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CAEP/ACMU 2020 Scientific Abstracts



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CAEP/ACMU 2020 Scientific Abstracts

June 1st – 4th, 2020, Ottawa, Ontario

Research in emergency medicine (EM) guides improvements in emergency patient care. Research helps to identify and standardize the best care to optimize patient outcomes.

Fostering a rich research environment requires funding, education, and a rigorous peer-review process. The CAEP Research Committee is pleased to support the development of EM-related research skills across Canada by administering two annual programs: the CAEP Grant Competition and the CAEP Abstract Competition.

Abstracts are the core of the research competition. This year for CAEP 2020 in Ottawa, we had 3 submission categories: research, education, and quality improvement and patient safety, as well as subcategories for quantitative research, qualitative research and education innovations. We continued to expand the abstract program as we introduced two new Choosing Wisely Canada abstract awards. We received 322 abstract submissions from EM researchers from across Canada and internationally, where the top-ranked abstracts will be presented at the research plenary session. In addition, the best resident, pediatric, new investigator, education innovation, venous thromboembolism (VTE), quality improvement and patient safety, and medical student abstracts submitted by CAEP members are awarded financially to subsidize conference travel expenses.

With the generous donations made by our EM colleagues, we were able to provide two EMAF grants of \$10,000 this year, as well as fund the Grizzly Den competition which takes place on Wednesday, June 3. In this highly entertaining track, researchers will “pitch” their research and try to convince the Grizzlies to fund their study for up to \$10,000. As well we awarded more than \$33,000 to nine projects focusing on aims to reduce venous thromboembolism, innovative educational program, QIPS, and junior investigator led initiatives. We hope to continue to expand the grants program and are looking to you for assistance, so remember to support your EM research colleagues through the EM Advancement Fund (www.TheEMAF.org).

CAEP also introduced the new CIHR-ICRH/CAEP Mid-Career Lecturer Award in Emergency Medicine; a 3-year partnership which allows the recipient to deliver a plenary presentation at the annual CAEP conference. The purpose of establishing this annual award by the CIHR-ICRH and CAEP is to recognize an individual's outstanding contribution to the advancement of emergency medicine in Canada and internationally at the mid-point of their career.

The hours of work that our volunteer reviewers contribute is critical to the success of the Research Committee activities during the busy abstract and grant competitions. Each submission is thoroughly read, reviewed, and scored by at least three experienced reviewers. The Research Committee would like to thank the reviewers for their contribution and recognize their commitment to support EM research.

The Research Committee would like to acknowledge the substantial effort of CAEP staff, particularly Shanna Scarrow and Kelly Wyatt, in coordinating the grant and abstract competitions, and in preparing the CAEP conference research program and *CJEM* research supplement.

Disclaimer: The large number of submitted abstracts and the deadlines associated with publication do not permit the author communication, abstract revisions, or *CJEM* editorial review. The abstracts are presented, as they were submitted to the Research Committee. Only the author affiliation supplied by the presenting author is specified.

Note: The CAEP 2020 Conference was cancelled due to the COVID-19 pandemic.

Andrew McRae, MD, PhD, FRCPC
CAEP/ACMU Research Committee Chair

Justin Yan, MD, MSc, FRCPC
CAEP/ACMU Research Committee
Abstract Competition Lead

CAEP/ACMU 2020 Abstract Awards

First place, Plenary Presentation, Grant Innes Research Paper and Presentation Award

Ian Stiell

PL01 Creation of a risk scoring system for emergency department patients with acute heart failure

Second place, Plenary Presentation

Sheldon Cheskes

PL02 Double Sequential External Defibrillation for Refractory Ventricular Fibrillation: The DOSE VF pilot randomized controlled trial

Third place, Plenary Presentation, Top Medical Student Research Abstract Award

Brenton Wong

PL03 Thromboembolic events following cardioversion for acute atrial fibrillation and flutter: a systematic review and meta-analysis

Fourth place, Plenary Presentation, Top New Investigator Research Abstract Award

Catherine Varner

PL04 A randomized controlled trial comparing prescribed light exercise to standard management for emergency department patients with acute mild traumatic brain injury

Top Resident Research Abstract Award

Michael Davison

LO92 The effect of prehospital intravenous fluids on mortality in trauma: a systematic review and meta-analysis

Top Pediatric Research Abstract Award

Samina Ali

LO42 A systematic review of short-term use of therapeutic opioids for children and future opioid use disorders

Top QIPS Abstract Award

Jesse McLaren

LO33 Sharing and teaching electrocardiograms to minimize infarction

Top Education Innovation Abstract Finalists

Steven Friedman*

LO11 STAR-EM: An innovative summer research program for medical students in an urban Canadian academic emergency department

Ben Forestell*

LO12 ClerkCast: a novel online free open access emergency medicine curriculum for medical students

Jared Baylis

LO13 Development of a national, standardized simulation case template

CAEP-CanVECTOR Research Abstract Awards

Sameer Sharif

LO55 Comparison of the age-adjusted D-dimer, clinical probability-adjusted D-dimer, and Wells rule with D-dimer for diagnosing deep vein thrombosis in the emergency department

Leila Salehi

P039 Utilization of serum D-dimer assays and computed tomography pulmonary angiography (CTPA) scans in the diagnosis of pulmonary embolism among emergency department (ED) physicians

* Due to the cancellation of CAEP 2020, the Top Education Innovation Abstract Competition did not take place. The highest-ranked abstract was deemed the winner – Dr. Friedman and Mr. Forestell tied and are co-winners of the award.

Choosing Wisely Canada Abstract Awards

Suneel Upadhye

LO27 Relevance of choosing wisely Canada non-emergency medicine specialty lists to emergency medicine practice

Samuel Thibault

MP48 Head computerized tomography overuse in adults with mild traumatic brain injury in a single Quebec emergency department

CAEP Resident Research Abstract Awards

Erfun Hatam

LO05 Rate of prescription of oral anticoagulation in patients presenting with new onset atrial fibrillation/flutter

Justin Koh

LO24 Implementing emergency department take-home naloxone programs: a systematic scoping review

Gregory Beller

LO54 Emergency department prevalence of intracranial aneurysm on computed tomography angiography (EPIC-ACT)

Shannon Fernando

LO60 Frailty and associated prognosis among older emergency department patients with suspected infection – a prospective, observational cohort study

Hussein Alrimawi

LO72 Spotting potential opportunities for teachable moments

Michael Hale

LO79 The variable landscape of resident selection: A study of Canadian Royal College emergency medicine training programs

Patrease Patton

LO93 A single center randomized control trial of intravenous lidocaine for the management of traumatic rib fractures

CAEP/ACMU 2020 Grant Awards

2019 Grizzly Den Grant

Christopher Skappak

SEPSIS ED: Identifying urinary biomarkers of patients with early sepsis in the emergency department

EMAF Grants

Teresa Chan

Harnessing machine learning in the age of competency-based medical education

Krishan Yadav

High-dose cephalexin for cellulitis (HI-DOCC): a pilot randomized controlled trial

CAEP-SREMI Grants

Lorne Costello

Where does simulation fit? Exploring the role of simulation in a transition to discipline emergency medicine curriculum

Jessica Moe

Buprenorphine/naloxone standard dosing and microdosing in the emergency department: a feasibility study

CAEP-CanVECTOR Grant

Federico Germini

Diagnostic yield of computed tomography for pulmonary embolism by presenting complaint in the emergency department: an observational study

Quality Improvement & Patient Safety Grants

Sahil Gupta

Improving testing for sexually transmitted infections at St. Michael's Hospital in Toronto

Ahmed Taher

Improving patient experience by sharing wait time information in the emergency department

Junior Investigator Grants

Ariane Boutin

Randomized control trial of casting versus pediatric walker-boot in the management of toddler's fractures

Shannon Fernando

Historical features, physical examination, imaging, and laboratory findings for diagnosis of ruptured abdominal aortic aneurysm in emergency department patients: a systematic review and meta-analysis

Quinten Paterson

A qualitative study aimed at identifying barriers and facilitators to EPA acquisition in emergency medicine

Rebecca Schonnop

Understanding why health care teams miss delirium recognition in older emergency department patients

Abbreviations:

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

*Corresponding authors are underlined.

