from all participants and each was offered the opportunity to review the transcription to ensure accuracy. A framework analysis was used to synthesize, reflect upon, and interpret the data from multiple perspectives using a structured, iterative approach. **Results:** In part 1 of this study, three broad over-lapping themes emerged from the analysis as being areas of opportunity for reducing hospital access block. They are: 1) Boundary Conditions (the historical, organizational cultural, psychological, economic, and other contexts influencing system performance), 2) Systems Integration (how well the parts interface with each other relate to the whole), and 3) Operations management (the more technical aspects of patient flow). When these three broad themes are cross-analyzed with a more conventional input-throughput-output approach, previously under-emphasized avenues for improvement may become apparent. **Conclusion:** A front-line ownership analysis of ED overcrowding is feasible. There are adaptive behaviors by some front-line individuals at each "level" of perspective that have been identified

and could be modified and implemented locally to improve patient flow in the ED (and the rest of the health system).
Keywords: quality improvement and patient safety, positive deviance, complex adaptive systems

P113

A systematic review and meta-analysis of tourniquet devices for speed of application, successful hemostasis and patient tolerance

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Introduction: Tourniquets are a mainstay of hemorrhage management. However, there is insufficient evidence to guide device sselection. This review analyses the literature on tourniquets, for the following outcomes: lower-extremity arterial hemostasis, application speed, and pain. **Methods:** Studies were limited to English. Non-human studies, case series, and intra-operative applications were excluded. A systematic review of MEDLINE, PubMed, Google Scholar, and the Cochrane Database from 1992 to Dec 2017 was performed. Article citations were also assessed. **Results:** Twenty-one studies met criteria, testing 28 tourniquet devices. The most popular devices for arterial hemostasis were the Combat Application Tourniquet (C-A-T) (662 applications), Special Operations Forces Tactical Tourniquet (SOFTT) (307 applications), blood pressure cuff (80 applications), rubber tubing (58 applications) and the Emergency Medical Tourniquet (EMT) (52 applications). The blood pressure cuff achieved the highest (weighted averages) rate of 99% (95% CI 93 to 100) based on four studies of 80 applications. Followed by the EMT which achieved 83% (95% CI 72 to 93), based on three studies of 52 applications ($p < 0.01$). The fastest device to apply, taking 17 seconds (95% CI 11 to 23), was surgical tubing, based on two studies totalling 30 applications. The next fastest was the blood pressure cuff, requiring 20 seconds (95% CI 18 to 22), based on two studies totaling 58 applications (though there was no statistical difference in application time, $p = 0.08$). Tolerance could not be analyzed, due to heterogeneity of outcome measures. **Conclusion:** This is the first meta-analysis of tourniquet outcomes. The literature lacks a standard approach to device application. The quality of evidence is of very low due to the small sample sizes, lack of blinding, selective outcome reporting and result inconsistency. Common medical equipment appear to outperform commercial tourniquets for arterial hemostasis and speed of application; however, they are some of the least studied devices.
Keywords: trauma, tourniquet, hemorrhage control

P114

Blood on board: the development of a prehospital blood transfusion program in a Canadian helicopter emergency medical service

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Introduction: Prehospital blood transfusion has been adopted by many civilian helicopter emergency medical service (HEMS) agencies and early outcomes are positive. Shock Trauma Air Rescue Service (STARS) operates six bases in Western Canada and in 2013 implemented a prehospital transfusion program. We describe the processes and standard work ensuring safe storage, administration, and stewardship of this precious resource. Our aim was to produce a sustainable and safe blood storage system that could be carried on each mission flown. **Methods:** Close collaboration with transfusion services and adherence to Canadian Transfusion Standards was key at each step of development. An inexpensive, reusable, temperature controlled thermal packaging device was obtained along with an electronic temperature logger. Conditioning of the device and temperature maintenance (1 6C) was tested to ensure safe storage conditions. Online training programs were developed for air medical crew (AMC) as well as transport physicians (TPs) regarding administration indications, safety, and stewardship processes. Blood traceability and usage was monitored on an ongoing basis for quality assurance. **Results:** Two units of O negative packed red blood cells (pRBCs) are now carried on each flight. The blood box is conditioned and prepared by transfusion services for routine exchange every 72 hours. If pRBCs are administered the blood bank is immediately notified for preparation of another cooler. Unused blood is returned to blood bank circulation. **Conclusion:** The introduction of the STARS blood on board program supports the provision of emergent transfusion to selected patients in the pre-hospital environment. Our standard work and stewardship processes minimize wastage of blood products while keeping it readily available for critically ill and injured patients. Subsequent work will aim to describe characteristics and patient centred outcomes.
Keywords: quality improvement and patient safety, prehospital blood transfusion, helicopter emergency medical service

P115

Bounceback reports-improving patient care

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Introduction: Seeking patient outcome feedback (POF), defined as obtaining information on a patients clinical course beyond ones care, is crucial to the learning process. However, the lack of POF is a major pitfall of emergency medicine. Emergency department (ED) bouncebacks, which are characterized as patients with unplanned returns to the ED after being discharged, are an important type of POF to study because they represent a potential misdiagnosis or mismanagement and can highlight areas for physician self-improvement. Currently, most hospitals do not relay details about ED bouncebacks back to the treating physician, unless a grave error occurred. This studys purpose is to provide weekly reports to all physicians in the ED on patients who have unplanned returns within 7 days of discharge from the ED, and evaluate the impact this has on the physicians practice on seeking POF. **Methods:** A new weekly report was distributed to physicians working at an academic hospital outlining the patients who have returned within 7 days of discharge from the ED, their new presenting complaint and final disposition. An online survey was also administered to all ED staff evaluating the amount of POF they sought pre and post report, and their attitude towards the new reports. **Results:** 22 responses were received, for a response rate of 85%. The majority of respondents follow the reports (73%) and actively seek POF by looking up patients charts and results(70%). Additionally, 58% state that they seek POF more often since receiving these reports, for both the bouncebacks and their other patients. Furthermore, 37% claimed that the reports helped improve the appropriateness of their referrals and 32% stated it helped increase their confidence in their clinical practice. The majority of physicians (87%) found the reports to be helpful and would like to continue receiving it. **Conclusion:** Weekly bounceback reports are a high-yield tool for increasing POF sought in the ED and have benefits for both the physician and the department as a whole. They can be used to not only identify patients who may have had an error in their management, but

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also help to improve physicians' clinical skills by encouraging and enabling follow-up of patients they managed. Thus, bounceback reports are a valuable tool to provide to physicians and should be considered by ED Departments.
Keywords: quality improvement and patient safety, bouncebacks, patient outcome feedback

P116

A randomized cross-over trial of conventional bimanual versus single elbow (Koch) chest compression quality in a height-restricted aeromedical helicopter

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Introduction: Aeromedical helicopters and fixed wing aircraft are used across Canada to transfer patients to definitive care. Given height limitation in aeromedical transport, CPR performance can be affected. An adapted manual compression technique has been proposed by H. Koch (pron. Cook) that uses the elbow to compress the sternum rather than the conventional hand. This preliminary study evaluated the quality of Koch compressions versus conventional bimanual compressions. **Methods:** Paramedics (5), registered nurses (3) and a physician (1) were recruited. Each participant performed a 2 minute cycle of each technique, were randomized to determine which technique was performed first, and rested 5 minutes between compression cycles. A Resusci Anne SkillReporter manikin atop a stretcher in a BK117 helicopter was used. The compressors performed without feedback or prompting. Outcomes include compression rate, depth, recoil, and fatigue. **Results:** The mean conventional compression rate was (bpm) 118 +/− 13 versus 111+/− 10 in the Koch scenario ($p = 0.02$) (target 100 to 120). Mean conventional compression depth (mm) was 44 +/− 9 versus 49 +/− 7 in the Koch scenario ($p = 0.01$) (target 50 to 60). The mean percentage of compressions with complete release in the conventional scenario was 86 +/− 20 versus 84 +/− 22 in the Koch scenario ($p = 0.9$) (target 100%). Using a Modified Borg Scale of 1 to 10, mean provider fatigue after conventional CPR was 7 (+/− 1.6) versus 3 (+/− 1.2) using Koch technique ($p < 0.001$). On average, Koch technique improved the percentage of compressions at target rate by 26%, the percentage at correct depth by 9%, overall compression quality score by 13% and were more less fatiguing. **Conclusion:** Using an elbow in a height-restricted environment improved compression depth and reduced provider fatigue. From our limited data, Koch compressions appear to improve compression quality. Further study and external validation are required.
Keywords: resuscitation, cardiopulmonary resuscitation, aeromedical transport

P117

A pilot program of physician at triage conducted at a tertiary care hospital improved measures of emergency department throughput and provides a potential solution for emergency department overcrowding

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Introduction: Emergency Department Overcrowding (EDOC) is a multifactorial issue that leads to Access Block for patients needing emergency care. Identified as a national problem, patients presenting to a Canadian Emergency Department (ED) at a time of overcrowding have higher rates of admission to hospital and increased seven-day mortality. Using the well accepted input-throughput-output model to study EDOC, current research has focused on throughput as a measure of patient flow, reported as ED length of stay (LOS). In fact, ED LOS and ED beds occupied by inpatients are two "extremely important indicators of EDOC identified by a 2005 survey of Canadian ED directors. One proposed solution to improve ED throughput is to utilize a physician at triage (PAT) to rapidly assess newly arriving patients. In 2017, a pilot PAT program was trialed at Kelowna General Hospital (KGH), a tertiary care hospital, as part of a PDSA cycle. The aim was to mitigate EDOC by improving ED throughput by the end of 2018, to meet the national targets for ED LOS suggested in the 2013 CAEP position statement. **Methods:** During the fiscal periods 1-6 (April 1 to September 7, 2017) a PAT shift occurred daily from 1000-2200, over four long weekends. ED LOS, time to inpatient bed, time to physician initial assessment (PIA), number of British Columbia Ambulance Service (BCAS) offload delays, and number of patients who left without being seen (LWBS) were extracted from an administrative database. Results were retrospectively analyzed and compared to data from 1000-2200 of non-PAT trial days during the trial periods. **Results:** Median ED LOS decreased from 3.8 to 3.4 hours for high-acuity patients (CTAS 1-3), from 2.1 to 1.8 hours for low-acuity patients (CTAS 4-5), and from 9.3 to 8.0 hours for all admitted patients. During PAT trial weekends, there was a decrease in the average time to PIA by 65% (from 73 to 26 minutes for CTAS 2-5), average number of daily BCAS offload delays by 39% (from 2.3 to 1.4 delays per day), and number of patients who LWBS from 2.4% to 1.7%. **Conclusion:** The implementation of PAT was associated with improvements in all five measures of ED throughput, providing a potential solution for EDOC at KGH. ED LOS was reduced compared to non-PAT control days, successfully meeting the suggested national targets. PAT could improve efficiency, resulting in the ability to see more patients in the ED, and increase the quality and safety of ED practice. Next, we hope to prospectively evaluate PAT, continuing to analyze these process measures, perform a cost-benefit analysis, and formally assess ED staff and patient perceptions of the program.
Keywords: quality improvement and patient safety, physician at triage, emergency department overcrowding

P118

Pulmonary Embolism Severity Index (PESI) score as a predictor for readmission in acute pulmonary embolism in emergency department?

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Introduction: Pulmonary Embolism (PE) management in Emergency Department (ED) confers a substantial cost burden representing opportunities for improvements in decision-making. The Pulmonary Embolism Severity Index (PESI) is a validated tool to prognosticate patients with PE supporting admit versus (vs.) discharge decisions from the ED. Despite existing evidence, PESI is under-used in patients with PE. We sought to evaluate PESI scores and patient disposition from 4 EDs within Calgary to determine discordance between them and the effect of the discordance on readmission and mortality. **Methods:** Retrospective review of adult patients 18 years, diagnosed with PE between January-June 2016 at 4 EDs in Calgary Health Region. Patients were divided into high-risk PESI (score > 85) and low-risk PESI (score 0-85). Chi-Square (2) test was used for comparison between the groups. Primary outcome measure was rate of discordance between PESI risk

and disposition decision and identify factors driving the discordance. Secondary outcome measures included comparing 30-day readmission rate, 30-day and 90-day mortality between the discordant PESI groups. **Results:** 365 patients were diagnosed with PE in the study period with 60% being admitted and 40% discharged. The median PESI score in admitted patients was 85 (26-172) vs. 68 (20-163) in discharged patients. 51% of admitted patients had a low-risk PESI score and 24% of the discharged patients were high-risk PESI. 30-day readmission rate was 22.9% vs. 5.3% ($p = 0.002$) in discharged patients with high-risk PESI vs. discharged patients with low-risk PESI. Hypoxemia was the most common (62%) justification for admission in low-risk PESI groups. Among discharged patients we noted an 8.6% 90-day mortality in the high-risk vs. 0% in the low-risk PESI groups. **Conclusion:** Discharging a PE patient from the ED with a high PESI score carries a significant risk of ED revisit and readmission. Hypoxia was the reason for admission in majority of low risk PE patients.

Keywords: pulmonary embolism severity index, acute pulmonary embolism

P119

Pain free laceration repairs using intra-nasal ketamine: DosINK 1- A dose escalation clinical trial

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Introduction: Laceration is common in children presenting to the emergency department (ED). They are often uncooperative related to pain and distressed during repair. Currently, there are wide variations regarding sedation and analgesia practices when sutures are required. There is a growing interest in the intranasal (IN) route for procedural sedation and pain control because of its effectiveness potential and ease of administration. Few studies have evaluated IN ketamine for procedural sedation in children with reported doses ranging from 3 to 9 mg/kg. The objective is to evaluate the optimal IN ketamine dose for effective and safe procedural sedation for laceration repair in children aged 1 to 12 years. **Methods:** A dose escalation clinical trial with an initial dose of 3 mg/kg of IN ketamine up to a maximum dose of 9 mg/kg in children 1 to 12 years old, using a 3+3 trial design. For each tested dose, 3 patients are enrolled. Escalation to the next dose is permitted if sedation is unsuccessful in at least one patient without serious adverse event (SAE). Regression to prior dose is warranted in the occurrence of two or more SEAs. This process is repeated until effective sedation for 6 patients at two consecutive doses is achieved with a maximum of 1 SAE or if regression occurs. The primary outcome is the optimal dose for successful procedural sedation as per the PERC/PECARN consensus criteria. Secondary outcome, namely, pain and anxiety levels, parent, patient and provider satisfaction, recovery time, length of stay in the ED, side effects and adverse event are recorded. **Results:** Nine patients have been recruited from March to December 2017 with median age of 2.9 years-old and with laceration length of 2 to 5 cm and with facial involvement in 55% of cases, respectively. Sedation was successful in 1/3, 1/3 and 3/3 of patients at doses of 3, 4, 5 mg/kg respectively, without any SAE. Median time from ketamine administration to return to baseline status and discharge were 35 and 98 min, respectively. We expect to complete patient recruitment in March 2018. **Conclusion:** The results from our trial is a groundwork for future dose-finding study. Pending study completion, a multicentric dose validation trial, is set up to further validate the optimal dose from dosINK1 trial. IN ketamine has the potential to improve the field of procedural sedation for children by introducing an effective IN agent with respiratory stability but without the need for an IV line insertion not otherwise needed.

Keywords: intranasal, ketamine, procedural sedation

P120

Rapid hepatitis C virus screening and diagnostic testing for high-risk patients in an urban emergency department: a pilot project

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Introduction: Hepatitis C virus (HCV) infection represents a significant public health problem in Canada and it is estimated that nearly half of individuals with chronic hepatitis C infection are unaware of their disease status. Previous studies of urban emergency department (ED) based screening programs have shown a prevalence ranging from 7.3 to 26% in high risk patients presenting to the ED . The advent of new treatment regimens with high rates of virologic cure strengthens the case for identifying the optimal setting for screening and testing individuals who may benefit from treatment. The proposed pilot project of ED-based screening for hepatitis C virus will aim to determine the prevalence of undiagnosed HCV infection and to link patients with chronic HCV infection to appropriate specialized follow-up care. **Methods:** We will be conducting a prospective cohort study of patients presenting to an urban emergency department between March and May 2018. Patients will be screened using high risk criteria for HCV infection as per national guidelines. Eligible patients will be offered and consented for a rapid point of care antibody test. Individuals with a positive antibody screen will have confirmatory testing and be linked to hepatology follow-up. The primary outcome will be the prevalence of hepatitis C virus among tested patients. Secondary outcomes will include the proportion of high risk patients without a primary care MD or access to alternate care settings where screening may occur, as well as the proportion of HCV-positive patients who are successfully linked to care. **Results:** We expect to screen approximately 2000 participants during the study period leading to an estimated 400 rapid antibody tests. Based on published results from other centres, we estimate that a significant proportion of screened patients will test positive for chronic HCV infection ($>$ 10%). Descriptive analyses will be performed for all variables using proportions with 95% confidence intervals. **Conclusion:** To our knowledge, no emergency department in Canada has undertaken protocoled HCV screening using rapid antibody testing in the ED. Results will inform the future development of integrated ED-based screening programs in novel settings more likely to be accessed by the at-risk population. Linking patients with chronic HCV infection to appropriate care will decrease the number of individuals developing HCV-related cirrhosis and hepatocellular carcinoma, thereby improving patient outcomes and reducing the future impact on our health care system.

Keywords: screening, public health, hepatitis C virus

P121

Derivation of a clinical decision tool for predicting adverse outcomes among emergency department patients with lower gastrointestinal bleeding

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Introduction: Lower gastrointestinal bleeding (LGIB) can result in serious adverse events, including recurrent bleeding, need for intervention

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and death. Endoscopy is important in the management of LGIB, however gastroenterologists have limited resources to safe endoscopy. Risk stratification of LGIB patients can aid physicians in disposition decisions. Objective: to develop a clinical decision tool to accurately identify LGIB patients presenting to the emergency department (ED) who are at risk for 30-day serious adverse events. **Methods:** We conducted a health records review and included 372 adult ED patients who presented with an acute LGIB. The outcome was a 30-day composite outcome consisting of all-cause death, recurrent LGIB, need for intervention to control the bleed and ICU admission. A second researcher confirmed data-collection of 10% of the data and we calculated a -value for inter-rater reliability. We analyzed the data using stepwise backwards selection and SELECTION = SCORE option and calculated the diagnostic accuracy of the final model. **Results:** Age 75 years, hemoglobin 100 g/L, INR 2.0, a bloody stool in the ED and a past medical history of colorectal polyps were significant predictors in the multivariable regression analysis. The AUC was 0.83 (95% CI 0.77-0.89), sensitivity 0.96 (0.90-1.00), specificity 0.53 (0.48-0.59), and negative likelihood ratio 0.08 (0.02-0.30) for a cut-off score of 1. **Conclusion:** This model showed good ability to identify LGIB patients at low risk for adverse events as evidenced by the high AUC, sensitivity and negative likelihood ratio. Future, large prospective studies should be done to confirm the data, after which it should be validated and implemented.

Keywords: lower gastrointestinal bleeding, decision tool, risk stratification

P122

Ready for the story? A mixed methods systematic review of factors that influence handovers between prehospital personnel and emergency department nurses receiving patients arriving by ambulance

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Introduction: Safe and efficient handovers between emergency medical services (EMS) practitioners and emergency nurses are vital as poor transitions may lead to loss of information and place patients at risk for adverse events. We conducted a mixed methods systematic review to a) examine factors that disrupt or improve handovers from EMS practitioners to emergency department nurses, and b) investigate the effectiveness of interventional strategies that lead to improvements in communication and fewer adverse events. **Methods:** We searched electronic databases (DARE, MEDLINE, EMBASE, Cochrane, CINAHL, Joanna Briggs Institute EBP; Communication Abstracts); grey literature (grey literature databases, organization websites, querying experts in emergency medicine); and reference lists of the included studies. Citation tracking was conducted for the included studies. Two reviewers independently screened titles/abstracts and full-texts for inclusion and methodological quality using the Effective Public Health Practice Project Quality Assessment Tool for quantitative studies and the Joanna Briggs Institute Critic Appraisal Checklist for Qualitative Research. Narrative and thematic synthesis were conducted to integrate and explore relationships within the data. **Results:** Twenty-two studies were included in this review from the 6150 records initially retrieved. Our analysis suggests that qualitative, quantitative, and mixed methods research approaches have been utilized to explore handovers. Studies (n = 11) have predominantly explored existing patterns of handovers focusing on barriers and facilitators. Interventions (e.g. multimedia transmission of pre-hospital information, tailored e-learning program) were investigated in five studies. Results suggest that lack of formal handover training, workflow interruptions, workload, and strained working relationships between EMS and nursing are perceived threats to optimal handovers. **Conclusion:** The findings from this review can inform the development of handover interventions and contribute to a more rigorous approach to researching handovers between EMS practitioners and emergency nurses. Furthermore, there is a need for studies in which specific interventions to optimize handovers are examined.

Keywords: handovers, emergency medical services, emergency department nurses

P123

Mental practice for technical skills training in emergency medicine: a scoping review

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Introduction: Emergency physicians must achieve and maintain competence in numerous procedural skills, many of which are high stakes, time dependent, and used infrequently in clinical practice. Mental practice (MP) is the systematic use of mental imagery to see and feel an action in ones imagination without engaging in actual physical movement, and has been shown to enhance skill acquisition and performance in music and athletics. In this scoping review, we describe the utility and effectiveness of MP as a tool for procedural skill acquisition in medicine. **Methods:** An electronic search of MEDLINE, EMBASE, the Cochrane Library, CINAHL, PsycINFO, Open Grey, Conference Proceedings Index, ProQuest Dissertations and Theses and Google Scholar was conducted. Included studies evaluated MP for learning medically related technical skills using any method of mental training (script memorization, hypo-therapy, psychotherapy). Two independent reviewers screened articles for inclusion, and data was extracted using a standardized tool. **Results:** Our search returned 2028 results, of which 61 were eligible for inclusion. Forty-three studies evaluated MP interventions for technical skill development. Of these, 69.6% focused on minimally invasive surgical skills. The most common outcome measure was quantitative evaluation of skill via observer-scored checklist (69.6%). Other outcomes included stress, time to task completion, and haptic and movement data from surgical simulators. 82.6% of studies demonstrated a positive effect of MP on skill acquisition or performance. The quality of the trials was modest, and only 34.7% of published work provided clear detail on specific MP strategies. **Conclusion:** MP is an effective tool for procedural skills training. Areas outside of minimally invasive surgery are under-represented, and more data is needed on MP for rare or emergent procedures that typify emergency care. The minority of studies reviewed reported methods for developing and validating MP interventions in sufficient detail, a practice that should be adopted in future trials.

Keywords: mental practice, airway, cricothyroidotomy

P124

A new in-skates balance error scoring system for the sideline assessment of concussion in hockey players

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Introduction: During a hockey game, athletes who are suspected of having sustained a concussion are removed from the game and evaluated. The modified balance error scoring system (MBESS) assessment, an essential part of the concussion evaluation, is performed in the dressing room, barefoot on a hard surface after equipment removal.

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

Keywords: concussion, balance, hockey

P125

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

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

Keywords: extracorporeal cardiopulmonary resuscitation, resuscitation, cardiac arrest

P126

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

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

Keywords: extracorporeal cardiopulmonary resuscitation, resuscitation, selection

P127

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

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

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

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

P128

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

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Introduction: Bed boarding of admitted patients in the Emergency Department (ED) is widely recognized as a major contributor to overcrowding, particularly in very high-volume hospitals. The issue of bed boarding is directly tied to hospital-wide capacity, flow and operations. Early morning discharge from inpatient units has been identified as a low-cost intervention to decrease bed boarding, as it allows earlier transfer of admitted patients from the ED. Several hospitals have instituted discharge before noon, or discharge before 10AM policies, practices and targets. Our objectives were 1) to assess the current status of flow within 3 high-volume community hospitals with respect to time of day of discharges from the in-patient units and time of day of transfers from the ED to in-patient units, and 2) to assess the association between time of transfer from the ED and total ED Length of Stay (EDLOS) of admitted patients. **Methods:** We conducted a retrospective multi-centre observational study during the period of January 1, 2015 to December 31, 2015 at three high-volume community hospitals within Ontario, Canada. All patients admitted to the Medicine service were identified. Time of discharge from the in-patient units and time of transfer from the ED were collected for all patients. EDLOS was calculated for all patients as a function of time of transfer from the ED. **Results:** Preliminary findings show that, for the three community hospitals, only 11.7% - 19.6% of admitted patients were discharged from the in-patient units during the period between 6AM and 12PM, with a peak discharge time of 2PM in all three hospitals. A concurrent lag was observed in the time of transfer of patients from the ED, with peak transfer times occurring the late afternoon between 3PM and 9PM, and coinciding with a peak in patient volume in the ED. Patients transferred out of the ED earlier in the day (between 12AM 11:59AM) had between 1.4 hours to 8.0 hours lower mean EDLOS when compared to those patients transferred later in the day (between 12PM 11:59PM). **Conclusion:** Hospital-wide flow and operational issues have a significant impact on ED bed boarding, and potential efficiencies seem at the current time to be underutilized. Interventions aimed at optimizing flow must be implemented alongside those aimed at increasing capacity in order to improve bed boarding. ** These findings are best communicated in graphic form to better represent the dynamics of the flow in and out of the ED over a 24-hour period, and will be presented in graphic format if selected for the conference.

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

P129

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

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

total of 44 ED physicians were analyzed. Results show average 4-year ordering rates for CT heads among ED physicians ranging from 4.0% to 13.9%, and CT PE ordering rates ranging from 0.1% - 1.7%. The correlation coefficient between CT head and CT PE ordering rates was positive for all 4 years, with a statistically significant ($p < 0.05$) correlation coefficient of 0.53. **Conclusion:** There is a wide degree of variability in DI ordering patterns among physicians working within the same clinical environment. Further exploration of this interphysician variability will be helpful in designing strategies to mitigate overutilization of diagnostic imaging.

Keywords: diagnostic imaging, physician practice patterns, computer tomography utilization

P130

Cumulative daily boarding time: a new way to measure emergency department congestion and hospital-wide flow

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Introduction: Bed boarding of admitted patients in the Emergency Department (ED) is one of the major contributors to ED overcrowding, and an indicator of hospital-wide deficiencies in capacity and flow. Most indicators of ED overcrowding have measured either counts or percentages of patient subgroups (e.g. number/percentage of patients waiting in triage or number/percentage of admitted patients as compared to full ED census), or specific process time intervals related to patient movement through the hospital (e.g. Physician to Initial Assessment (PIA) time or total ED Length of Stay (EDLOS)). We sought to 1) devise an alternative measure of ED overcrowding that captured the dynamic and disproportionate resource utilization of admitted versus non-admitted patients in the ED, and to 2) determine the association of this measure with selected ED quality metrics for non-admitted patients. **Methods:** We conducted a retrospective multi-centre observational study at three very high-volume community hospitals in the Greater Toronto Area. Data on all patients visiting the ED during the period between January 1, 2015 and December 31, 2016 were included in the study. We calculated the total daily cumulative boarding time - or time to bed (TTB) - for each day of the study duration. The daily cumulative TTB was calculated as the time from decision to admit to transfer from the ED for all admitted patients within a 24-hour period. We conducted linear regression analysis to determine the association between our measured daily cumulative TTB and daily median and 90th percentile PIA and EDLOS times for non-admitted patients. **Results:** Preliminary results for 2015 indicate a total cumulative TTB time ranging from 50,973 hours to 191,093 patient-hours for the year, with daily mean cumulative TTB ranging from 140 524 patient-hours/day among the three hospitals. In all three hospitals, there was a statistically significant ($p < 0.01$) positive association between daily cumulative TTB and both median and 90th percentile PIA times for all patients, and median EDLOS times for non-admitted CTAS 1-3 patients. There was a statistically significant ($p < 0.05$) positive association between daily cumulative TTB and 90th percentile EDLOS for non-admitted CTAS 1-3 patients in two of the three hospitals, with the third hospital showing a positive but non-significant association. **Conclusion:** Bed boarding constitutes a significant resource cost for EDs, and has a negative impact on timeliness of ED care for the general ED population, particularly more complex (CTAS 1-3) non-admitted patients.