Plenary Oral Presentations

PL01

Creation of a risk scoring system for emergency department patients with acute heart failure

I. Stiell, MD, MSc, J. Perry, MD, MSc, C. Clement, S. Sibley, MD, A. McRae, MD, B. Rowe, MD, B. Borgundvaag, MD, S. McLeod, MSc, L. Mielniczuk, MD, J. Dreyer, MD, J. Yan, BSc, MD, MSc, E. Brown, BSc, J. Brinkhurst, BA, M. Nemnom, MSc, M. Taljaard, PhD, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Acute heart failure (AHF) is a common emergency department (ED) presentation and may be associated with poor outcomes. Conversely, many patients rapidly improve with ED treatment and may not need hospital admission. Because there is little evidence to guide disposition decisions by ED and admitting physicians, we sought to create a risk score for predicting short-term serious outcomes (SSO) in patients with AHF. **Methods:** We conducted prospective cohort studies at 9 tertiary care hospital EDs from 2007 to 2019, and enrolled adult patients who required treatment for AHF. Each patient was assessed for standardized real-time clinical and laboratory variables, as well as for SSO (defined as death within 30 days or intubation, non-invasive ventilation (NIV), myocardial infarction, coronary bypass surgery, or new hemodialysis after admission). The fully pre-specified, logistic regression model with 13 predictors (age, pCO₂, and SaO₂ were modeled using spline functions with 3 knots and heart rate and creatinine with 5 knots) was fitted to the 10 multiple imputation datasets. Harrell's fast step-down procedure reduced the number of variables. We calculated the potential impact on sensitivity (95% CI) for SSO and hospital admissions and estimated a sample size of 170 SSOs. **Results:** The 2,246 patients had mean age 77.4 years, male sex 54.5%, EMS arrival 41.1%, IV NTG 3.1%, ED NIV 5.2%, admission on initial visit 48.6%. Overall there were 174 (7.8%) SSOs including 70 deaths (3.1%). The final risk scale is comprised of five variables (points) and had c-statistic of 0.76 (95% CI: 0.73-0.80): 1. Valvular heart disease (1) 2. ED non-invasive ventilation (2) 3. Creatinine 150-300 (1) ≥ 300 (2) 4. Troponin 2x-4x URL (1) ≥ 5 x URL (2) 5. Walk test failed (2) The probability of SSO ranged from 2.0% for a total score of 0 to 90.2% for a score of 10, showing good calibration. The model was stable over 1,000 bootstrap samples. Choosing a risk model total point admission threshold of ≥ 2 would yield a sensitivity of 80.5% (95% CI 73.9-86.1) for SSO with no change in admissions from current practice (48.6% vs 48.7%). **Conclusion:** Using a large prospectively collected dataset, we created a concise and sensitive risk scale to assist with admission decisions for patients with AHF in the ED. Implementation of this risk scoring scale should lead to safer and more efficient disposition decisions, with more high-risk patients being admitted and more low-risk patients being discharged. **Keywords:** heart failure, risk scale, safety

PL02

Double Sequential External Defibrillation for Refractory Ventricular Fibrillation: the DOSE VF pilot randomized controlled trial

S. Cheskes, MD, P. Dorian, MD, MSc, M. Feldman, MD, PhD, S. McLeod, MSc, D. Scales, MD, PhD, R. Pinto, PhD, L. Turner, PhD, L. Morrison, MD, MSc, I. Drennan, P. Verbeek, MD, University of Toronto, Toronto, ON

Introduction: Despite recent advances in resuscitation, some patients remain in ventricular fibrillation (VF) after multiple defibrillation attempts during out-of-hospital cardiac arrest (OHCA). Vector change defibrillation (VC) and double sequential external defibrillation (DSED) have been proposed as alternate therapeutic strategies for OHCA patients with refractory VF. The primary objective was to determine the feasibility, safety and sample size required for a future cluster randomized controlled trial (RCT) with crossover comparing VC or DSED to standard defibrillation for patients experiencing refractory VF. Secondary objectives were to evaluate the intervention effect on VF termination and return of spontaneous circulation (ROSC). **Methods:** We conducted a pilot cluster RCT with crossover in four Canadian paramedic services and included all treated adult OHCA patients who presented in VF and received a minimum of three defibrillation attempts. In addition to standard cardiac arrest care, each EMS service was randomly assigned to provide continued standard defibrillation (control), VC or DSED. Services crossed over to an alternate defibrillation strategy after six months. Prior to the launch of the trial, 2,500 paramedics received in-person training for VC and DSED defibrillation using a combination of didactic, video and simulated scenarios. **Results:** Between March 2018 and September 2019, 152 patients were enrolled. Monthly enrollment varied from 1.4 to 6.1 cases per service. With respect to feasibility, 89.5% of cases received the defibrillation strategy they were randomly allocated to, and 93.1% of cases received a VC or DSED shock prior to the sixth defibrillation attempt. There were no reported cases of defibrillator malfunction, skin burns, difficulty with pad placement or concerns expressed by paramedics, patients, families, or ED staff about the trial. In the standard defibrillation group, 66.6% of cases resulted in VF termination, compared to 82.0% in VC and 76.3% of cases in the DSED group. ROSC was achieved in 25.0%, 39.3% and 40.0% of standard, VC and DSED groups, respectively. **Conclusion:** Findings from our pilot RCT suggest the DOSE VF protocol is feasible and safe. VF termination and ROSC were higher with VC and DSED compared to standard defibrillation. The results of this pilot trial will allow us to inform a multicenter cluster RCT with crossover to determine if alternate defibrillation strategies for refractory VF may impact patient-centered, clinical outcomes

Keywords: double sequential external defibrillation, refractory ventricular fibrillation, vector change defibrillation

PL03

Thromboembolic events following cardioversion for acute atrial fibrillation and flutter: a systematic review and meta-analysis

B. Wong, BHSc, J. Perry, MD, MSc, W. Cheng, PhD, B. Zheng, MD, K. Guo, BSc, M. Taljaard, PhD, A. Skanes, MD, I. Stiell, MD, MSc, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Several recent observational studies have presented concerning data regarding the safety of cardioversion (CV) for acute

atrial fibrillation and flutter (AAFF). We conducted this systematic review to determine whether it is safe to cardiovert AAFF patients without prescribing oral anticoagulation (OAC) post-CV for those who are CHADS-65 negative. **Methods:** We conducted a librarian assisted search of MEDLINE, Embase, and Cochrane from inception through November 23, 2019. We included observational studies and randomized trials reporting thromboembolic (TE) events (i.e. stroke, transient ischemic attack, or systemic thromboembolism) within 30 days following CV in patients with AAFF, where onset of symptoms was <48 hours. Two reviewers independently screened studies and extracted data. The main outcome was risk of TE events within 30 days post-CV, stratified by OAC use. Risk of bias was assessed with the Quality in Prognostic Studies (QUIPS) tool. The primary analysis was based on prospective studies and the secondary analysis was based on retrospective studies. We performed meta-analyses for TE events where 2 or more studies were available, by applying the DerSimonian-Laird random-effects model. We implemented analyses stratified by study design using Open MetaAnalyst and generated the forest plots. **Results:** Our search yielded 969 titles; 74 were selected for full-text review and 20 studies were included in the review. The primary meta-analysis of 6 prospective studies, including two randomized trials, found a TE event rate of 0.15% (2 TE events/1,314 CVs). Within this prospective group, lack of OAC use was associated with a decreased risk of TE events (RR=2.15 where RR >1 indicates increased risk of TE events with OAC compared to no OAC; 95% CI 0.50 to 9.31; I²=0%). Five of the 6 prospective studies had a low or moderate risk of bias in all QUIPS domains. Secondary meta-analysis of 6 retrospective studies revealed a TE event rate of 0.53% (56 TE events/10,521 CVs). This subgroup showed a trend favouring OAC use with decreased risk of TE events (RR=0.34 where RR <1 suggests decreased risk of TE events with OAC; 95% CI 0.17 to 0.72; I²=0%). **Conclusion:** In the primary analysis of prospective studies, we found a low TE event rate following CV of AAFF, irrespective of OAC use. This contradicts previous analyses of retrospective studies. Our study supports the longstanding practice of not necessarily prescribing OAC post-CV in the ED for AAFF patients who are CHADS-65 negative.