Keywords: emergency department overcrowding, quality metrics, hospital administration

P131

Antimicrobial stewardship and best practices for the treatment of STIs in ED sexual assault patients

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Introduction: It is assumed that sexual assault cases presenting at Emergency Departments (ED) are frequently lost to follow-up and should be considered an eligible population for presumptive antimicrobial treatment of sexual transmitted infections (STIs) at initial assessment without lab confirmation. With the growing burden of antibiotic resistance, antimicrobial stewardship guidelines caution against this practice. Among sexual assault cases, our study evaluated STI prevalence, follow-up and retention patterns, and described the prevalence of STI presumptive treatment. **Methods:** The Sexual Assault and Partner Abuse Care Program (SAPACP) at The Ottawa Hospital is the only program in Ottawa offering emergency and forensic care for survivors of sexual assault and domestic violence. Descriptive statistics were used to summarize information on demographics, clinical presentation, STI testing and results using data from the SAPACP case registry (January 1 - December 31, 2015). **Results:** Among the 406 patients seen by the SAPACP, there were 262 (64.5%) sexual assault cases that were included in this analysis. STI testing was completed for 209 (79.8%) patients at the initial visit, 90 (43.1%) completed via urine nucleic acid testing (NAAT), 140 (67.0%) via culture swab and 20 (9.6%) via both. Laboratory results detected no cases of gonorrhea, 8 (3.8%) cases of chlamydia, 33(15.8%) cases of bacterial vaginosis (BV), 17 (8.1%) cases of yeast vaginitis and 16 (7.7%) indeterminate testing results. Antimicrobial STI presumptive treatment was given to 12 (5.7%) patients at the time of their initial visit prior to lab confirmation. Patient follow-up occurred in 172 (82.3%) patients, with all chlamydia cases treated. Of the 37 (17.7%) patients lost to follow up, 9 were positive for BV, 1 was positive for yeast and 10 were indeterminate, all of which may be underlying vaginal flora. Follow up testing/test of cure was completed in 91 (52.9%) of patients, with 4 (2.3%) positive results, all of which were BV. **Conclusion:** In our ED, up to 15.8% of sexual assault patients had at least one laboratory confirmed STI and over 80% of all patients returned for follow-up. Our results show that it is safe and effective to only treat STI screen positive cases at follow-up, reducing the frequency of presumptive antimicrobial STI treatment. Benefits of this strategy include decreased patient side effects, cost savings and better antimicrobial stewardship.

Keywords: sexual assault, sexually transmitted infections, antibiotic stewardship

P132

Real life management of patients presenting with upper gastrointestinal bleeding in a tertiary care emergency department - Are we delivering the standard of care?

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Introduction: Upper gastrointestinal bleeding (UGIB) is a common Emergency Department (ED) presentation. Early endoscopic intervention, supported by Glasgow Blatchford Score (GBS) severity, has been shown to reduce re-bleeding rates and lower morbidity and mortality. However, emergent endoscopy is not necessary for all patients. Low-risk patients can be managed with outpatient follow-up. Other important

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management decisions such as blood transfusion (Hb <70) and use of proton pump inhibitors (PPI) also warrant evaluation. The aim of this study was to compare the timing and appropriateness of endoscopy and blood transfusion and proton pump inhibitor (PPI) use in a tertiary care setting to the standard of care. **Methods:** A retrospective cohort study was conducted to examine the management of patients presenting with UGIB to the ED in 2016 using a standard chart review methodology. TANDEM and EDIS (Emergency Department Information System) databases were queried to identify patients using specified ICD 10 codes and the CEDIS (Canadian Emergency Department Information System) presenting complaints of vomiting blood or blood in stool/melena. Outcome measures included: patient characteristics, the GBS to determine appropriateness of endoscopic intervention, diagnoses, blood transfusion indications and utilization of oral or intravenous PPIs. Data were entered into a REDCap database and analyzed using standard non-parametric statistical tests. **Results:** A total of 200 patients, 59% male (118/200), mean age 59 years (range 18 - 92 years) were included. The median GBS was 9. 79% of patients (157/200) underwent endoscopy during the hospital visit: 30% of patients with GBS 0-3 (13/43) and 80% patients with GBS 4 (125/157) underwent endoscopy 24 hours. The two most common endoscopic diagnoses were peptic ulcers (39%, 61/157) and varices (18%, 28/157), while 14% (22/157) had a normal diagnosis or mild gastritis. 174/200 patients (87%) were given IV or oral PPI in the ED whereas the remaining 26 (13%) did not receive PPI in hospital. 46% of patients (89/194) received blood transfusion, but only 51% (45/89) were administered based on the 70 g/L threshold while in 40% (36/89) of patients the less restrictive threshold of 90 g/L was used. **Conclusion:** A majority of UGIB patients presenting to a tertiary hospital ED appropriately received endoscopy 24 hours based on a GBS score 4. PPI use was appropriate but a proportion of patients received inappropriate blood transfusions.

Keywords: gastrointestinal bleeding, outcomes, management

P133

Meteorological predictors of epidemic orthopedic trauma in Calgary

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Introduction: On March 16 2017, emergency departments and urgent care centres (collectively, EDs) in Calgary saw 3 times the number of fall-related ED visits, and 8 times the number of ED orthopedic consultations and admissions than the daily average for March 2014-2016. Fall-related injuries have significant associated morbidity and burden of disease, as well as cost to the health care system, caregivers and society. The purpose of this study was to use regression analysis to generate best fit models and identify weather and temporal variables which predict the frequency of fall-related ED visits, orthopedic consultations and admissions in winter (November-March). **Methods:** Daily number of ED visits, orthopedic consults, and orthopedic admissions for presenting complaint of Lower Extremity Injury, Upper Extremity Injury, or with an ED diagnosis of Fracture or Fall, were obtained for winter months from November 1 2013 to March 31 2017 from the Alberta Health Services ED database. Weather data was obtained from Environment Canada. Linear and multiple regression were performed to evaluate the predictive value of individual weather and temporal parameters, and derive the best-fitting model to predict the number of ED visits, orthopedic consultations, and orthopedic admissions. **Results:** Individual predictive factors ($p < 0.05$) were month, temperature, overnight temperature drop from >0C to <0C, day of the week, amount of snow on the ground at 05:00, post-chinook day (chinooks are a warm winter wind in Calgary that can cause large temperature swings), maximum wind gust speed, and presence of precipitation. The best-fit multivariable models predicting fall-related ED visits (F-stat = 15.36, R2 = 0.171), orthopedic consults (F-stat = 6.369, R2 = 0.048), and orthopedic admissions (F-stat = 8.658, R2 = 0.126) were statistically significant (probability of F-statistics all <0.0001). **Conclusion:** This study is, to the best of our knowledge, the first to use multiple regression to compute models using weather and temporal variables that can predict fall-related ED visits, orthopedic consults and admissions. This information could be used to alert the population regarding an increased fall and fracture risk ahead of the weather occurrence, as well as municipal snow and ice clearing services, who may be able to mitigate that risk. The ability to predict the frequency of fall-related injuries could enable EDs, EMS, orthopedic services, and hospitals to adjust resource and staffing allocation in anticipation of increases in fall-related injuries.

Keywords: orthopedic, weather, fall

P134

Escape game as a theatre-based simulation for teamwork skills training in undergraduate medical education

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Introduction: Teamwork skills are essential in emergency presentations. When training medical students to manage acute care cases, simulation is frequently the educational tool. However, simulation content is often medically-focused, and post-simulation debriefs may not prioritize discussion of teamwork skills, as time is limited. Furthermore, debriefing both medical and teamwork aspects of a case may add to the learners cognitive load. This innovation uses an escape game as a non-clinical simulation to gamify teamwork skills training, with a focus on the collaborator CanMEDS role. In the entertainment industry, escape games are activities where teams solve a series of puzzles together to ultimately escape a room. **Methods:** 2 groups of 5 second-year medical students piloted the escape game, created within a simulation theatre, designed to surface teamwork competencies under the four University of Calgary Team Scheme domains (adapted from CIHCs National Interprofessional Competency Framework and TeamSTEPPS): Leadership/Membership, Communication, Situation Monitoring, and Collaborative Decision-Making/Mutual Support. During the game, facilitators noted examples of students strengths and challenges in demonstrating teamwork competencies. Post-game, a debrief and written reflective exercise enabled students to analyze successes and challenges in demonstrating teamwork competencies, propose solutions to teamwork challenges, and write 3 goals to improve teamwork skills. All competencies listed under each Team Scheme domain represented themes used in a thematic analysis to uncover students reported teamwork challenges. **Results:** Each escape game is a 30-minute teamwork activity where 5 students collaborate to complete 8 puzzles, which do not require medical knowledge, in order to win. Briefing is scheduled for 15-minutes, whereas post-game debriefing and reflection is 45-minutes. **Conclusion:** Escape games can highlight strengths and challenges in teamwork and collaboration amongst second-year medical students. Every competency under the Team Scheme domains was highlighted by the escape game pilots, touching on both strengths and challenges, for which students demonstrated, debriefed, and reflected upon. Students self-documented teamwork challenges include issues surrounding task-focused, closed-loop communication, and frequent reassessments. Advantages of this innovation include its use as a learning progression towards acute care simulations, portability and affordability, potential interprofessional use, and customizability. Additional training time may be required to orient facilitators to this

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atypical simulation. The escape game will launch in MDCN490 for second-year medical students and is scheduled prior to their acute care simulations. Further teamwork challenges identified at that time will help inform teamwork curriculum development for year 3.
Keywords: innovations in emergency medicine education, simulation, teamwork

P135

Frequent emergency department use as an independent factor associated with mortality in substance and opioid misuse: a retrospective analysis of linked databases

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Introduction: Substance and opioid misuse present significant illness burdens in Emergency Departments (EDs). Understanding risk factors for mortality in these patients is urgently needed to allow targeted prevention. This studys objective was to determine whether frequent ED use is independently associated with mortality among patients with substance and opioid misuse, and secondarily, whether degree of frequent use influences mortality risk. **Methods:** This is a retrospective cohort study in Alberta, Canada. National Ambulatory Care Reporting System ED data was linked to Vital Statistics mortality data using postal code, birthdate, and sex. All adults (18 years old at index visit, i.e. first visit made in the study year) with substance or opioid misuse (defined by ICD-10 codes) from April 1, 2012 to March 31, 2013 were included. Frequent use was defined by 5 ED visits in the 12 months prior to index visit. The primary outcome was mortality within 90 days, and secondarily, within 30 days, 365 days, and 2 years post-index visit. Mortality was compared using Kaplan-Meier curves and Cox regression adjusting for age, sex and income. Degree was examined by subcategorizing frequent use into 5-10, 11-15, 16-20, and >20 visits. **Results:** Overall, 16,389 patients made 24,880 visits for substance misuse, and 1787 patients made 2241 visits for opioid misuse. Frequent vs. non-frequent substance misusers were older, more often female, lower income, more often of rural residence, and arrived more by ambulance for lower acuity visits that were hospitalized less often. Compared to frequent substance misusers, frequent opioid misusers were more often female, of non-rural residence, arrived less often by ambulance, and made higher acuity visits that were hospitalized more often. Among substance misuse patients, 97.1% (95% CI: 96.6, 97.7) of frequent users vs. 98.0% (95% CI: 97.7, 98.2) of non-frequent users were alive at 2 years. Frequent use was significantly associated with mortality at 365 days (HR 1.36 [95% CI: 1.04, 1.77]) and 2 years (HR 1.32 [95% CI: 1.04, 1.67]) but not at 90 or 30 days. Subcategorized by degree, frequent use was significantly associated with mortality only for patients with >20 visits/year at 365 days (HR 1.88 [1.03, 3.44]) and 2 years (HR 1.89 [1.10, 3.22]). Among opioid misuse patients, there was no difference in mortality between frequent and non-frequent ED users at any time point. However, subcategorized by degree, a significant association was seen for those with 16-20 visits/year at 365 days (HR 3.62 [95% CI:1.13, 11.66]), and 2 years (HR 3.37 [95% CI: 1.05, 10.81]). **Conclusion:** In substance misuse patients, frequent ED use was significantly associated with long-term but not short-term mortality. Mortality risk for substance and opioid misuse patients was concentrated in extremely frequent users suggesting that the highest frequency presenters should be targeted for prevention.
Keywords: substance-related disorders, opioid-related disorders, public health

P136

Evaluating the use of the YEARS clinical decision rule for diagnosing pulmonary embolism in the emergency department

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Introduction: Diagnosing pulmonary embolism (PE) can be challenging because the signs and symptoms are often non-specific. Studies have shown that evidence-based algorithms are not always adhered to in the Emergency Department (ED) and are often not used correctly, which leads to unnecessary CT scanning. The YEARS diagnostic algorithm, consisting of three items (clinical signs of deep vein thrombosis, hemoptysis, and whether pulmonary embolism is the most likely diagnosis) and D-dimer, is a novel and simplified way to approach suspected acute PE. The purpose of this study was to 1) evaluate the use of the YEARS algorithm in the ED and 2) to compare the rates of testing for PE if the YEARS algorithm was used. **Methods:** This was a health records review of ED patients investigated for PE at two emergency departments over a two-year period (April 2013-March 2015). Inclusion criteria were ED physician ordered CT pulmonary angiogram, ventilation-perfusion scan, or D-dimer for investigation of PE. Patients under the age of 18 and those without a D-dimer test were excluded. PE was considered to be present during the emergency department visit if PE was diagnosed on CT or VQ (subsegmental level or above), or if the patient was subsequently found to have PE or deep vein thrombosis during the next 30 days. Trained researchers extracted anonymized data. The rate of CT/VQ imaging and the false negative rate was calculated. **Results:** There were 1,163 patients that were tested for PE and 1,083 patients were eligible for our analysis. Of the total, 317/1,083 (29.3%; 95% CI 26.6-32.1%) had CT/VQ imaging for PE, and 41/1,083 (3.8%; 95% CI 2.8-5.1%) patients were diagnosed with PE at baseline. Three patients had a missed PE, resulting in a false negative rate of 0.4% (95% CI 0.1-1.2%). If the YEARS algorithm was used, 211/1,083 (19.5%; 95% CI 17.2-22.0%) would have required imaging for PE. Of the patients who would not have required imaging according to the YEARS algorithm, 8/872 (0.9%; 95% CI 0.5-1.8%) would have had a missed PE. **Conclusion:** If the YEARS algorithm was used in all patients with suspected PE, fewer patients would have required imaging with a small increase in the false negative rate.
Keywords: pulmonary embolism, D-dimer, diagnosis

P137

Automation of follow-up microbiology culture results in patients discharged from the emergency department

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Introduction: At Sunnybrook Health Sciences Centres Emergency Department (ED), delays occurred in reporting positive microbiology culture results of patients discharged from the ED. Follow-up of culture results was driven by a manual paper based process that was inefficient and resulted in a one to three day delay in reporting results. The previous system was time consuming, labour intensive and prone to human error. Timely reporting of microbiology culture results is important to ensuring that patients receive optimal care. The aim is that >80% of positive microbiology culture results of patients discharged from Sunnybrook Health Sciences Centre ED will be followed-up within 24 hours of results being available from the lab. **Methods:** Outcome Measure Percentage of positive culture results followed up

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within 24 hours Process Measure Time from availability of culture results from lab to completion of patient follow-up Balancing Measure Number of positive culture results not displayed in ED server Change Idea Electronically push positive culture results to an ED server that is periodically checked daily and acted upon. An electronic interface was created to capture positive results from the microbiology lab in real time. **Results:** There was a 45 hour reduction in the mean time to complete a patients follow-up of culture results (59 hours pre vs. 14 hours post, $p = 0.03$). We surpassed our aim of >80% follow-up within 24 hours. **Conclusion:** A significant reduction to completing a patients follow-up of microbiology culture results was achieved by automating the availability of results and eliminating the manual process previously used in relaying results from the microbiology lab to ED. This new process has the following benefits: 1) Improves timely reporting of culture results to patients, that may require initiation or change in antibiotics 2) Enhanced patient safety due to elimination of human error 3) Decreased workload due to elimination of batching of results and data entry 4) Entire process is streamlined, since only positive culture results are transmitted for follow-up.

Keywords: quality improvement and patient safety, microbiology culture results, follow-up

P138

Using electronic health record data to assess emergency medicine trainees independent and interdependent performance: a qualitative perspective on measuring what matters

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Introduction: Competency-based medical education (CBME) affirms that trainees will receive timely assessments and effective feedback about their clinical performance, which has inevitably raised concerns about assessment burden. Therefore, we need ways of generating assessments that do not rely exclusively on faculty-produced reports. The main object of this research is to investigate how data already collected in the electronic health record (EHR) might be meaningfully and appropriately used for assessing emergency medicine (EM) trainees independent and interdependent clinical performance. This study represents the first step in exploring what EHR data might be utilized to monitor and assess trainees clinical performance **Methods:** Following constructivist grounded theory, individual semi-structured interviews were conducted with 10 EM faculty and 11 EM trainees, across all postgraduate years, to identify EHR performance indicators that represent EM trainees independent and interdependent clinical actions and decisions. Participants were presented with a list of performance indicators and asked to comment on how valuable each would be in assessing trainee performance. Data analysis employed constant comparative inductive methods and occured throughout data collection. **Results:** Participants created, refined, and eliminated performance indicators. Our main result is a catalogue of clinical performance indicators, described by our participants, as reflecting independent and/or interdependent EM trainee performance that are believed to be captured within the EHR. Such independent indicators include: number of patients seen (according to CTAS levels), turnaround time between when a patient is signed up for and first orders are made, number of narcotics prescribed. Meanwhile, interdependent indicators include, but are not limited to, length of stay, bounce-back rates, ordering practices, and time to fluids. **Conclusion:** Our findings document a process for developing EM trainee report cards that incorporate the perspectives of clinical faculty and trainees. Our work has important implications for distinguishing between independent and interdependent clinical performance indicators.

Keywords: electronic health records, postgraduate education, performance indicators

P139

How available is availability bias? Examining factors that influence diagnostic error

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Introduction: Cognitive bias is often cited as an explanation for diagnostic errors. Of the numerous cognitive biases currently discussed in the literature, availability bias, defined as the current case reminds you of a recent similar example is most well-known. Despite the ubiquity of cognitive biases in medical and popular literature, there is surprisingly little evidence to substantiate these claims. The present study sought to measure the influence of availability bias and identify contributing factors that may increase susceptibility to the influence of a recent similar case. **Methods:** To investigate the role of prior examples and category priming on diagnostic error at different levels of expertise, we devised a 2 phase experiment. The experimental intervention was in a validation phase preceding the test, where participants were asked to verify a diagnosis which was either i) representative of Diagnosis A, and similar to a test case, ii) representative of Diagnosis A and dissimilar to a test case, iii) representative of Diagnosis B and similar to a test case. The test phase consisted of 8 written cases, each with two approximately equally likely diagnoses (A or B). Each participant verified 2 cases from each condition, for a total of 6. They then diagnosed all 8 test cases; the remaining 2 test cases had no prior example. All cases were counterbalanced across conditions. Comparison between Condition i) and ii) and no prior showed effect of prior exemplar; comparison between iii) and no prior showed effect of category priming. Because cases were designed so that both Diagnosis A and B were likely, overall accuracy was measured as the sum of proportion of cases in which either was selected. Subjects were emergency medicine staff ($n = 40$), residents ($n = 39$) and medical students ($n = 32$) from McMaster University, University of Washington, and Harvard Medical School. **Results:** Overall, staff had an accuracy (A + B) of 98%, residents 98% and students 85% ($F = 35.6$, $p < 0.0001$). For residents and staff there was no effect of condition (all mean accuracies 97% to 100%); for students there was a clear effect of category priming, with accuracy of 84% for i), 87% for ii) and 94% for iii) but only 73% for the no prime condition (Interaction $F = 3.54$, $p < 0.002$) **Conclusion:** Although prior research has shown substantial biasing effects of availability, primarily in cases requiring visual diagnosis, the present study has shown such effects only for novices (medical students). Possible explanations need to be explored. Nevertheless, our study shows that with increasing expertise, availability may not be a source of error.

Keywords: diagnosis, availability bias

P140

Risk factors for adverse outcomes in hyperglycemic patients presenting to the emergency department: a systematic review

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Introduction: Hyperglycemia is a significant cause of morbidity and mortality, often resulting in adverse outcomes such as recurrent ED

visits, hospitalization or death. The objective of this study was to perform a systematic review to identify predictors of these adverse outcomes among patients who present to the ED with hyperglycemia. **Methods:** Electronic searches of Medline and EMBASE were conducted for studies published in English between the years 1946 and June 2017. Studies with patients presenting to the ED with hyperglycemia were eligible for inclusion. Both adult and pediatric populations were included, as were diabetic and non-diabetic patients. Two reviewers independently screened all titles and abstracts for relevance to the research question. If consensus could not be reached, full-length manuscripts were reviewed. For any discrepancy, a third reviewer was consulted, and disagreement was resolved through discussion. Study quality was assessed using the Newcastle-Ottawa Quality Assessment Scale. Study- and patient-specific data were then extracted and presented descriptively in the systematic review. **Results:** Thirteen observational studies were included, with a combined total of 664,829 patients. The studies scored between 5 to 8 on the Quality Assessment Scale out of a possible total of 8. Predictors of adverse outcomes included patients in both older and younger (<25) age groups, history of diabetes, multiple comorbidities, patients requiring insulin, sepsis and hyperlactatemia, access to a family physician, a sentinel hyperglycemia visit in the past month, and triage glucose level >20 mmol/L. Protective factors included no admissions in the past year, care from a diabetes team while in hospital, systolic blood pressure between 90-150 mmHg and heart rate >110 bpm. **Conclusion:** This systematic review found eight predictors and four protective factors for adverse outcomes in patients presenting to the ED with hyperglycemia. These factors should be considered for easier identification of higher-risk patients for adverse outcomes in order to guide management and follow-up.

Keywords: hyperglycemia, emergency department, risk factors

P141

Predictive validity of the Regional Paramedic Program for Eastern Ontario (RPPEO) prehospital sepsis notification tool

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Introduction: Early recognition of sepsis can improve patient outcomes yet recognition by paramedics is poor and research evaluating the use of prehospital screening tools is limited. Our objective was to evaluate the predictive validity of the Regional Paramedic Program for Eastern Ontario (RPPEO) prehospital sepsis notification tool to identify patients with sepsis and to describe and compare the characteristics of patients with an emergency department (ED) diagnosis of sepsis that are transported by paramedics. The RPPEO prehospital sepsis notification tool is comprised of 3 criteria: current infection, fever &/or history of fever and 2 or more signs of hypoperfusion (eg. SBP <90, HR 100, RR24, altered LOA). **Methods:** We performed a review of ambulance call records and in-hospital records over two 5-month periods between November 2014 February 2016. We enrolled a convenience sample of patients, assessed by primary and advanced care paramedics (ACPs), with a documented history of fever &/or documented fever of 38.3°C (101°F) that were transported to hospital. In-hospital management and outcomes were obtained and descriptive, t-tests, and chi-square analyses performed where appropriate. The RPPEO prehospital sepsis notification tool was compared to an ED diagnosis of sepsis. The predictive validity of the RPPEO tool was calculated (sensitivity, specificity, NPV, PPV). **Results:** 236 adult patients met the inclusion criteria with the following characteristics: mean age 65.2 yrs [range 18-101], male 48.7%, history of sepsis 2.1%, on antibiotics 23.3%, lowest mean systolic BP 125.9, treated by ACP 58.9%, prehospital temperature documented 32.6%. 34 (14.4%) had an ED diagnosis of sepsis. Patients with an ED diagnosis of sepsis, compared to those that did not, had a lower prehospital systolic BP (114.9 vs. 127.8, $p = 0.003$) and were more likely to have a prehospital shock index >1 (50.0% vs. 21.4%, $p = 0.001$). 44 (18.6%) patients met the RPPEO sepsis notification tool and of these, 27.3% (12/44) had an ED diagnosis of sepsis. We calculated the following predictive values of the RPPEO tool: sensitivity 35.3%, specificity 84.2%, NPV 88.5%, PPV 27.3%. **Conclusion:** The RPPEO prehospital sepsis notification tool demonstrated modest diagnostic accuracy. Further research is needed to improve accuracy and evaluate the impact on patient outcomes.

Keywords: paramedicine, sepsis notification, prehospital

P142

Diagnosis of pulmonary embolism in the Canadian context: clinical review findings from a health technology assessment

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Introduction: Pulmonary embolism (PE) is a diagnostic challenge, since it shares symptoms with other conditions. Missed diagnosis puts patients at a risk of a potentially fatal outcome, while false positive results leave them at risk of side effects (bleeding) from unnecessary treatment. Diagnosis involves a multi-step pathway consisting of clinical prediction rules (CPRs), laboratory testing, and diagnostic imaging, but the best strategy in the Canadian context is unclear. **Methods:** We carried out a systematic review of the diagnostic accuracy, clinical utility, and safety of diagnostic pathways, CPRs, and diagnostic imaging for the diagnosis of PE. Clinical prediction rules were studied by an overview of systematic reviews, and pathways and diagnostic imaging by a primary systematic review. Where feasible, a diagnostic test meta-analysis was conducted, with statistical adjustment for the use of variable and imperfect reference standards across studies. **Results:** The Wells CPR rule showed greater specificity than the Geneva, but the relative sensitivities were undetermined. Application of a CPR followed by with D-dimer laboratory testing can safely rule out PE. In diagnostic test accuracy meta-analysis, computed tomography (CT) (sensitivity 0.973, 95% CrI 0.921 to 1.00) and ventilation/perfusion single-photon emission CT (VQ-SPECT) (sensitivity 0.974, 95% CrI 0.898 to 1.00) had the highest sensitivity) and CT the highest specificity (0.987, 95% CrI 0.958 to 1.00). VQ and VQ-SPECT had a higher proportion of indeterminate studies, while VQ and VQ-SPECT involved lower radiation exposure than CT. **Conclusion:** CPR and D-dimer testing can be used to avoid unnecessary imaging. CT is the most accurate single modality, but radiation risk must be assessed. These findings, in conjunction with a recent health technology assessment, may help to inform clinical practice and guidelines.