Keywords: atrial fibrillation, cardioversion, thromboembolism

PL04

A randomized controlled trial comparing prescribed light exercise to standard management for emergency department patients with acute mild traumatic brain injury

C. Varner, MD, MSc, C. Thompson, BSc, MSc, K. de Wit, MD, MSc, B. Borgundvaag, MD, PhD, R. Houston, BSc, S. McLeod, MSc, Mount Sinai Hospital - University of Toronto, Toronto, ON

Introduction: The emergency department (ED) is often the first point of health care contact for patients with mild traumatic brain injury (MTBI). Spontaneous resolution occurs in most patients within 7 days, yet 15-30% will develop post-concussion syndrome (PCS). Given the paucity of effective management strategies to prevent PCS and emerging evidence supporting exercise, the objective of this study was to evaluate the impact of prescribed early light exercise compared to standard discharge instructions for acute MTBI patients in the ED. **Methods:** This was a randomized controlled trial conducted in three Canadian EDs. Consecutive, adult (18-64 years) ED patients with a MTBI sustained within the preceding 48 hours were eligible for enrollment. The intervention group received discharge instructions prescribing 30 minutes of daily light exercise (e.g.,

walking), and the control group was given standard MTBI instructions advising gradual return to exercise following symptom resolution. Participants documented their daily physical activities and completed follow-up questionnaires at 7, 14, and 30 days. The primary outcome was the proportion of patients with PCS at 30 days, defined as the presence of ≥ 3 symptoms on the Rivermead Post-concussion Symptoms Questionnaire (RPQ) at 30 days. **Results:** 367 patients were enrolled (control n=184; intervention n=183). Median age was 32 years and 201 (57.6%) were female. There was no difference in the proportion of patients with PCS at 30 days (control 13.4 vs intervention 14.6; Δ1.2, 95% CI: -6.2 to 8.5). There were no differences in median change of RPQ scores (control 14 vs intervention 13; Δ1, 95% CI: -1 to 4), median number of return health care provider visits (control 1 vs intervention 1; Δ0, 95% CI: 0 to 0), or median number of missed school or work days (control 2 vs intervention 2; Δ0, 95% CI: 0 to 1) at 30 days. There was a nonsignificant difference in unplanned return ED visits within 30 days (control 9.9% vs intervention 5.6%; Δ1, 95% CI: -1.4 to 10.3). Participants in the control group reported fewer minutes of light exercise at 7 days (30 vs 35; Δ5, 95% CI: 2 to 15). **Conclusion:** To our knowledge, this is the first randomized trial of prescribed early light exercise for adults with acute MTBI. There were no differences in recovery or healthcare utilization outcomes. Results suggest prescribed early light exercise should be encouraged as tolerated at ED discharge following MTBI, but exercise prescription alone is not sufficient to prevent PCS.

Keywords: concussion, exercise prescription, mild traumatic brain injury

Oral Presentations

LO01

What presenting features predict obstetrical outcomes in women who present to the emergency department with early pregnancy bleeding?

M. Burgoyne, BSc, MSc, R. Clouston, MD, A. Banerjee, MBChB, J. Fraser, BN, P. Atkinson, MBChB, Dalhousie University, Saint John, NB

Introduction: Vaginal bleeding in early pregnancy is a common emergency department (ED) presentation, with many of these episodes resulting in poor obstetrical outcome. These outcomes have been extensively studied, but there have been few evaluations of what variables are associated predictors. This study aimed to identify predictors of less than optimal obstetrical outcomes for women who present to the ED with early pregnancy bleeding. **Methods:** A regional centre health records review included pregnant females who presented to the ED with vaginal bleeding at <20 weeks gestation. This study investigated differences in presenting features between groups with subsequent optimal outcomes (OO; defined as a full-term live birth >37 weeks) and less than optimal outcomes (LOO; defined as a miscarriage, stillbirth or pre-term live birth). Predictor variables included: maternal age, gestational age at presentation, number of return ED visits, socioeconomic status (SES), gravida-para-abortus status, Rh status, Hgb level and presence of cramping. Rates and results of point of care ultrasound (PoCUS) and ultrasound (US) by radiology were also considered. **Results:** Records for 422 patients from Jan 2017 to Nov 2018 were screened and 180 patients were included. Overall, 58.3% of study participants had a LOO. The only strong predictor of outcome was seeing an Intra-Uterine Pregnancy (IUP) with Fetal Heart Beat (FHB) on US; OO rate 74.3%

(95% CI 59.8-88.7; $p < 0.01$). Cramping (with bleeding) trended towards a higher rate of LOO (62.7%, 95% CI 54.2-71.1; $p = 0.07$). SES was not a reliable predictor of LOO, with similar clinical outcome rates above and below the poverty line (57.5% [95% CI 46.7-68.3] vs 59% [95% CI 49.3-68.6] LOO). For anemic patients, the non-live birth rate was 100%, but the number with this variable was small ($n = 5$). Return visits (58.3%, 95% CI 42.2-74.4), previous abortion (58.8%, 95% CI 49.7-67.8), no living children (60.2%, 95% CI 50.7-69.6) and past pregnancy (55.9%, 95% CI 46.6-65.1) were not associated with higher rates of LOO. **Conclusion:** Identification of a live IUP, anemia, and cramping have potential as predictors of obstetrical outcome in early pregnancy bleeding. This information may provide better guidance for clinical practice and investigations in the emergency department and the predictive value of these variables support more appropriate counseling to this patient population.

Keywords: clinical predictors, early pregnancy, vaginal bleeding

LO02

Direct laryngoscopy: is it becoming a lost art in resident education?

C. Botros, BSc, C. Renschler, BSc, MD, K. Dullemond, BSc, MD, J. Yoo, BSc, MD, J. Trojanowski, BSc, MD, University of British Columbia, Vancouver, BC

Introduction: Intubation is one of the highest-risk procedures performed in the emergency department (ED) on a regular basis. The British Columbia Airway Registry for Emergencies (BCARE) Network collects data from every ED intubation at two tertiary care centres and one community centre and serves as a valuable quality improvement tool. We compared intubation techniques, success, and complication rates between emergency medicine physicians and trainees. **Methods:** We completed an observational study of all patients intubated in the ED by resident trainees or attending physicians over a period of 28 months from July 2017 to November 2019. Respiratory therapists (RTs) completed a standardized data collection form after every intubation and the data was used to analyze techniques, success, and complication rates. Form completion compliance was periodically reviewed by cross-referencing patient names in the BCARE network with the radiology database for chest x-rays that were performed after intubation in the hospital. **Results:** 642 intubations were performed by EM physicians: 66 by PGY1-2 residents, 141 by PGY3-5 residents, and 435 by staff physicians. Airway assessment prior to intubation was completed by PGY1-2 in 78.1% of cases, PGY3-5 in 67.9%, and staff in 62.6%. Direct laryngoscopy (DL) was chosen as first-choice technique 24.2% by PGY1-2, 24.8% by PGY3-5, and 30.1% by attending physicians. Bougie was used 2.7% of cases for all groups. First-pass success was 78.8% for PGY1-2, 86.5% for PGY3-5, and 85.7% for staff. Mean number of attempts were similar at 1.24, 1.18, and 1.20 for R1-2, R3-5, and staff, respectively. There were similar complication rates between all groups, on average 16.9%, with the most common being hypoxemia prior to induction, and desaturation following induction. There was a higher rate of staff performing second intubation attempts following junior residents (50.0%) than senior residents (26.3%). **Conclusion:** Trainees have a stronger preference to use video laryngoscopy (VL) than staff physicians as their first-line technique. Success rates were similar between senior residents and attending physicians, but significantly lower in junior residents, despite number of attempts being similar between the three groups. Complication rates were similar

among all 3 groups. This data may suggest that a stronger emphasis for DL use among trainees is important.

Keywords: education, intubation, resident

LO03

Prospective comparative evaluation of the ESC 1-hour and a 2-hour rapid diagnostic algorithm for myocardial infarction using high-sensitivity troponin-T

J. Andruchow, MD CM, MSc, T. Boyne, MD, MSc, I. Seiden-Long, PhD, D. Wang, MSc, S. Vatanpour, PhD, G. Innes, MD, MSc, A. McRae, MD, PhD, University of Calgary, Calgary, AB

Introduction: Rapid diagnostic algorithms using high-sensitivity cardiac troponin can rapidly diagnose or exclude acute myocardial infarction (MI). However, multiple algorithms have been proposed and it is unclear if some outperform others. The objective of this study was to prospectively compare the diagnostic performance of 1- and 2-hour algorithms in clinical practice in a Canadian population. **Methods:** Emergency department patients with chest pain had high-sensitivity cardiac troponin-T (hs-cTnT) collected on presentation and 1- and 2-hours later at a single academic tertiary hospital and regional percutaneous coronary intervention site over a 2-year period. The primary outcome was index MI, the secondary outcome was 30-day major adverse cardiac events (MACE). All outcomes were 2 physician adjudicated. **Results:** We enrolled 1,167 patients with hs-cTnT collected on ED presentation. Of these, 350 had a valid 1-hour and 550 had a 2-hour hs-cTnT sample. Index MI prevalence was ~11%. Sensitivity of the 1- and 2-hour algorithms for index MI was 97.3% (95% CI 85.8-99.9%) and 100% (95% CI 91.6-100%) and for 30-day MACE was 80.9% (95% CI 66.7-90.9%) and 83.3% (95% CI 73.2-90.8%), respectively. The 1-hour algorithm was 96.3% specific for index MI (95% CI 93.8-98.2%) whereas specificity for the 2-hour algorithm was 97.9% (95% CI 96.3-100%). Both algorithms classified about one-quarter of patients in an indeterminate observational zone with an ~11% MI prevalence. **Conclusion:** Both the 1- and 2-hour algorithms were highly sensitive and specific for MI, but were less sensitive for 30-day MACE. However, the 2-hour algorithm trended toward better performance, likely because its larger delta cutoffs reduce the risk of misclassification owing to analytic variability. These findings suggest algorithms using larger delta cutoffs may provide a greater margin of safety. Further comparative evaluation of rapid diagnostic algorithms using different cutoffs and characterization of patients in the observational zone is warranted.

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

LO04

Decreasing emergency department length of stay for patients with acute atrial fibrillation and flutter: a cluster-randomized trial

I. Stiell, MD, MSc, D. Eagles, MD, MSc, J. Perry, MD, MSc, P. Archambault, MD, MSc, V. Thiruganasambandamoorthy, MSc, MBBS, R. Parkash, MD, E. Mercier, MD, J. Morris, MD, D. Godin, MD, P. Davis, BSc, MD, MSc, G. Clark, MD, S. Gosselin, MD, B. Mathieu, MD, B. Pomerleau, MD, S. Rhee, MD, G. Kaban, MD, E. Brown, BSc, M. Taljaard, PhD, For the RAFF3 Study Group, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: CAEP recently developed the acute atrial fibrillation (AF) and flutter (AFL) [AAFF] Best Practices Checklist to promote

optimal care and guidance on cardioversion and rapid discharge of patients with AAFB. We sought to assess the impact of implementing the Checklist into large Canadian EDs. **Methods:** We conducted a pragmatic stepped-wedge cluster randomized trial in 11 large Canadian ED sites in five provinces, over 14 months. All hospitals started in the control period (usual care), and then crossed over to the intervention period in random sequence, one hospital per month. We enrolled consecutive, stable patients presenting with AAFB, where symptoms required ED management. Our intervention was informed by qualitative stakeholder interviews to identify perceived barriers and enablers for rapid discharge of AAFB patients. The many interventions included local champions, presentation of the Checklist to physicians in group sessions, an online training module, a smartphone app, and targeted audit and feedback. The primary outcome was length of stay in ED in minutes from time of arrival to time of disposition, and this was analyzed at the individual patient-level using linear mixed effects regression accounting for the stepped-wedge design. We estimated a sample size of 800 patients. **Results:** We enrolled 844 patients with none lost to follow-up. Those in the control ($N = 316$) and intervention periods ($N = 528$) were similar for all characteristics including mean age (61.2 vs 64.2 yrs), duration of AAFB (8.1 vs 7.7 hrs), AF (88.6% vs 82.9%), AFL (11.4% vs 17.1%), and mean initial heart rate (119.6 vs 119.9 bpm). Median lengths of stay for the control and intervention periods respectively were 413.0 vs. 354.0 minutes ($P < 0.001$). Comparing control to intervention, there was an increase in: use of antiarrhythmic drugs (37.4% vs 47.4%; $P < 0.01$), electrical cardioversion (45.1% vs 56.8%; $P < 0.01$), and discharge in sinus rhythm (75.3% vs. 86.7%; $P < 0.001$). There was a decrease in ED consultations to cardiology and medicine (49.7% vs 41.1%; $P < 0.01$), but a small but insignificant increase in anticoagulant prescriptions (39.6% vs 46.5%; $P = 0.21$). **Conclusion:** This multicenter implementation of the CAEP Best Practices Checklist led to a significant decrease in ED length of stay along with more ED cardioversions, fewer ED consultations, and more discharges in sinus rhythm. Widespread and rigorous adoption of the CAEP Checklist should lead to improved care of AAFB patients in all Canadian EDs. **Keywords:** atrial fibrillation, implementation, quality improvement

LO05

Rate of prescription of oral anticoagulation in patients presenting with new onset atrial fibrillation/flutter

E. Hatam, BSc, MD, G. Ghate, BSc, M. Columbus, BSc, PhD, C. Garvida, BSc, K. Van Aarsen, BSc, MSc, Western University, London, ON

Introduction: Atrial fibrillation (AF) and atrial flutter (AFL) are two common arrhythmias that present to the emergency department (ED) and are a major risk factor for stroke. The 2014 Canadian Cardiovascular Society (CCS) guidelines recommend starting oral anticoagulation (OAC) upon ED discharge for patients with CHADS₆₅ scores of ≥ 1 to reduce stroke risk. The goal of this study was to identify whether the ED patient population presenting with new onset AF/AFL with CHADS₆₅ ≥ 1 are appropriately initiated on OAC by ED physicians. **Methods:** This was a retrospective chart review (Jan-Dec 2017) of ED visits at two academic hospitals in Ontario. The year 2017 was chosen to allow for adequate time from the publishing of the CCS guidelines for uptake into clinical practice. Inclusion criteria: patients with a new diagnosis of AF/AFL who are discharged by ED physicians. Exclusion criteria: patients with a history of AF/AFL, already on OAC, admitted to hospital, presenting with arrhythmia other than AF/AFL, and

charts without adequate information to calculate CHADS₆₅ score. Charts were reviewed in detail to assess CHADS₆₅ score, ED physician decision to prescribe OAC, referral rates to outpatient clinics and timing of follow up. **Results:** A total of 1272 charts were reviewed. 1124 were excluded. 148 charts were identified as patients with new onset AF/AFL presenting to the ED who were discharged by ED physicians. 24/148 (16%) were appropriately prescribed OAC. 124/148 (84%) were not prescribed OAC. Of these 40/124 (32%) were CHADS₆₅ 0 while the other 84/124 (67%) were CHADS₆₅ ≥ 1 who should have been considered for OAC. Further review determined that 78/84 (92%) were referred to outpatient clinics for the decision regarding OAC with the mean (SD) number of days to follow up being 11(± 15). Importantly 1/84 (1.2%) returned prior to their scheduled appointment with a stroke. Only 6/84 (7%) had no follow up arranged. **Conclusion:** Overall, we found that the rate of OAC prescription by ED physicians for patients being discharged with a new diagnosis of AF/AFL with a CHADS₆₅ score ≥ 1 was 16%. This is despite the CCS 2014 recommendation of starting OAC for all patients with a CHADS₆₅ score ≥ 1 . It appears that ED physicians are continuing to defer the decision to prescribe OAC to outpatient clinics. Further projects can explore barriers to application of the CCS guidelines and create knowledge translation tools.

Keywords: atrial fibrillation, atrial flutter, oral anticoagulation

LO06

Development of practice recommendations for ED management of syncope by mixed methods

V. Thiruganasambandamoorthy, MSc, M. Taljaard, PhD, N. Hudek, PhD, J. Brehaut, PhD, B. Ghaedi, MSc, P. Nguyen, BSc, M. Sivilotti, MD, MSc, A. McRae, MD, PhD, J. Yan, MD, MSc, R. Ohle, MD, C. Fabian, MD, N. Le Sage, MD, PhD, E. Mercier, MD, MSc, M. Hegdekar, MD, P. Huang, MD, M. Nemnom, MSc, A. Krahn, MD, P. Archambault, MD, J. Presseau, PhD, I. Graham, PhD, B. Rowe, MD, MSc, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Emergency department (ED) syncope management is extremely variable. We developed practice recommendations based on the validated Canadian Syncope Risk Score (CSRS) and outpatient cardiac monitoring strategy with physician input. **Methods:** We used a 2-step approach. Step-1: We pooled data from the derivation and validation prospective cohort studies (with adequate sample size) conducted at 11 Canadian sites (Sep 2010 to Apr 2018). Adults with syncope were enrolled excluding those with serious outcome identified during index ED evaluation. 30-day adjudicated serious outcomes were arrhythmic (arrhythmias, unknown cause of death) and non-arrhythmic (MI, structural heart disease, pulmonary embolism, hemorrhage). We compared the serious outcome proportion among risk categories using Cochran-Armitage test. Step-2: We conducted semi-structured interviews using observed risk to develop and refine the recommendations. We used purposive sampling of physicians involved in syncope care at 8 sites from Jun-Dec 2019 until theme saturation was reached. Two independent raters coded interviews using an inductive approach to identify themes; discrepancies were resolved by consensus. **Results:** Of the 8176 patients (mean age 54, 55% female), 293 (3.6%; 95%CI 3.2-4.0%) experienced 30-day serious outcomes; 0.4% deaths, 2.5% arrhythmic, 1.1% non-arrhythmic outcomes. The serious outcome proportion significantly increased from low to high-risk categories ($p < 0.001$; overall 0.6% to 27.7%; arrhythmic 0.2% to 17.3%; non-arrhythmic 0.4% to 5.9% respectively).