Keywords: diagnostic imaging, pulmonary embolism, systematic review

P143

An exploratory study to understand relationship between gameplay experience and observed actions

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Introduction: The GridlockED game is a serious game aimed at teaching junior learners about flow and organization in the emergency

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department(ED). With serious games, the mechanism of learning is thought to be via the gameplay experience. Objectives built into gameplay are aimed at teaching players about a specific concept; in this case, we hoped to teach players about interprofessional collaboration and basic mechanics that drive flow in the ED. However, before a player can be taught, he or she must be engaged and have a positive gameplay experience. From the GridlockED gameplay, we aim to explore how a players gameplay experience related to observed actions while playing the game, including participating in decision making and keeping the team organized. **Methods:** From April-August 2017, participants were invited to play 4 turns of a GridlockED game session. They were video recorded during gameplay. After playing the game, they were surveyed using the previously derived Game Experience Questionnaire (GEQ) to measure their gameplay experience. The videos were reviewed by two research team members (SH, EJ), tallying various observed game actions. We conducted Pearson correlation between players GEQ total score and their observed actions. **Results:** A total of 32 participants (13 attendings, 5 senior residents, 10 junior residents, and 4 nurses) played the game. The average total GEQ was 67.2/132 (SD = 10.7), suggesting most players had a moderately good gameplay experience. The total GEQ score correlated with component subscores within the questionnaire. Overall observed activity correlated well with each observed action subtype. However, the GEQ total score did not correlate significantly with the total observed action (Pearsons $r = 0.18, p = 0.32$). GEQ total score was found to be moderately correlated to an observation that a player participated in determining strategy during gameplay ($r = 0.36, p = 0.04$). There was a moderate negative correlation between determining strategy during gameplay and teaching about the game ($r = -0.37, p = 0.04$) or emergency medicine concepts ($r = -0.47$, $p < 0.01$). **Conclusion:** The GEQ is internally consistent, but does not have a strong relationship to observed actions, suggesting that game experience does not necessarily correlate with observable actions. This suggests that players may be intellectually stimulated or engaged without necessarily completing any observable actions during gameplay.

Keywords: education, simulation, serious games

P144

Assessment of the quality of evidence presented at the Canadian Association of Emergency Physicians annual meeting over a five-year period (2013-2017)

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Introduction: The CAEP annual meeting presents the latest evidence for clinical practice, but there has not yet been an appraisal of the abstracts presented at this conference. Therefore, we sought to evaluate the level of evidence of research presented at the annual meeting, and assess for trends over a five-year period (2013-2017). **Methods:** We conducted a scoping review that included all CAEP abstracts from 2013-2017, obtained through the Canadian Journal of Emergency Medicine. Two reviewers assessed eligibility and extracted data from abstracts individually, with conflicts resolved by a third reviewer. Qualitative research was excluded. Extracted data included type of presentation (ex. oral, poster), sample size, study design and type of study (therapeutic, prognostic, diagnostic, education, quality improvement, or systems-wide/economic analyses research). A level of evidence (LOE) was assigned using the 2011 Oxford Centre for Evidence-Based Medicine criteria. **Results:** Abstracts from 2014-2017 have been analyzed thus far, 1090 of which were eligible and 990 included. Inter-rater agreement for screening and data extraction was high (value 0.87 and 0.84 respectively). Systems-wide/economic analyses research was the predominant type of study (28.6%, 283/990), followed by therapeutic (19.9%, 197/990) and education (19.9%, 195/990). The mean LOE was 2.81 (95% CI 2.77,2.85). The highest proportion of studies were of level III evidence (77.7%, 769/990), followed by level II (9.6%, 95/990) and level I evidence (7.8%, 77/990). 72.1% (124/172) of all level I and II abstracts were presented in 2016 and 2017. A significant change in LOE between years was evident ($p < 0.0001$, chi-squared). The greatest proportion of level I and II abstracts were lightning oral (41.9%, 72/172), followed by posters (36.0%, 62/172). The best average LOE was observed for lightning oral (2.64, 95% CI 2.56, 2.72), with the poorest average LOE witnessed for moderated posters (2.90, 95% CI 2.83, 2.97). A significant difference was present in mean LOE between types of presentations ($p < 0.0001$, one-sided ANOVA). **Conclusion:** The majority of abstracts were level III evidence. The lightning oral sessions had the greatest proportion of level I and II evidence presented. Recent years of the conference have also seen the presentation of a greater number of level I and II evidence, which may suggest a shift towards generating and disseminating higher level evidence in emergency medicine.

Keywords: evidence-based medicine, level of evidence, quality of evidence

P145

The role of audit and feedback in the ED setting: are physicians able to accurately predict their own practice?

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Introduction: Prior research has shown that audit and feedback (A &F) can be an effective tool for practice change. However, questions remain about how to optimize A&F. The objectives of this project were to determine if: 1) there are differences in practice between physicians who do, and do not, consent to receive a confidential report on their practice and; 2) if there is a relationship between consenting physicians self-predicted and actual practice. **Methods:** This was a prospective, cross-sectional study embedded in a larger quality improvement (QI) initiative to align physician practice with best evidence in the emergency department (ED) care of infants with bronchiolitis. All physicians practicing in the ED of a tertiary care pediatric hospital were offered the opportunity to consent to receive an individual, confidential data report on their practice. Prior to receiving their data, consenting physicians completed a survey which asked them to predict the proportion of bronchiolitic patients for whom they ordered diagnostic tests or treatments. We used chi-squared testing to compare the proportion of consenting and non-consenting physicians whose diagnostic test (Chest X-ray (CXR), viral study) and treatment (steroid, Ventolin) ordering was above the median for all ED physicians. We used Pearsons correlation to assess the relationship between consenting physicians self -predicted and actual practice. **Results:** 56% (37/66) of physicians consented to receive a data report. The median proportion of patients with an x-ray ordered was 20%, 63% of non-consenters were above the median, compared to 36% of consenters ($X2\ (1, N = 66) = 4.91, p = 0.03$). For viral testing, 31% of patients had a test ordered, with 50% of non-consenters and 50% consenters above the median ($X2\ (1, N = 66) = 0, p = 1$); 11% of patients had steroids ordered, with 53% of non-consenters and 47% of consenters above the median ($X2\ (1, N = 66) = 0.24, p = 0.621$); and 18% of patients had Ventolin ordered, with 60% of non-consenters and 42% of consenters above the median ($X2\ (1, N = 66) = 2.2, p = 0.138$). There was a

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moderate correlation between physicians predicted and actual practice with respect to viral testing (r = 0.67), but minimal correlation for CXR (0.05), steroids (r = 0.17) or Ventolin (r = 0.33) ordering. **Conclusion:** The finding that physicians have a limited ability to accurately predict their own performance emphasizes the importance of providing physicians with feedback. However, our results suggest that the consent process may be a potential barrier to effective A &F.

Keywords: bronchiolitis, audit and feedback

P146

Organ and tissue donation from poisoned patients in the emergency department: a Canadian perspective

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Introduction: Screening for organ and tissue donation is an essential skill for emergency physicians. In 2015, 4564 individuals were on a waiting list for organ transplant and 242 died while waiting. As Canadas donation rates are less than half that of other comparable countries, it is crucial to ensure we are identifying all potential donors. Patients deceased from poisoning are a source that may not be considered for referral as often as those who die from other causes. This study aims to identify if patients dying from poisoning represent an under-referred group and determine what physician characteristics influence referral decisions. **Methods:** In this cross-sectional unidirectional survey study, physician members of the Canadian Association of Emergency Physicians were invited to participate. Participants were presented with 20 organ donation scenarios that included poisoned and non-poisoned deaths, as well as one ideal scenario for organ or tissue donation used for comparison. Participants were unaware of the objective to explore donation in the context of poisoning deaths. Following the organ donation scenarios, a range of follow-up questions and demographics were included to explore factors influencing the decision to refer or not refer for organ or tissue donation. Results were reported descriptively and associations between physician characteristics and decisions to refer were assessed using odds ratios and 95% confidence intervals. **Results:** 208/2058 (10.1%) physicians participated. 25% did not refer in scenarios involving a drug overdose (n = 71). Specific poisonings commonly triggering the decision to not refer included palliative care medications (n = 34, 18%), acetaminophen (n = 42, 22%), chemical exposure (n = 48, 27%) and organophosphates (n = 87, 48%). Factors associated with an increased likelihood to refer potential donors following overdose included previous organ and tissue donation training (OR = 2.6), having referred in the past (OR = 4.3), available donation support (OR = 3.9), greater than 10 years of service (OR = 2.1), large urban center (OR = 3.8), holding emergency medicine certification (OR = 3.6), male gender (OR = 2.2, CI), and having indicated a desire to be a donor on government identification (OR = 5.8). **Conclusion:** Scenarios involving drug overdoses were associated with under-referral for organ and tissue donation. As poisoning is not a contraindication for referral, this represents a potential source of donors. By examining characteristics that put clinicians at risk for under-referral of organ or tissue donors, becoming aware of potential biases, improving transplant knowledge bases, and implementing support and training programs for the organ and tissue donation processes, we have the opportunity to improve these rates and reduce morbidity and mortality for Canadians requiring organ or tissue donation.

Keywords: organ donation, poisoning, tissue donation

P147

Clinical characteristics and system factors of elderly treated for agitation in the emergency department: a data driven approach

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Introduction: Aligning health systems appropriately to the needs of the elderly is an urgent global priority, according to the WHO. In Canada, ED length of stay has risen 16% for elderly patients in the last year. Agitation requiring chemical restraint is a common, high-risk problem for elderly in the ED. Improving outcomes in this heterogeneous population remain difficult due to inability to effectively identify and evaluate delirium, frailty, multi-morbidity, and incompatibility with the ED system. A data-driven approach to complex health problems is a recognized emerging tool for healthcare innovation. New opportunities for targeted quality improvement in the ED will be uncovered by identifying the clinical characteristics of elderly patients with agitation, and the system process factors that influence their outcomes. **Methods:** We studied 400 patients in a case-control study at two tertiary-care EDs over five years. Patients were randomly selected if age was greater than 75 years. 200 cases of patients who received an intravenous dose of haloperidol, midazolam and/or lorazepam were selected as a surrogate data marker for having agitation. Controls were randomly matched by age and ED diagnosis. Standardized clinical, systems and process variables were collected. We conducted a univariate analysis. **Results:** Elderly given intravenous medications for agitation had increased mortality (OR 3.8 CI: 1.6-10.7, $p < 0.001$) and ED length of stay (27 vs. 15 hours, $p < 0.001$). No statistical significance was found in clinical characteristics, CTAS scores, PRISMA7 frailty scores nor sentinel or return visits. There was no statistical difference in median hospital length of stay (8 vs. 6 days, $p < 0.70$). No differences were found in median time from ED physician seeing a patient to first consultant request (73 vs. 83 mins, $p = 0.75$). The largest time intervals contributing to ED length of stay were from first consultant request to hospital request (15 vs. 12 hours, $p = 0.056$) and hospitalization delay (13 vs. 7 hours, $p = 0.45$). **Conclusion:** Identification of high-risk elderly patients for targeted intervention through a data-driven approach is feasible and informative. Traditional clinical characteristics remain unhelpful in identifying and evaluating outcomes in elderly with agitation. We have identified a process factor that is clinically relevant and pragmatic to evaluate in our ED system. Future research focused on optimizing systems process factors to improve quality of elderly care should be prioritized.

Keywords: elderly, agitation, data driven

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What do surgeons expect of the emergency department in the diagnosis and management of pediatric appendicitis?

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Introduction: The optimal diagnostic strategy for children presenting to the Emergency Department (ED) with suspected appendicitis (SA), the most common non-traumatic surgical emergency in children, remains unclear. This study aims to identify which investigations and management priorities are preferred by Canadian surgeons prior to consultation from the ED. **Methods:** An internet survey was extended to practicing surgeons who are members of the Canadian Association of Pediatric

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Surgeons and Canadian Association of General Surgeons. Three case-based scenarios evaluated surgeons expected ED investigations and management for SA with varying severity of disease (simple - SA vs perforated - PA) and sex (male vs female). Differences across scenarios were determined by ANOVA and direct comparisons were reported using proportions and odds ratios with 95% confidence intervals. **Results:** Surveys were completed by 82 surgeons. Across the 3 cases, CBC (227/246, 92.3%) and urinalysis (188/246, 76.4%) were the sole investigations expected in >75% of responses. Expectations differed across cases for use of blood cultures ($p < 0.001$), electrolytes ($p < 0.001$), sexually transmitted infection testing (0.015) and ultrasound (US) ($p < 0.001$). Blood cultures (26/82, 31.7% vs. 4/82, 4.9%; OR 9.05 95% CI 2.88-37.33) and electrolytes (58/82, 70.7% vs. 33/82, 40.2%; OR 3.59 95% CI 1.79-7.24) were expected more often in severe disease. US was expected more often in females (58/82,70.7% vs. 25/82, 30.5%; OR 5.51, 95% CI 2.68-11.38). Expected management differed across cases for fluid boluses ($p = 0.01$), intravenous (IV) analgesia ($p < 0.001$) and antibiotics ($p < 0.001$), with all differences attributed to severity of illness (fluids 73/82, 89.0% vs. 59/82, 72.0% OR 3.16 95% CI 1.28-8.33; IV analgesia 66/82, 80.5% vs. 42/82, 51.2% OR 3.93 95% CI 1.86-8.45; antibiotics 44/82, 53.7% vs. 10/82, 12.2% OR 8.34 95% CI 3.59-20.44). **Conclusion:** Severity of illness and sex of the child impact the ED investigations and management expected by surgeons consulted for suspected appendicitis. Further research focusing on how these expectations influence patient outcomes should be conducted. Collaborative ED-surgery protocols for the diagnosis and management of acute appendicitis in children should be established.

Keywords: appendicitis, children, physician expectations

P149

Do patients presenting to the emergency department with a mental health crisis have access to community healthcare resources?