C-statistic was 0.88 (95% CI 0.86–0.90). Non-arrhythmia risk per day for the first 2 days was 0.5% for medium-risk, 2% for high-risk and very low thereafter. We recruited 31 physicians (14 ED, 7 cardiologists, 10 hospitalists/internists). 80% of physicians agreed that low risk patients can be discharged without specific follow-up with inconsistencies around length of ED observation. For cardiac monitoring of medium and high-risk, 64% indicated that they don't have access; 56% currently admit high-risk patients and an additional 20% agreed to this recommendation. A deeper exploration led to following refinement: discharge without specific follow-up for low-risk, a shared decision approach for medium-risk and short course of hospitalization for high-risk patients. **Conclusion:** The recommendations were developed (with online calculator) based on in-depth feedback from key stakeholders to improve uptake during implementation.

Keywords: practice recommendation, risk-stratification, syncope

LO07

Procainamide for the acute management of atrial fibrillation and flutter in the emergency department: a systematic review

F. Tran, BN, D. Junqueira, MSc, PhD, PharmD, M. Tan, MSc, BScOT, MSc, MLIS, B. Rowe, MD, MSc, University of Alberta, Edmonton, AB

Introduction: Management of acute atrial fibrillation or flutter (AFF) in the emergency department (ED) can be performed with chemical or electrical cardioversion. Procainamide is the most common chemical agent used in Canada; however, there is substantial practice variation. The objective of this systematic review was to provide comparative evidence on return to normal sinus rhythm (NSR) and adverse events to better support clinical decisions. **Methods:** Systematic search of five electronic databases and grey literature. Randomized controlled trials (RCTs) and prospective controlled cohort studies including adults (≥ 17 years) with recent-onset of AFF comparing intravenous procainamide with other cardioversion strategies (e.g., electrical cardioversion, placebo or other antiarrhythmic drugs) were eligible. Two independent reviewers performed study selection and data extraction. Relative risks (RR) with 95% confidence intervals (CIs) were calculated using a random-effects model. The protocol was registered with PROSPERO (CRD42019142080). **Results:** From 4060 potentially relevant citations, 7 studies were considered eligible and three RCTs and two cohort studies included in the analysis. Procainamide was less effective in promoting return to NSR at 1st attempt compared to other chemical (RR 0.76; 95% CI: 0.65 to 0.90) and electrical (RR 0.58; 95% CI: 0.53 to 0.64) options. Electrical cardioversion was more effective in restoring NSR compared to procainamide when used as 2nd attempt in one RCT (RR 0.46; 95% CI: 0.23 to 0.92). Pre-specified serious adverse events were assessed and reported by two studies showing that hypotension was more common in patients receiving procainamide in comparison with electrical cardioversion (RR 20.57; 95% CI: 1.59 to 265.63). Treatment discontinuation due to adverse events was infrequently reported with only two studies reporting that no patients withdrew from the study following treatment with procainamide. The remaining studies provided incomplete data reporting on adverse events. **Conclusion:** Shared decision-making for patients with acute AFF in the ED requires knowledge of the effectiveness and safety of comparative interventions. Overall, procainamide is less effective than other

chemical options and electrical cardioversion strategies to restore NSR. Evidence shows that hypotension is a concern when procainamide is administered; however, the overall adverse events information provided from the studies is suboptimal.

Keywords: atrial fibrillation, cardioversion, procainamide

LO08

A randomized, controlled comparison of electrical versus pharmacological cardioversion for emergency department patients with atrial flutter

I. Stiell, MD, MSc, M. Sivilotti, MD, M. Taljaard, PhD, D. Birnie, MD, A. Vadeboncoeur, MD, C. Hohl, MD, MHSc, A. McRae, MD, PhD, B. Rowe, MD, MSc, R. Brison, MD, MPH, V. Thiruganasambandamoorthy, MSc, MBBS, L. Macle, MD, B. Borgundvaag, MD, PhD, J. Morris, MD, MSc, E. Mercier, MD, MSc, C. Clement, J. Brinkhurst, BA, E. Brown, BSc, M. Nemnom, MSc, G. Wells, PhD, J. Perry, MD, MSc, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: For rhythm control of acute atrial flutter (AAFL) in the emergency department (ED), choices include initial drug therapy or initial electrical cardioversion (ECV). We compared the strategies of pharmacological cardioversion followed by ECV if necessary (Drug-Shock), and ECV alone (Shock Only). **Methods:** We conducted a randomized, blinded, placebo-controlled trial (1:1 allocation) comparing two rhythm control strategies at 11 academic EDs. We included stable adult patients with AAFL, where onset of symptoms was < 48 hours. Patients underwent central web-based randomization stratified by site. The Drug-Shock group received an infusion of procainamide (15mg/kg over 30 minutes) followed 30 minutes later, if necessary, by ECV at 200 joules x 3 shocks. The Shock Only group received an infusion of saline followed, if necessary, by ECV x 3 shocks. The primary outcome was conversion to sinus rhythm for ≥ 30 minutes at any time following onset of infusion. Patients were followed for 14 days. The primary outcome was evaluated on an intention-to-treat basis. Statistical significance was assessed using chi-squared tests and multivariable logistic regression. **Results:** We randomized 76 patients, and none was lost to follow-up. The Drug-Shock (N = 33) and Shock Only (N = 43) groups were similar for all characteristics including mean age (66.3 vs 63.4 yrs), duration of AAFL (30.1 vs 24.5 hrs), previous AAFL (72.7% vs 69.8%), median CHADS2 score (1 vs 1), and mean initial heart rate (128.9 vs 126.0 bpm). The Drug-Shock and Shock only groups were similar for the primary outcome of conversion (100% vs 93%; absolute difference 7.0%, 95% CI -0.6;14.6; P = 0.25). The multivariable analyses confirmed the similarity of the two strategies (P = 0.19). In the Drug-Shock group 21.2% of patients converted with the infusion. There were no statistically significant differences for time to conversion (84.2 vs 97.6 minutes), total ED length of stay (9.4 vs 7.5 hours), disposition home (100% vs 95.3%), and stroke within 14 days (0 vs 0). Premature discontinuation of infusion (usually for transient hypotension) was more common in the Drug-Shock group (9.1% vs 0.0%) but there were no serious adverse events. **Conclusion:** Both the Drug-Shock and Shock Only strategies were highly effective and safe in allowing AAFL patients to go home in sinus rhythm. IV procainamide alone was effective in only one fifth of patients, much less than for acute AF.

Keywords: atrial flutter, cardioversion

LO09

Role of hospitalization for detection of serious adverse events among emergency department patients with syncope: a propensity-score matched analysis of a multicenter prospective cohort

R. Krishnan, MSc, M. Mukarram, MPH, MBBS, B. Ghaedi, MSc, M. Sivilotti, MD, MSc, N. Le Sage, MD, PhD, J. Yan, MD, MSc, P. Huang, MD, M. Hegdekar, MD, E. Mercier, MD, MSc, M. Nemnom, MSc, L. Calder, MD, MSc, A. McRae, MD, PhD, B. Rowe, MD, MSc, G. Wells, PhD, V. Thiruganasambandamoorthy, MSc, MBBS, Ottawa Hospital Research Institute, Ottawa, ON