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Introduction: The emergency department (ED) is often the first point of access to the health care system for patients with an acute mental health crisis. Outpatient resources are limited, typically do not operate after hours, and patients and their families often lack sufficient information on where and how to access mental health services within their communities. The objective of this study was to determine which community healthcare resources patients attempted to access for their mental health condition prior to presenting to the ED. **Methods:** Between April 2016 to June 2017, a convenience sample of adult (18 years) patients presenting to an academic ED (annual census 65,000) with a mental health complaint were invited to complete a 23-item, paper-based survey. The questionnaire was pilot-tested and peer-reviewed for feasibility and comprehension. **Results:** Of the 200 patients who completed the survey, mean (SD) age was 37 (16) years and 96 (48%) were male. 20 (10%) patients were brought to the ED involuntarily by police services. 175 (88%) had been previously diagnosed with a mental health condition, the most common being depression and/or anxiety ($n = 134$, 67%). 47 (24%) patients indicated they were currently only connected to a primary care provider, while 94 (47%) patients indicated they had existing relationships with multiple mental healthcare providers. 117 (59%) patients attempted to see an alternative healthcare provider prior to coming to the ED. 78 (39%) patients had a pending scheduled appointment with a healthcare provider for their mental health condition, 44 (56%) of which were within 7 days of their ED visit, but chose to seek care in the ED. 38 (19%) patients either had a referral with no appointment date set, or had an impending mental health appointment scheduled more than 30 days from their ED visit. **Conclusion:** These findings suggest that most patients seeking ED care during a mental health crisis do so despite being connected to alternative healthcare providers and outpatient services. Future studies should attempt to determine reasons why patients with mental health conditions seek care in the ED, and examine barriers to mental health care in the community and outpatient setting.

Keywords: mental health, community healthcare resources, emergency department

P150

Emergency medicine resident perspectives on journal club as a community of practice and its impact on clinical medicine

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Introduction: Despite revolutionary changes in the medical education landscape, journal club (JC) continues to be a ubiquitous pedagogical tool and is a primary way that residency programs review new evidence and teach evidence-based medicine. JC is a community of practice among physicians, which may help translate research findings into practice. Program representatives state that JC should have a goal of translating novel research into changes in clinical care, but there has been minimal evaluation of the success of JC in achieving this goal. Specifically, emergency medicine resident perspectives on the utility of JC remain unknown. **Methods:** We designed a multi-centre qualitative study for three distinct academic environments at the University of British Columbia (Vancouver, Victoria and Kelowna). Pilot testing was performed to generate preliminary themes and to finalize the interview script. An exploratory, semi-structured focus group was performed, followed by multiple one-on-one interviews using snowball sampling. Iterative thematic analysis directed data collection until thematic sufficiency was achieved. Analysis was conducted using a constructivist Grounded Theory method with communities of practice as a theoretical lens. Themes were compared to the existing literature to corroborate or challenge existing educational theory. **Results:** Pilot testing has revealed the following primary themes: (1) Only select residents are able to increase their participation in JC over the course of residency and navigate the transition from peripheral participant to core member; (2) These residents use their increased clinical experience to perceive relevance in JC topics; and (3) Residents who remain peripheral participants identify a lack time to prepare for journal club and a lack of staff physician attendance as barriers to resident engagement. We will further develop these themes during the focus group and interview phases of our study. **Conclusion:** JC is a potentially valuable educational resource for residents. JC works as a community of practice only for a select group of residents, and many remain peripheral participants for the duration of their residency. Incorporation of Free Open-Access Medical Education resources may also decrease preparation time for residents and staff physicians and increase buy-in. To augment clinical impact, the JC community of practice may need to expand beyond emergency medicine and include other specialties.

Keywords: graduate medical education, qualitative research, knowledge translation

P151

Occupational therapy in the emergency department: sustaining results

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Introduction: An emergency department visit may represent a sentinel event for someone who is older and frail, signalling a slide into dependence and functional decline. The gold standard for the treatment of frail older adults is a comprehensive geriatric assessment, involving consideration of multiple domains including mobility and function in activities of daily living. Despite this, when a chart audit was conducted in a Canadian metropolitan emergency department, none of the patients age 65 and older had a documented assessment of their function or mobility. In response, an occupational therapy program was implemented. The goals of this program were to reduce the number of unnecessary hospital admissions related to patient functional impairments, and to increase function, safety, and independence for patients upon discharge from the emergency department. **Methods:** The pilot project, which was completed in 2013, was evaluated using a mixed methods approach. Positive patient outcomes at that time included a reduction in avoidable admissions and better support for patients upon discharge from the emergency department. A survey of emergency department staff indicated that occupational therapy consultation added value to the diagnostic and discharge planning processes. However, due to changes in administrative priorities, several service redesigns were required. Multiple PDSA cycles were completed, and the development of a logic model guided and focused program development. **Results:** A reassessment of program objectives was conducted using 2015 data, which found that the number of patients seen by the occupational therapist remained the same, as did the percentage of patients discharged with support of occupational therapy intervention, such as provision of adaptive equipment or referral to community rehabilitation referrals. The percentage of patients discharged due to occupational therapy as a primary contributing factor rose slightly, and staff satisfaction with the program remained high. **Conclusion:** This evaluation proves that the provision of occupational therapy services in the emergency department is sustainable, benefits patients, and can be incorporated into the emergency department workflow and culture.

Keywords: quality improvement and patient safety, allied health care, frail elderly

P152

Point of care biliary ultrasound in the emergency department (BUSED): implications for surgical referral and emergency department wait times

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Introduction: Patients with uncomplicated biliary disease frequently present to the emergency department for assessment. To improve bedside clinical decision making many emergency medicine physicians have pursued specialized training to perform point of care biliary ultrasound in the emergency department (BUSED). The purpose of this study was to determine the usefulness of BUSED in predicting the need for surgical consultation and intervention for biliary disease. **Methods:** A retrospective study of 283 consecutive patients visiting the emergency department who received a BUSED scan from December 1, 2016 to July 16, 2017. Physician interpretations of the BUSED scans were collected from the electronic image storage and interpretation system. Additional data was collected from the electronic health record including lab values, the subsequent use of diagnostic imaging, and outcomes data including disposition, surgical consultation or intervention, and 28 day follow up for representation or complication. Descriptive statistics and logistic regression were performed. **Results:** Of the patients who received a biliary POCUS scan, 29% were referred to general surgery, and 43% of those referred proceeded to eventual cholecystectomy. Factors found to be independently predictive of surgical intervention on point of care BUSED scans included presence of gall stones (OR 13.01, 95% CI 5.02 to 27.1) and increased gallbladder wall thickness (OR 6.01, 95% CI 1.7 to 11.1). A total of 30% of patients receiving BUSED required at least one additional, radiology based imaging test (CT or diagnostic US). Average emergency department length of stay was substantially longer for those who required additional imaging as compared to those who were able to be diagnosed by BUSED alone (16.1 versus 5.2 hours, 10.9 hours 95% CI 10.6 11.2, $p < 0.05$). **Conclusion:** Point of care biliary ultrasound performed by emergency physicians provides timely access to diagnostic information. Positive findings of gall stones and increased gall bladder wall thickness are highly predictive of the need for surgical intervention. Future, prospective studies are warranted to determine if point of care sonography is sufficient to proceed to surgery in select cases of uncomplicated biliary disease.

Keywords: point-of-care ultrasound, biliary disease

P153

Preparedness of Canadian physician offices for paediatric emergencies

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Introduction: Background: Studies in the US have demonstrated that many primary care staff and offices are inadequately prepared for paediatric emergencies. Although the Canadian Paediatric Society (CPS) recently reaffirmed their Guidelines for Paediatric Emergency Equipment and Supplies for a Physicians Office, no evaluation has been made regarding the impact of publishing these recommendations, or on the state of preparedness for paediatric emergencies in family physician offices. Objectives: The aim of this study was to evaluate awareness and adherence of family physicians in Ontario to the CPS guidelines on preparedness for paediatric emergencies. **Methods:** We conducted a province-wide, cross-sectional survey of 749 randomly selected family physicians. Participants were asked to complete a 14-question survey regarding clinic characteristics, incidence of paediatric emergencies, and preparedness of the clinic in the case of a paediatric emergency. Ethics approval was obtained from the regional Ethics Review Board. **Results:** 104 physicians responded to our Ontario survey (response rate of 14.8%). 71.2% of respondents reported seeing more than 10 children per week, and 58.7% and had experienced at least one paediatric emergency in the past year. The proportion of physicians reporting paediatric emergencies within the last year increased with the number of children seen - 37.9% of physicians who saw fewer than 10 children per week reported an emergency, compared to 85.7% of those who saw more than 40 children per week. 85.6% of respondents reported that they were unaware of the CPS guidelines on paediatric emergency preparedness. Only 9.6% of respondents were aware of the guidelines, and even fewer, 3.8% had read them. Of the physicians who were unaware of the guidelines, 4.5% [CI = 0.2, -0.09] engaged in mock code sessions, 29.2% [CI = 0.2, 0.2] were up-to-date on Paediatric Advanced Life Support (PALS), 1.1% [CI = 0.03, -0.01] had written protocols outlining safe transport of children to hospitals, and 50.6% [CI = 0.4, 0.6] stocked half or more of the recommended supplies. In comparison, of the physicians who were aware of the guidelines, 14.3% [CI = 0.3, -0.04] engaged in mock code sessions, 35.7% [CI = 0.1, 0.6] were up-to-date on PALS, 7.1% [CI = 0.2, -0.06] had written protocols, and 78.6% [CI = 0.8, 0.8] stocked half or more of the recommended supplies. **Conclusion:** A large proportion of respondents had experienced at least one paediatric emergency in the past year, but were overall underprepared. The majority of respondents, 85.6%, were not aware of the

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guidelines, compared to 9.6% who were aware of them. However, offices with the latter were more adherent to the guidelines recommendations. It will be important for CPS to consider how to further advocate for paediatric emergency preparedness in clinics that see children regularly.
Keywords: paediatrics, community, emergency

P154

Exploring health care connections and transitions in care for patients presenting to emergency departments with acute wheezing illnesses

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Introduction: Asthma and/or chronic obstructive pulmonary disease (COPD) exacerbations often result in emergency department (ED) visits. This study examined the health-related personnel providing regular care to patients with asthma and/or COPD, as well as, explored the coordination of care between the ED and outpatient settings. **Methods:** Descriptive cross-sectional examination of patients presenting with asthma and/or COPD exacerbations to two EDs in Edmonton between August and December 2017. Using patient interview methods information on demographics, established health care connections and health system use was collected; information on consultations, disposition and referrals was collected through chart review methods. **Results:** A total of 50 patients were recruited (14 patients with asthma and 36 patients with COPD). Most of the patients with asthma were female (64%) and their median age was 36 years (interquartile range [IQR]: 29, 46); sex was evenly distributed among the patients with COPD and their median age was 68 years (IQR: 61, 78). The majority reported having a family doctor (86% of the patients with asthma and 94% of the patients with COPD). On the day of admission to the ED, 29% of the patients with asthma visited their family doctor while 42% of the patients with COPD visited their Respirologist; these doctors referred >70% of the patients to the ED. While in the ED, consultations were requested in 21% of the patients with asthma (all to Pulmonary) and in 78% of the patients with COPD (evenly divided between Medicine and Pulmonary). Transition coordinators and social workers were involved in the ED care of <15% of the patients with COPD. Most patients with asthma were discharged home (86%) and 64% of the patients with COPD were hospitalized. After discharge, 14% of the patients with asthma and 50% of the patients with COPD were referred to specialized care. **Conclusion:** While the study patients with asthma and COPD had different health professionals providing regular care to their respiratory conditions, they both sought care before presenting to the ED. More health professionals were involved in the ED care of patients with COPD than of those with asthma. This study provided important information to support further research projects exploring ways to effectively and efficiently improve the delivery, comprehensiveness and utilization of health care services.
Keywords: transitions in care, respiratory, emergency department

P155

Utilization of personal mobile devices to record patient data by emergency physicians and residents

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Introduction: The use of personal mobile devices to record patient data appears to be increasing, but remains poorly studied. We sought to determine the magnitude and purposes for which Canadian emergency physicians (EPs) and residents use their personal mobile devices (PMDs) to record patient data in the emergency department (ED). **Methods:** An anonymous survey was distributed to EPs and residents in the Canadian Association of Emergency Physicians (CAEP) database between 27/02/17 and 23/03/17. The survey captured demographic information and information on frequency and purpose of PMD use in the ED, whether consent was obtained, how the information was secured, and any possible implications for patient care. Participants were also asked about knowledge of, and any perceived restrictions from, current regulations regarding the use of PMDs healthcare settings. **Results:** The survey response rate was 23.1%. Of 415 respondents, 9 surveys were rejected for incomplete demographic data, resulting in 406 participants. A third (31.5%, 128/406, 95% CI 27.0-36.3) reported using PMDs to record patient data. Most (78.1%) reported doing so more than once a month and 7.0% reported doing so once every shift. 10.9% of participants indicated they did not obtain written or verbal consent. Reasons cited by participants for using PMDs to record patient data included a belief that doing so improves care provided by consultants (36.7%), expedites patient care (31.3%), and improves medical education (32.8%). 53.2% of participants were unaware of current regulations and 19.7% reported feeling restricted by them. Subgroup analysis suggested an increased frequency of PMD use to record patient data among younger physicians and physicians in rural settings. **Conclusion:** This is the first known Canadian study on the use of PMDs to record patient data in the ED. Our results suggest that this practice is common, and arises from a belief that doing so enhances patient care through better communication, efficiency, and education. Our findings also suggest current practices result in risk of both privacy and confidentiality breaches, and thus support arguments for both physician education and regulation reform.
Keywords: mobile device, personal health information, emergency medicine

P156

Exploring educational innovation: out of the shadows of shadow week

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Introduction: In the third year of medical school, students participate in a four week period called Transition to Clerkship, followed by Shadow week, where students spend one week in the discipline prior to starting clerkship. In the past, students have identified that receiving specific additional training during Shadow week would help them succeed in their rotation. To address this problem, the curriculum discussed in this paper is being developed for third year students who will be commencing clerkship in Emergency Medicine (EM). **Methods:** In order to assess achievement of objectives within the curriculum, questionnaires were provided to participants in the morning and afternoon of the session, as well as at the end of their rotation. Evaluative analysis is done through the Kirkpatrick program evaluation framework based on descriptive comparison of scores on the questionnaires, followed by statistical analysis with the Mann-Whitney Test (2-tailed, $p = 0.05$) and a reflective critique. **Results:** Learning activities in this curriculum included: case-based learning, video critique, role play, scavenger hunt, jigsaw activity, think-pair-share, and a game-show style game. This study aims to show if, and how, providing interactive, hands-on learning sessions, which are directly relevant to clinical practice in the emergency department, positively impacted medical students beginning their clerkship in EM. **Conclusion:** Learners showed statistically significant

positive improvement on all learning objectives of the curriculum. A reflective critique provides insight into lessons learned from delivering this curriculum and future directions for this curriculum. This learner-centered curriculum with innovative teaching methods and a considerable number of active learning strategies has encouraged the learners to take responsibility for their own learning. While this curriculum took place in the medical school, it can apply equally to learners completing their EM clerkship in a community or tertiary Emergency Department.
Keywords: innovations in emergency medicine education, undergraduate education, active learning

P157

Pain management post-emergency department discharge: how are analgesics being consumed by patients with ongoing pain?