Introduction: Selecting appropriate patients for hospitalization following emergency department (ED) evaluation of syncope is critical for serious adverse event (SAE) identification. The primary objective of this study is to determine the association of hospitalization and SAE detection using propensity score (PS) matching. The secondary objective was to determine if SAE identification with hospitalization varied by the Canadian Syncope Risk Score (CSRS) risk-category. **Methods:** This was a secondary analysis of two large prospective cohort studies that enrolled adults (age ≥ 16 years) with syncope at 11 Canadian EDs. Patients with a serious condition identified during index ED evaluation were excluded. Outcome was a 30-day SAE identified either in-hospital for hospitalized patients or after ED disposition for discharged patients and included death, ventricular arrhythmia, non-lethal arrhythmia and non-arrhythmic SAE (myocardial infarction, structural heart disease, pulmonary embolism, hemorrhage). Patients were propensity matched using age, sex, blood pressure, prodrome, presumed ED diagnosis, ECG abnormalities, troponin, heart disease, hypertension, diabetes, arrival by ambulance and hospital site. Multivariable logistic regression assessed the interaction between CSRS and SAE detection and we report odds ratios (OR). **Results:** Of the 8183 patients enrolled, 743 (9.0%) patients were hospitalized and 658 (88.6%) were PS matched. The OR for SAE detection for hospitalized patients in comparison to those discharged from the ED was 5.0 (95%CI 3.3, 7.4), non-lethal arrhythmia 5.4 (95%CI 3.1, 9.6) and non-arrhythmic SAE 6.3 (95%CI 2.9, 13.5). Overall, the odds of any SAE identification, and specifically non-lethal arrhythmia and non-arrhythmia was significantly higher in-hospital among hospitalized patients than those discharged from the ED ($p < 0.001$). There were no significant differences in 30-day mortality ($p = 1.00$) or ventricular arrhythmia detection ($p = 0.21$). The interaction between ED disposition and CSRS was significant ($p = 0.04$) and the probability of 30-day SAEs while in-hospital was greater for medium and high risk CSRS patients. **Conclusion:** In this multicenter prospective cohort, 30-day SAE detection was greater for hospitalized compared with discharged patients. CSRS low-risk patients are least likely to have SAEs identified in-hospital; out-patient monitoring for moderate risk patients requires further study.

Keywords: Canadian Syncope Risk Score, hospitalization, syncope

LO10

Low high-sensitivity troponin concentrations identify low-risk chest pain patients unlikely to benefit from further risk stratification

J. Andruchow, MD CM, MSc, T. Boyne, MD, MSc, G. Innes, MD, MSc, S. Vatanpour, PhD, I. Seiden-Long, PhD, D. Wang, MSc, E. Lang, MD, A. McRae, MD, PhD, University of Calgary, Calgary, AB

Introduction: Very low high-sensitivity troponin-T (hs-cTnT) concentrations on presentation can rule out acute myocardial infarction (AMI),

but the ability to identify patients at low risk of 30-day major adverse cardiac events (MACE) is less clear. This study examines the sensitivity of low concentrations of hs-cTnT on presentation to rule out 30-day MACE. **Methods:** This prospective cohort study enrolled emergency department chest pain patients with non-ischemic ECGs who underwent AMI rule-out with an hs-cTnT assay. The primary outcome was 30-day MACE; secondary outcomes were individual MACE components. Because guidelines recommend using a single hs-cTnT strategy only for patients with more than 3-hours since symptom onset, a subgroup analysis was performed for this population. Outcomes were adjudicated based on review of medical records and telephone follow-up. **Results:** Of 1,167 patients enrolled, 125 (10.7%) experienced 30-day MACE and 97 (8.3%) suffered AMI on the index visit. More than one-third (35.6%) had presenting hs-cTnT concentrations below the limit of detection (5ng/L), which was 94.4% (95%CI 88.8-97.7%) sensitive for 30-day MACE and 99.0% (95%CI 94.5-100%) sensitive for index AMI. Of 292 (25.0%) patients with hs-cTnT < 5 ng/L and at least 3-hours since symptom onset, only 3 experienced 30-day MACE (sensitivity 97.6%, 95%CI 93.2-100%) and none suffered AMI within 30-days (sensitivity 100%, 95%CI 96.3-100%). **Conclusion:** Among patients with non-ischemic ECGs and >3 -hours since symptom onset, low hs-cTnT concentrations on presentation confer a very low risk of 30-day MACE. In the absence of a high risk clinical presentation, further risk stratification is likely to be low yield.

Keywords: high-sensitivity troponin, myocardial infarction, risk stratification

LO11

STAR-EM: An innovative summer research program for medical students in an urban Canadian academic emergency department

S. Friedman, MD, MPH, D. Porplycia, BSc, MSc, J. Lexchin, MD, K. Hayman, MD, MPH, S. Masood, MD, MPH, E. O'Connor, MD, MSc, E. Xie, MD, MSc, J. Bryan, MD, MA, MSPH, T. Smith-Gorvie, MD, MSc, D. Lim, BSc, MBA, MD, J. Leung, MD, MScCH, H. Sheikh, MD, University Health Network, University of Toronto, Toronto, ON

Innovation Concept: Research training programs for students, especially in emergency medicine (EM), may be difficult to initiate due to lack of protected time, resources, and mentors (Chang Y, Ramnanan CJ. Academic Medicine 2015). We developed a ten-week summer program for medical students aimed at cultivating research skills through mentorship, clinical enrichment, and immersion in EM research culture through shadowing and project support. **Methods:** Five second year Ontario medical students were recruited to participate in the Summer Training and Research in Emergency Medicine (STAR-EM) program at University Health Network, Toronto, from June - Aug, 2019. Program design followed review of existing summer research programs and literature regarding challenges to EM research (McRae, Perry, Brehaut et al. CJEM 2018). The program had broad emergency physician (EP) engagement, with five EP research project mentors, and over ten EPs delivering academic sessions. Curriculum development was collaborative and iterative. All projects were approved by the hospital Research Ethics Board (REB). **Curriculum, Tool or Material:** Each weekly academic morning comprised small group teaching (topics including research methodology, manuscript preparation, health equity, quality improvement, and wellness), followed by EP-led group progress review of each student's project. Each student spent one half day per week in the emergency department (ED), shadowing an EP and identifying

patients for recruitment for ongoing mentor-initiated ED research projects. Remaining time was spent on independent student project work. Presentation to faculty and program evaluation occurred in week 10. Scholarly output included one abstract submitted for publication per student. Program evaluation by students reflected a uniform impression that course material and mentorship were each excellent (100%, $n = 5$). Interest in pursuing academic EM as a career was identified by all students. Faculty researchers rated the program as very effective (80%, $n = 4$) or somewhat effective (20%, $n = 1$) in terms of enhancing productivity and scholarly output. **Conclusion:** The STAR-EM program provides a transferable model for other academic departments seeking to foster the development of future clinician investigators and enhance ED research culture. Program challenges included delays in REB approval for student projects and engaging recalcitrant staff to participate in research.

Keywords: innovations in EM education, medical education

LO12

ClerkCast: a novel online free open access emergency medicine curriculum for medical students

B. Forestell, BSc, L. Beals, BHSc, T. Chan, MD, BHSc, MHPE, BEd, McMaster University, Hamilton, ON

Innovation Concept: Canadian medical students completing their Emergency Medicine (EM) clerkship rotations must develop approaches to undifferentiated patients. Increasingly used in post-graduate EM education, Open Educational Resources (OERs) are a convenient and flexible solution to meeting medical student educational needs on their EM rotation. We hoped to supplement Canadian medical student EM education through the development of 'ClerkCast', a novel OER and podcast-based curriculum on CanadiEM.org. **Methods:** We utilized the Kern Six Step approach to curriculum development for 'ClerkCast'. A general needs assessment involved a review of available OERs and identified a lack of effective EM OERs specific for medical students. A specific online needs assessment was used to determine which EM topics required further education for medical students. The survey was shared directly with key Canadian medical student and undergraduate medical educator stakeholder groups, and distributed globally through the CanadiEM social media networks. Results of the needs assessment highlighted shared perceptions of educational needs for medical students, with an emphasis on increased need for education on critical care and common EM presentations. We used the topics determined to be highest priority for the development of our first ten episodes of 'ClerkCast'. **Curriculum, Tool or Material:** Podcast episodes are released from CanadiEM biweekly. Episodes are 30 to 45 min in length, and focus on cognitive approaches to a common EM presentation for medical students. Content is anchored on medical student interactions with a staff or resident EM co-host. Podcasts are supplemented by infographics and blog posts highlighting the key points from each episode. Learners are also encouraged to interact with the content through review quizzes on a provided question bank. Quality assurance of the content is provided by physician co-hosts who review episode scripts both prior to recording. Post-production feedback is elicited via comments on the curriculum's host website, CanadiEM.org, and through direct email correspondence to the ClerkCast address. **Conclusion:** With an ever increasing number of OERs in EM and critical care, the systematic development of new resources is important to avoid redundancies in content and medium while also addressing unmet learner needs. We describe the successful use of the Kern

Six Steps for curriculum development for the creation of our novel EM OER for Canadian medical students, 'ClerkCast'.

Keywords: free open access medical education, innovations in EM education, medical students

LO13

Development of a national, standardized simulation case template

J. Baylis, BSc, MD, C. Heyd, MD, B. Thoma, MD, MSc, MA, A. Hall, MD, MMed, T. Chaplin, MD, A. Petrosioniak, MD, MSc, T. McColl, MD, M. O'Brien, MD, MSc, J. Deshaies, MD, K. Caners, MD, University of British Columbia, Kelowna, BC

Innovation Concept: A major barrier to the development of a national simulation case repository and multi-site simulation research is the lack of a standardized national case template. This issue was recently identified as a priority research topic for Canadian simulation based education (SBE) research in emergency medicine (EM). We partnered with the EM Simulation Education Researchers Collaborative (EM-SERC) to develop a national simulation template. **Methods:** The EM Sim Cases template was chosen as a starting point for the consensus process. We generated feedback on the template using a three-phase modified nominal group technique. Members of the EM-SERC mailing list were consulted, which included 20 EM simulation educators from every Canadian medical school except Northern Ontario School of Medicine and Memorial University. When comments conflicted, the sentiment with more comments in favour was incorporated. **Curriculum, Tool or Material:** In phase one we sought free-text feedback on the EM Sim Cases template via email. We received 65 comments from 11 respondents. An inductive thematic analysis identified four major themes (formatting, objectives, debriefing, and assessment tools). In phase two we sought free-text feedback on the revised template via email. A second thematic analysis on 40 comments from 12 respondents identified three broad themes (formatting, objectives, and debriefing). In phase three we sought feedback on the penultimate template via focus groups with simulation educators and technologists at multiple Canadian universities. This phase generated 98 specific comments which were grouped according to the section of the template being discussed and used to develop the final template (posted on emsimcases.com). **Conclusion:** We describe a national consensus-building process which resulted in a simulation case template endorsed by simulation educators from across Canada. This template has the potential to: 1. Reduce the replication of effort across sites by facilitating the sharing of simulation cases. 2. Enable national collaboration on the development of both simulation cases and curricula. 3. Facilitate multi centre simulation-based research by removing confounders related to the local adoption of an unfamiliar case template. This could improve the rigour and validity of these studies by reducing inter-site variability. 4. Increase the validity of any simulation scenarios developed for use in national high-stakes assessment.

Keywords: innovations in EM education, medical education, simulation

LO14

Interdepartmental program to improve outcomes for acute heart failure patients seen in the emergency department

I. Stiell, MD, MSc, M. Taljaard, PhD, A. Forster, MD, MSc, L. Mielniczuk, MD, G. Wells, PhD, G. Hebert, MD, H. Clark, MD, C. Clement, J. Brinkhurst, BA, C. Sheehan, BA, E. Brown, BSc, M. Nemnom, MSc, J. Perry, MD, MSc, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: An important challenge physicians face when treating acute heart failure (AHF) patients in the emergency department (ED) is deciding whether to admit or discharge, with or without early follow-up. The overall goal of our project was to improve care for AHF patients seen in the ED while avoiding unnecessary hospital admissions. The specific goal was to introduce hospital rapid referral clinics to ensure AHF patients were seen within 7 days of ED discharge. **Methods:** This prospective before-after study was conducted at two campuses of a large tertiary care hospital, including the EDs and specialty outpatient clinics. We enrolled AHF patients ≥ 50 years who presented to the ED with shortness of breath (< 7 days). The 12-month before (control) period was separated from the 12-month after (intervention) period by a 3-month implementation period. Implementation included creation of rapid access AHF clinics staffed by cardiology and internal medicine, and development of referral procedures. There was extensive in-servicing of all ED staff. The primary outcome measure was hospital admission at the index visit or within 30 days. Secondary outcomes included mortality and actual access to rapid follow-up. We used segmented autoregression analysis of the monthly proportions to determine whether there was a change in admissions coinciding with the introduction of the intervention and estimated a sample size of 700 patients. **Results:** The patients in the before period ($N = 355$) and the after period ($N = 374$) were similar for age (77.8 vs. 78.1 years), arrival by ambulance (48.7% vs 51.1%), comorbidities, current medications, and need for non-invasive ventilation (10.4% vs. 6.7%). Comparing the before to the after periods, we observed a decrease in hospital admissions on index visit (from 57.7% to 42.0%; $P < 0.01$), as well as all admissions within 30 days (from 65.1% to 53.5% ($P < 0.01$)). The autoregression analysis, however, demonstrated a pre-existing trend to fewer admissions and could not attribute this to the intervention ($P = 0.91$). Attendance at a specialty clinic, amongst those discharged increased from 17.8% to 42.1% ($P < 0.01$) and the median days to clinic decreased from 13 to 6 days ($P < 0.01$). 30-day mortality did not change (4.5% vs. 4.0%; $P = 0.76$). **Conclusion:** Implementation of rapid-access dedicated AHF clinics led to considerably increased access to specialist care, much reduced follow-up times, and possible reduction in hospital admissions. Widespread use of this approach can improve AHF care in Canada.

Keywords: emergency department, heart failure, quality improvement

LO15

Paramedic and allied health professional interventions at long-term care facilities to reduce emergency department visits: systematic review

S. Leduc, Z. Cantor, P. Kelly, V. Thiruganasambandamoorthy, MSc, MBBS, G. Wells, PhD, C. Vaillancourt, MD, MSc, Ottawa Paramedic Service, Ottawa, ON

Introduction: Emergency department (ED) crowding, long waits for care, and paramedic offload delay are of increasing concern. Older adults living in long-term care (LTC) are more likely to utilize the ED and are vulnerable to adverse events. We sought to identify existing programs that seek to avoid ED visits from LTC facilities where allied health professionals are the primary providers of the intervention and, to evaluate their efficacy and safety. **Methods:** We completed this systematic review based on a protocol we published apriori and following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement. We systematically

searched Medline, CINAHL and EMBASE with terms relating to long-term care, emergency services, hospitalization and allied health personnel. Two investigators independently selected studies and extracted data using a piloted standardized form and evaluated the risk of bias of included studies. We report a narrative synthesis grouped by intervention categories. **Results:** We reviewed 11,176 abstracts and included 22 studies. Most studies were observational and few assessed patient safety. We found five categories of interventions including: 1) use of advanced practice nursing; 2) a program called Interventions to Reduce Acute Care Transfers (INTERACT); 3) end-of-life care; 4) condition specific interventions; and 5) use of extended care paramedics. Of the 13 studies that reported ED visits, all (100%) reported a decrease, and of the 16/17 that reported hospitalization, 94.1% reported a decrease. Patient adverse events such as functional status and relapse were seldom reported (6/22) as were measures of emergency system function such as crowding/inability of paramedics to transfer care to the ED (1/22). Only 4/22 studies evaluated patient mortality and 3/4 found a non-statistically significant worsening. When measured, studies reported decreased hospital length of stay, more time spent with patients by allied health professionals and cost savings. **Conclusion:** We found five types of programs/interventions which all demonstrated a decrease in ED visits or hospitalization. Many identified programs focused on improved primary care for patients. Interventions addressing acute care issues such as those provided by community paramedics, patient preferences, and quality of life indicators all deserve more study.

Keywords: community paramedic, long-term care, reducing emergency department visits

LO16

Predicting survival from out-of-hospital cardiac arrest

I. Drennan, K. Thorpe, MMath, S. Cheskes, MD, M. Mamdani, PharmD, D. Scales, MD, PhD, L. Morrison, MD, MSc, University of Toronto, Toronto, ON

Introduction: Prognostication is a significant challenge early in the post-cardiac arrest period. Common prognostic factors for neurological survival are unreliable (high false positive rates) until 72 hours post-cardiac arrest. It is not known whether there are a combination of factors that can be utilized earlier in the post-cardiac arrest period to accurately predict patient outcome. Our objective was to predict neurological outcome utilizing a novel combination of patient factors early in the post-cardiac arrest period. **Methods:** We conducted a retrospective cohort study using data from our local cardiac arrest registry. We included adult patients who obtained a return of spontaneous circulation (ROSC) after out-of-hospital cardiac arrest (OHCA). We excluded patients who did not survive for at least 24 hours post-ROSC and those who had a do not resuscitate (DNR) order within 2 hours of ROSC. We performed an ordinal regression analysis using the proportional odds model to predict neurological outcome (modified rankin score (mRS)). We included a good neurological outcome (mRS 0-2), poor neurological outcome (mRS 3-5), and dead (mRS 6) as an ordinal outcome. We included a number of patient demographics, intra- and post-cardiac arrest factors as covariates in our model. The predictive performance of our model was analyzed using receiver operating characteristic (ROC) curves for discrimination and Brier statistic for calibration. **Results:** We included 3448 patients in our analysis. We found that an initial shockable rhythm (odds ratio (OR) 4.1; 95% confidence interval (CI) 3.6, 5.4), the absence of pupillary reflexes (OR 3.5; 95% CI 2.4, 4.8) and

maximum motor score on the Glasgow Coma Scale (GCS) (OR 1.5; 95% CI 1.4,1.6) had the greatest association with improved neurologic outcome. Longer duration of resuscitation was associated with worse outcomes (OR 0.84, 95% CI 0.82,0.87). The overall performance of our model was excellent with an area under the ROC curve of 0.89 and a Brier statistic of 0.13. **Conclusion:** Our model predicted good neurological outcome with a high rate of accuracy, however external validation of the model is required. This model may be useful in providing initial risk stratification of patients in clinical practice and future research on post-cardiac arrest care.