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Introduction: Pain management is a cornerstone of emergency department (ED) practice, yet ongoing pain after ED discharge and return visits for inadequate analgesia are common. Over-the-counter (OTC) acetaminophen and nonsteroidal anti-inflammatory drugs are widely accepted first line agents for mild to moderate pain. Previous research has not investigated how patients actually consume such agents after discharge, and if they consume them synergistically and at sufficient doses for optimal analgesia. We sought to determine the proportion of patients in ongoing pain post-discharge that were utilizing analgesics as well as the type and dose of agent(s) used. **Methods:** Adults presenting to our ED with an acutely painful musculoskeletal complaint during research assistant hours were eligible for enrollment. After excluding non-English speakers as well as admitted, pregnant/breast-feeding, and chronic pain patients, consenting subjects completed in-person questionnaires during their ED stay and a follow-up telephone interview 2-3 days later. **Results:** 158 individuals were approached during the study period, of which 99 enrolled. 78 completed follow-up. At follow-up, 71 (91%) individuals experienced ongoing pain with a median score of 5 (interquartile range (IQR) 3-6) on an 11-point scale. 48 (67%) of patients still in pain consumed analgesics in the preceding 24 hours. The most commonly used agents were acetaminophen by 18 individuals (38% of analgesic users), ibuprofen by 16 (33%), and naproxen by 9 (19%). 29 respondents (60% of analgesic users) were using solely oral OTC analgesics. Only 15 (31% of analgesic users) used multiple agents concurrently, and 11 (23%) used prescription opioids. Acetaminophen was used at a median daily dose of 1500mg (IQR 1000-2000mg), much lower than that recommended for maximal analgesia (4000mg). Ibuprofen daily doses (1200mg, IQR 800-1300mg) were slightly lower than typical recommended doses (1600mg, 400mg every 6 hours). **Conclusion:** Only two-thirds of patients with ongoing pain at 2-3 days post-ED discharge were consuming analgesics, most commonly acetaminophen and ibuprofen. Of patients using analgesics, less than one-third used multiple agents. OTC medications are not used by most patients at doses for maximal analgesia. It may be possible to reduce pain burden and repeat-visits in discharged ED patients by optimizing the use of OTC analgesics.
Keywords: analgesia, pain management

P158

Sensitivity analysis of CTAS temperature modifier in the emergency department

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Introduction: The importance of early recognition and treatment of Sepsis has been emphasized over the last several years. In an attempt to better prioritize these patients, the Canadian Triage and Acuity Scale (CTAS) revised the adult temperature modifier after 2008 to define fever as 38.0C or higher and apply SIRS criteria, appearance and immunocompromise to assign a CTAS level of 2, 3, or 4. Prior to 2008, the fever threshold was defined as 38.5C and SIRS criteria were not included. This study looks to see if these changes increased the sensitivity of the temperature modifier. **Methods:** This study is a retrospective cohort analysis of patients presenting with a temperature of <36.0C or >38.0C to six Edmonton-area EDs in calendar years 2008 (n = 26181) and 2012 (n = 51622). Outcomes of interest included the temperature modifier predicted score and the actual assigned CTAS score. Data was extracted from the HASS/iSoft EDIS database including: presenting complaint, vital signs, CTAS score, and applied CTAS modifier to generate a before and after comparison of the actual and theoretical impact of temperature modifier revisions on the CTAS score, for both time periods. **Results:** Applying the pre-2008 temperature modifier to the 2008 patient cohort assigned 11.5% to CTAS 2, 39.8% to CTAS 3, and 33.3% to CTAS 4. Applying the post-2008 revised temperature modifier assigned 22.2% CTAS 2, 41.9% CTAS 3, and 27.6% CTAS 4. Carrying out the same analysis on the 2012 patients pre-results were 12.4% CTAS 2, 46.4% CTAS 3, 30.2% CTAS 4; and the post results were 21% CTAS 2, 47.7% CTAS 3, and 25% CTAS 4. Differences between pre- and post-results were statistically significant ($p < 0.0001$) in both years. The actual triage scores in 2012 were 18.7% CTAS 2 indicating the temperature modifier was not always correctly applied and 50.6% CTAS 3 as other modifiers were sometimes applied. **Conclusion:** There was a significant increase in sensitivity following the post 2008 revisions to the CTAS temperature modifier when applied to two large ED patient cohorts. The differences between theoretical and actual CTAS scores was less dramatic as nurses were able to apply other first order or special modifiers to assign an appropriate score. Further analysis will be carried out to determine the impact of the temperature modifier revisions on time to antibiotic and admission rates.
Keywords: triage, sepsis, sensitivity

P159

Identifying the cause for inappropriate urine cultures in a Canadian urban academic emergency department

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Introduction: Inspired by the Choosing Wisely® campaign, St. Michaels Hospital (SMH) launched an initiative to reduce unnecessary tests, treatments and procedures that may cause patient harm. Stakeholder engagement identified inappropriate ordering of urine culture & sensitivities (C&S) in the emergency department (ED) as a focus area. Inappropriate urine C&S increase workload, healthcare costs and detection of asymptomatic bacteriuria which can lead to unnecessary antibiotics. The project's purposes were to describe the scope of inappropriately ordered urine C&S in the SMH ED and to conduct a root-cause analysis to inform future quality improvement interventions. **Methods:** Criteria for determining appropriateness was developed a priori using evidence-based guidelines from the University Health Network together with additional literature review. A retrospective chart review was performed on all urine C&S ordered in the ED from Jun 1 Aug 30, 2016. Each chart was reviewed for order appropriateness, demographic information and ordering provider. All inappropriate urine C&S were reviewed to identify root causes which were then grouped

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into common themes. A pareto chart was constructed to analyze the frequency of causes. **Results:** Of 425 urine C&S ordered, 75 (17.7%) were inappropriate. The top 3 reasons were: inappropriate urosepsis work-ups (53%), order processing errors (17%) and inappropriate work-ups for weakness (16%). Inappropriate urosepsis work-ups were defined as urine C&S that were ordered empirically despite there being a clear focus for infection elsewhere (i.e. cough, cellulitis) and in the absence of urinary symptoms. Order processing errors were defined as urine C&S which were sent despite there being no documented order. Inappropriate testing was more likely to occur overnight, in females and when a urine routine and microscopy was not ordered prior to C&S. 29% of patients with inappropriate C&S received antibiotics. **Conclusion:** 17.7% of urine C&S ordered in the SMH ED during the 3-month study period were inappropriate. The top cause was septic patients who were empirically tested despite having another source for infection identified from the outset. A possible reason for this is the recent ED emphasis on early recognition of sepsis which may encourage early use of antibiotics and empiric urine C&S. One question to resolve is whether a 17.7% overutilization rate is sufficient to make it a target for change. Interventions designed to reduce inappropriate urine C&S may inadvertently increase the number of missed cultures in patients admitted with sepsis not yet diagnosed. Next steps involve discussions between the ED, Internal Medicine, Infectious Disease and Microbiology, and patient partners to identify patient-centered change ideas and sustainable strategies. This may involve establishing guidelines for ordering urine C&S and incorporating lab services to provide oversight into urine C&S processing.

Keywords: quality improvement and patient safety, emergency department, urine culture

P160

Outpatient parenteral antibiotic therapy following emergency department treatment of non-purulent skin and soft tissue infections: a descriptive analysis

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Introduction: Emergency department (ED) patients with non-purulent skin and soft tissue infections (SSTIs) requiring intravenous antibiotics may be managed via outpatient parenteral antibiotic therapy (OPAT). To date, there are no prospective studies describing the performance of an ED-to-OPAT clinic program. Furthermore, there are no studies that have examined physician rationale for intravenous therapy, despite this being a critical first step in the decision to refer to an OPAT program. **Methods:** We conducted a prospective observational cohort study of adults (age 18 years) with non-purulent SSTIs receiving parenteral therapy at two tertiary care EDs. Patients were excluded if they had purulent infections or could not provide consent. The emergency physician completed a form documenting rationale for intravenous therapy, infection size, and choice of antimicrobial agent, dose and duration. OPAT treatment failure was defined as hospitalization after a minimum of 48 hours of OPAT for: (i) worsening infection; (ii) peripheral intravenous line complications; or (iii) adverse antibiotic events. Patient satisfaction was assessed at a 14-day telephone follow up. **Results:** We enrolled a consecutive sample of 153 patients (mean age 60 years, 82 male (53.6%) and 38 (24.8%) with diabetes). A total of 137 patients (89.5%) attended their clinic appointment. Of the 101 patients prescribed cefazolin, 50.5% received 1000 mg and 48.5% received 2000 mg per day. There were low rates of OPAT treatment failure (3.9%). None of the adverse peripheral intravenous line events (9.8%) or adverse antibiotic events (7.2%) required hospitalization. Patients reported a high degree of satisfaction with timeliness of clinic referral (median score 9 out of 10) and overall care received (median score of 10 out of 10). The top 5 reasons given by physicians for selecting intravenous therapy were: clinical impression of severity (52.9%); failed oral antibiotic therapy (41.8%); diabetes (17.6%); severe pain (7.8%); and peripheral vascular disease (7.8%). **Conclusion:** This is the first study to identify physician rationale for the use of intravenous antibiotics for SSTIs. There was significant variability in antibiotic prescribing practices by ED physicians. This prospective study demonstrates that an ED-to-OPAT clinic program for non-purulent SSTIs is safe, has a low rate of treatment failures and results in high patient satisfaction.

Keywords: cellulitis, intravenous antibiotics, outpatient parenteral antibiotic therapy

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Emergency department visits for hyperglycemia in emerging adults with diabetes: a health records review

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Introduction: Patients with diabetes who are in emerging adulthood, defined as the life stage between 18-29 years, have unique challenges in managing their illness and are at risk of acute complications and loss to follow-up. The studys objective was to describe emergency department (ED) utilization for hyperglycemia in emerging adults with diabetes and to characterize 30-day outcomes including return visits and admission for hyperglycemia. **Methods:** This was a health records review of emerging adults presenting over a one-year period to four tertiary care EDs with a diagnosis of hyperglycemia, diabetic ketoacidosis or hyperosmolar hyperglycemic state. Research personnel collected data on patient characteristics, treatment, disposition, and determined if patients returned to the ED for hyperglycemia within 30 days. Descriptive statistics were used to summarize the data where appropriate. **Results:** There were 185 ED encounters for hyperglycemia, representing 116 unique emerging adult patients. Mean (SD) age was 23 (3.5) years and 50.9% were female. 80 (69.0%) had known type 1 diabetes, 11 (9.5%) had type 2, and 25 (21.5%) were newly diagnosed in the ED. Of 185 visits, 98 (53.0%) resulted in hospital admission. 56 (30.3%) returned to the ED for hyperglycemia within 30 days of their initial encounter, and 21 (11.4%) resulted in admission on this subsequent visit. **Conclusion:** We characterized ED utilization and 30-day outcomes of emerging adults with diabetes for hyperglycemia. Future research should focus on earlier identification of those at higher risk for recurrent ED visits or admission and the efficacy of interventions to prevent these adverse outcomes.

Keywords: diabetes mellitus, hyperglycemia, emerging young adults

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Patient-important outcomes in hyperglycemia after discharge from the emergency department: a prospective cohort study

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Introduction: Hyperglycemic emergencies, including diabetic ketoacidosis (DKA) and hyperosmolar hyperglycemic state (HHS), carry

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significant morbidity for individuals even after discharge. The objective of this study was to describe the patient-important outcomes and burden of disease for emergency department (ED) patients with hyperglycemia after discharge from hospital. **Methods:** This was a prospective cohort study of patients 18 years presenting to two tertiary care EDs (combined annual census 150,000 visits) with a discharge diagnosis of hyperglycemia, DKA or HHS over a 15-month period (Jul 2016-Oct 2017). During the ED visit, consent was obtained for a telephone follow-up call to determine patient-important outcomes. Trained research personnel collected data from medical records and completed a 14 day telephone follow-up using a standardized questionnaire to determine medication changes, missed days of school or work, and repeat admissions or visits to a healthcare provider. Descriptive statistics were used where appropriate to summarize the data. **Results:** Thus far, 172 patients have been enrolled in our study. Mean (SD) age is 53.9 (19.3) years and 97 (56.4%) are male. 65 (37.8%) patients were admitted from their initial ED visit. Of the 125 patients (72.7%) providing post-discharge outcomes, 75 (60.0%) required an adjustment to their diabetes medications or insulin. 21 (16.8%) patients missed days of school or work for a median (IQR) duration of 3.5 (1.3, 7.0) days. 85 (68.0%) saw another healthcare provider within a 14 day period, 45 (36.0%) saw their family physician, and 34 (27.2%) saw an internist or endocrinologist. 9 (7.2%) were seen again in the ED, 5 of these patients required admission to hospital. There was one death that occurred within the follow-up period. **Conclusion:** This prospective study builds on our previous retrospective work and demonstrates that visits for hyperglycemia carry a significant burden of disease beyond what may be seen in a single ED encounter. Further research will attempt to identify the factors that may be predictive of adverse outcomes in hyperglycemic patients presenting to the ED.

Keywords: diabetes mellitus, hyperglycemia, patient-important outcomes

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Methanol poisoning by inhalation: a case series

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Introduction: Methanol intoxication is a well-recognized toxicological emergency. While most cases of significant methanol poisoning occur via ingestion, there are reports in the literature of poisoning resulting from the inhalational route. We report a series of methanol intoxications secondary to inhalational abuse of a methanol containing lacquer thinner presenting to an inner city Emergency Department. **Methods:** A laboratory database was searched for methanol levels >5 mmol/L. (16mg/dL). from January 1, 2010 to December 31, 2015. A chart review was completed to determine mode of poisoning, clinical presentation, treatment, and disposition. **Results:** We found 35 patients who made a total of 83 emergency department (ED) visits with a methanol level >5mmol/L. (16mg/dL). The methanol levels ranged from 5.3-39.6 mmol/L. (16.96-126.72 mg/dL). 73% of poisonings were secondary to inhalation of a methanol-containing lacquer thinner. The median age of these patients was 43 years, and 49% were male. The majority of patients (96%) resided in the core area. The most frequent chief complaints were substance abuse/intoxication, gastrointestinal complaints, and chest pain. 18% of patients described visual symptoms. Treatments were fomepizole only (59%), fomepizole plus hemodialysis (26%), and hemodialysis alone (2%). 49% of patients were discharged from the ED, while 28% and 23% were admitted to an intensive care unit (ICU) and an internal medicine ward respectively. There were no cases of blindness. We describe a cohort of patients who developed methanol poisoning from inhalation of a methanol containing lacquer thinner that required treatment with fomepizole and hemodialysis. While almost 1/3 of these patients were admitted to ICU, 49% were discharged from the emergency department after a course of fomepizole. The etiology of this outbreak was found to be a change in the formulation of the lacquer thinner, substituting a higher concentration of methanol for toluene. The manufacturer and a number of local retail outlets were contacted. This resulted in the product being taken off the shelves by the retail outlets, and eventually, a change in the product formulation by the manufacturer, with a resultant decrease in the methanol content. After these actions, we have not seen any additional presentations of inhalational methanol intoxication. **Conclusion:** We report the largest case series to date of patients who presented with methanol intoxication, requiring fomepizole and/or hemodialysis, secondary to inhalation of a methanol containing lacquer thinner. Physician advocacy regarding the etiology of this outbreak resulted in collaboration with retail outlets and subsequent action by the manufacturer. This ended the outbreak.

Keywords: methanol, advocacy, poisoning

P164

Development of the BC-Airway Registry for Emergencies (BCARE) network

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Introduction: Intubation is one of the highest-risk procedures performed in the ED. Few Canadian centres monitor intubation frequency, indications, methods used, success, and/or complication rates. An airway registry that tracks patient outcomes and variation in practice would be a valuable quality improvement (QI) tool. We describe the development of the BC-Airway Registry for Emergencies (BCARE) network, an emergency intubation database at two tertiary-care and one community hospital. **Methods:** Respiratory Therapists (RTs) are present at every intubation outside of the OR and complete a standardized post-intubation form. The airway forms were developed collaboratively with input from RTs, emergency physicians, intensivists, and anesthetists. Completed forms are collected from participating sites and data is entered into a secure online database where patient outcomes are analyzed in real-time. **Results:** We collected data from 737 unique intubations over 19 months with ongoing enrolment at the time of abstract submission. Mean age was 59.4 (Range 17-95, SD 17.6), Male 66.2%, intubation locations were ED (396, 53.7%), ICU (221, 30.0%), Ward (120, 16.3%). The most common indications for ED intubation were ICH/stroke (14.6%), seizure (10.9%), and sepsis (9.5%). Intubations are done by attending physicians more frequently in the ED (48.0%) compared to in the ICU (11.8%), and ward (8.6%). ED intubations were more commonly performed using video laryngoscopy (57.7%) with a smaller proportion using direct laryngoscopy (39.0%). First-pass success was 81.8% in the ED, 79.2% in the ICU, and 77.5% on the wards. Of ED intubations, 56 (14.1%) had complications and 73 (18.4%) were considered to be a difficult airway. **Conclusion:** The BCARE network tracks intubation performance across hospitals and is a valuable QI tool. BCARE can be used to ensure that all centres are meeting a benchmark success rate, for assessing the impact of practice changes such as pre-intubation checklists, and for implementing systematic methods to identify patients who previously had a "difficult airway."

Keywords: airway, intubation, registry

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A non-hierarchical mentorship model for professional development

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Introduction: Mentorship is an essential component of professional development and benefits include increased career satisfaction, scholarship, and efficiency of academic promotion. The Mastermind group, a collaborative, network-based model for mentorship has gained popularity in the business world. It comprises of a group of colleagues that provide mentorship and career advice for each other through regularly scheduled meetings. The group benefits from the combined intelligence and accumulated experience of the participants, who may be at different career stages. **Methods:** Academic Life in Emergency Medicine (ALiEM; www.aliem.com), a digital health professions education organization, conducted two Mastermind groups for 14 team members in 2017. The groups included all levels of academic rank from full professor to instructors, and represented 14 different medical schools in North America. Each Mastermind group completed a self-assessment summarizing their professional strengths and weaknesses, two homework assignments, and two 90-minute videoconference meetings, using a structured, moderator-facilitated format. Meetings were conducted on Google Hangouts on Air© (Google Inc.). In the initial group meeting, participants discussed their self-assessments, current projects, and career challenges. The second meeting allowed discussion of suggested professional development resources for each participant, actionable next steps, and an accountability timeline for each participant. The free, cloud-based platforms and voluntary basis for the Mastermind groups resulted in a zero-cost innovation. **Results:** In a post-intervention survey, the 14 participants rated the experience as 9.4/10 (response rate 100%) using a Likert scale. In a quasi-experimental analysis participants cited the need for career advice or assistance with a project as their reason for participating. Participants received specific resource recommendations during the sessions, including books, training courses, or conferences. Contacts outside the group for additional mentorship were made possible given the breadth of networks among the participants. All participants had at least one identifiable next step with accountability to the group. Overall, the participants described a synergy of energy, commitment to one anothers longitudinal success, and benefit from the diverse range of talent and expertise in the group. Many of the members discussed plans to replicate this mentorship model at their own institutions. **Conclusion:** Our experiences suggest that the Mastermind conceptual framework is an easily replicated, feasible, zero-cost, and effective model for professional development. Though the model was originally proposed as a method for in-person discussions, we report a more modern, online experience for professional development in our diverse, globally-distributed team.

Keywords: innovations in emergency medicine education, mentorship, professional development

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The chief resident incubator - a virtual community of practice

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Introduction: The Emergency Medicine Chief Resident Incubator is a year-long curriculum for chief residents that aims to provide participants with a virtual community of practice, formal administrative training, mentorship, and opportunities for scholarship. **Methods:** The Chief Resident Incubator was designed by Academic Life in Emergency Medicine (ALiEM; www.aliem.com) a digital health professions education organization in 2015, following a needs assessment in emergency medicine. A 12-month curriculum was created using constructivist social learning theory, with specific learning objectives that reflected 11 key administrative or professional development domains deemed important to chief residents. The topics covered included interviewing skills, contract negotiations, leadership, coaching, branding, conflict resolution, and ended with a focus on wellness and career longevity. A Core Leadership Team and Virtual Mentors were recruited to lead each annual iteration of the curriculum. The Incubator was implemented as a virtual community of practice using Slack©, a messaging and digital communication platform. Ancillary technology such as Google Hangout on Air© and Mailchimp© were used to facilitate learner engagement with the curriculum. Three in person networking events were hosted at three large emergency medicine and education conferences with special medical education guests. Outcomes include chief resident participation rates, Slack© activity, Google Hangout© web analytics, newsletter email engagement, and scholarship. We also incorporated a hidden curriculum throughout the year with multiple online publications, competitions for guest grand round presentations, and incorporation of digital technologies in medical education. **Results:** A total of 584 chief residents have participated over the first 3 years of the Chief Resident Incubator; this includes chief residents from over 212 residency programs across North America. Over 27,000 messages have been shared on Slack© (median 214 per week). A total of 32 Google Hangouts© have occurred over the course of the inaugural Incubator including faculty mentorship from Dr. Rob Rogers, Dr. Dara Kass and Dr. Amal Mattu. A monthly newsletter was distributed to the participants with an opening rate of 59%. Scholarship included 26 published academic blog posts, 2 open access In-Training exam prepbooks, a senior level online curriculum with 9 published modules and 3 book club reviews. **Conclusion:** The Chief Resident Incubator is a virtual community of practice that provides longitudinal training and mentorship for chief residents. This Incubator framework may be used to design similar professional development curricula across various health professions using an online digital platform.

Keywords: innovations in emergency medicine education, chief residents, mentorship

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The Spot the Diagnosis! series: using fine art to teach observation skills and medical concepts on a medical education website

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Introduction: Fine art education increases the quality and quantity of observations that medical students make in both art and clinical reports. However, there are few free and accessible resources that teach art and observational skills to healthcare learners and providers. CanadiEM.org, a medical education blog, developed a new series called Spot the Diagnosis! to address this gap. The goals of the Spot the Diagnosis! series are to: 1) use art to explain medical concepts, 2) tie medical concepts to visual art, 3) hone observational skills, and 4) expose healthcare providers to art. **Methods:** Each piece of art for the Spot the Diagnosis! Series is selected based upon the author's art history knowledge, resources found using an online search, and/or suggestions made by other healthcare professionals. The accompanying blog post is researched and written by a medical student in a question-and-answer style and peer-reviewed by another medical student and physician. Posts are uploaded monthly to CanadiEM.org and accessible to anyone with an internet connection. Promotion occurs on site, via email, word-of-mouth, and social media. Viewership is tracked using Google Analytics (GA). A survey for readers is planned to assess who, how, and why

readers use the series, but results were not available prior to abstract submission. **Results:** Six Spot the Diagnosis! posts have been published, each of which begins with the selection of a piece of fine arts that showcases a potential medical diagnosis and a blog post outlining an interpretation of the work informed by observations, historical reports, and medical evidence. Each was published as a blog post on a Saturday and added to a page containing a list of all posts in the broader Arts PRN section on CanadiEM. All contained a single piece of art as the focus, 6 ± 2 (median $\pm$ IQR) questions, 638 ± 250 words, and 6 ± 3 references. The answers to questions are hidden under drop-down formatting to allow viewers to arrive at their own answers first. In the first 30 days of publication, each post in the series was viewed 1582 ± 401 times. **Conclusion:** The Spot the Diagnosis! series is an online educational resource published on CanadiEM.org that aims to improve learners medical knowledge and observational skills by featuring fine arts pieces with relevant question-and-answer style posts. This series fills the gap between art and medicine and has been well received by CanadiEM viewers. We look forward to analyzing responses in our survey to further understand how, why, and who uses this new and innovative resource.

Keywords: innovations in emergency medicine education, arts in medicine, observation skills

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Critical dynamics study of burnout in emergency department health professionals in New Brunswick: revisiting 6 years later

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Introduction: Emergency Department (ED) staff burnout correlates with psychological coping strategies used by Emergency department health professionals (EDHPs). Staff at two urban referral EDs in New Brunswick took part in a survey of burnout and coping strategies after one ED experienced an influx of new physicians and a newly renovated ED in 2011. Six years later, ED crowding and EDHP staffing problems became prevalent at both EDs. We compared levels of burnout at two urban referral EDs to determine if burnout and coping worsened over time. **Methods:** An anonymous survey of all EDHPs at 2 urban referral EDs was performed in 2011 and in 2017. A demographics questionnaire, the Maslach Burnout Inventory (MBI, measuring emotional exhaustion, depersonalization and personal accomplishment), and the Coping Inventory for Stressful Situations (CISS, measuring task-oriented, emotion-oriented, and avoidance-oriented coping styles) were collected. Descriptive statistics and linear regression models examined relationships over time and between the two hospitals. **Results:** Burnout scores were similar both at the two facilities and in 2011 ($n = 153$) and 2017 ($n = 127$). There were no differences between samples or EDs for important factors. Emotion-oriented coping was associated with higher levels of burnout, while task-oriented coping was inversely correlated with burnout. Experiencing professional stress was a significant predictor of emotional exhaustion, while those working longer years in their current department had higher emotional exhaustion and depersonalization. By 2017, both EDs had experienced significant nursing staff turnover (50%) compared to 2011. **Conclusion:** Burnout scores remained consistent after 6 years at these two urban referral EDs. Given the evidence that increased years of service is associated with increased burnout, high staff turnover rate at both EDs could explain how scores remained constant. Staff turnover may represent a way these ED systems cope in a challenging environment. In 2017, task-oriented copers continued to score lower while emotionally-oriented copers showed higher burnout risk, and experiencing professional stress remains a strong predictor of burnout.

Keywords: burnout, emergency medicine, administration

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