Keywords: out-of-hospital cardiac arrest, post-cardiac arrest, prognostication

LO17

Major adverse cardiac events in patients ruled-out by a validated high-sensitivity troponin algorithm for acute myocardial infarction

C. O'Rielly, BSc, J. Andruchow, MD, A. McRae, MD, MSc, PhD, University of Calgary, Calgary, AB

Introduction: Chest pain and symptoms of acute coronary syndrome are a leading cause of emergency department (ED) visits in Canada. Validated 2-hour high-sensitivity troponin algorithms can rapidly and accurately rule-in or rule-out myocardial infarction (MI) in most patients. The objective of this study was to quantify the incidence and timing of major adverse cardiac events (MACE: MI, death, or urgent revascularization) in the 30-days following the index ED encounter among patients who had MI ruled out using a 2-hour high-sensitivity troponin T (hs-cTnT) algorithm. We also sought to identify patient characteristics associated with very low risk of MACE. **Methods:** This was a secondary analysis of data prospectively collected from adult patients presenting with a primary complaint of chest pain or symptoms of ACS. This analysis focused on patients who had an MI ruled out using a validated 2-hour serial hs-cTnT diagnostic algorithm. Incidence of 30-day MACE was quantified. Sex-specific Kaplan-Meier curves were constructed to describe timing of MACE events after MI rule-out. Demographic and clinical variables of patients who did or did not have MACE were compared using simple bivariable analyses. **Results:** This analysis included 550 patients with serial 2h hs-cTnT testing. Of these, MI was ruled out in 344 (62.5% of patients), ruled in 67 (12.2%), and 139 (25.3%) had non-diagnostic hs-cTnT results. Among the 344 patients who had MI ruled out, 11 (3.2%) experienced a MACE in the 30 days following their index ED encounter. These included 10 (2.9%) unplanned revascularizations and 1 (0.3%) fatal MI. MACE occurred at a median of 5 days (range: 0-23 days) after the index ED encounter. Of the 11 patients experiencing MACE, 9 (81.8%) had a normal ECG at their index ED encounter. None of the 93 (27.0%) ruled-out patients under the age of 50 experienced a MACE in the follow-up period. Patients experiencing MACE were more likely to have a history of coronary disease and multiple vascular risk factors compared to those not experiencing MACE. **Conclusion:** The validated 2h hs-cTnT AMI algorithm ruled-out MI in a large proportion of patients. The 30-day MACE incidence after MI rule-out was 3%. Most MACE events were unplanned revascularizations. We determined that age < 50 was associated with event-free survival and may be of value in identifying patients who do not need additional cardiac testing after MI has been ruled out using high-sensitivity troponin testing.

Keywords: chest pain, high-sensitivity cardiac troponin, rapid rule-out algorithm

LO18

The state of the evidence for emergency medical services (EMS) care of prehospital hypoglycemia: an analysis of appraised research from the Prehospital Evidence-based Practice Program

J. Greene, BSc, J. Goldstein, PhD, R. Brown, MSc, J. Swain, BSc, D. Fidge, BSc, Y. Leroux, MD, J. McVey, MD, J. Jensen, MSc, A. Carter, MD, Dalhousie University, Halifax, NS

Introduction: The Prehospital Evidence-based Practice (PEP) program is an online, freely accessible, continuously updated repository of appraised EMS research evidence. This report is an analysis of published evidence for EMS interventions used to assess and treat patients suffering from hypoglycemia. **Methods:** PubMed was systematically searched in June 2019. One author screened titles, abstracts and full-texts for relevance. Trained appraisers reviewed full text articles, scored each on a three-point Level of Evidence (LOE) scale (based on study design and quality) and three-point Direction of Evidence (DOE) scale (supportive, neutral, or opposing findings for each intervention's primary outcome), abstracted the primary outcome, setting and assigned an outcome category (patient or process). Second party appraisal was conducted for all included studies. The level and direction of each intervention was plotted in an evidence matrix, based on appraisals. **Results:** Twenty-nine studies were included and appraised for seven interventions: 5 drugs (Dextrose 50% (D50), Dextrose 10% (D10), glucagon, oral glucose and thiamine), one assessment tool (point-of-care (POC) glucose testing) and one call disposition (treat-and-release). The most frequently reported study primary outcomes were related to: clinical improvement (n = 15, 51.7%), feasibility/safety (n = 8, 27.6%), and diagnostics (n = 6, 20.7%). The majority of outcomes were patient focused (n = 18, 62.0%). **Conclusion:** EMS interventions for treating hypoglycemia are informed by high-quality supportive evidence. Both D50 and D10 are supported by high-quality evidence; suggesting D10 may be an effective alternative to the standard D50. "Treat-and-release" practices for hypoglycemia are supported by moderate-quality evidence for the patient related outcomes of relapse, patient preference and complications. This body of evidence is high-quality, patient-focused and conducted in the prehospital setting thus generalizable paramedic practice.

Keywords: emergency medical services, hypoglycaemia, prehospital

LO19

AED on the fly: A drone delivery feasibility study for rural and remote out-of-hospital cardiac arrest

I. Drennan, S. Cheskes, MD, P. Snobelen, M. Nolan, MA, T. Chan, PhD, S. McLeod, MSc, K. Dainty, PhD, C. Vaillancourt, MD, S. Brooks, MD, MSc, University of Toronto, Toronto, ON

Introduction: Time-to-treatment plays a pivotal role in survival from sudden cardiac arrest (SCA). Every minute delay in defibrillation results in a 7-10% reduction in survival. This is particularly problematic in rural and remote regions, where bystander and EMS response is often prolonged and automated external defibrillators (AED) are often not available. Our objective was to examine the feasibility of a novel AED drone delivery method for rural and remote SCA. A secondary objective was to compare times between AED drone delivery and ambulance response to various mock SCA resuscitations. **Methods:** We conducted 6 simulations in two different rural communities in southern Ontario. During phase 1 (4 simulations) a "mock" call was placed to 911 and a single AED drone and an ambulance were simultaneously dispatched from the same location to a pre-determined destination. Once on scene, trained first responders retrieved the AED

from the drone and initiated resuscitative efforts on a manikin. The second phase (2 scenarios) were done in a similar manner save for the drone being dispatched from a regionally optimized location for drone response. **Results:** Phase 1: The distance from dispatch location to scene varied from 6.6 km to 8.8 km. Mean (SD) response time from 911 call to scene arrival was 11.2 (+/- 1.0) minutes for EMS compared to 8.1 (+/- 0.1) for AED drone delivery. In all four simulations, the AED drone arrived before EMS, ranging from 2.1 to 4.4 minutes faster. The mean time for trained responders to retrieve the AED and apply it to the manikin was 35 (+/- 5) sec. No difficulties were encountered in drone activation by dispatch, drone lift off, landing or removal of the AED from the drone by responders. Phase 2: The ambulance response distance was 20km compared to 9km for the drone. Drones were faster to arrival at the scene by 7 minutes and 8 minutes with AED application 6 and 7 minutes prior to ambulance respectively. **Conclusion:** This implementation study suggests AED drone delivery is feasible with improvements in response time during a simulated SCA scenario. These results suggest the potential for AED drone delivery to decrease time to first defibrillation in rural and remote communities. Further research is required to determine the appropriate distance for drone delivery of an AED in an integrated EMS system as well as optimal strategies to simplify bystander application of a drone delivered AED.

Keywords: defibrillation, emergency medical services, out-of-hospital cardiac arrest

LO20

The characteristics, clinical course and disposition of long-term care patients treated by paramedics during an emergency call: Exploring the potential impact of community paramedicine

S. Leduc, G. Wells, PhD, V. Thiruganasambandamoorthy, MSc, MBBS, Z. Cantor, P. Kelly, M. Rietschlin, C. Vaillancourt, MD, MSc, Ottawa Paramedic Service, Ottawa, ON

Introduction: An increasing number of Canadian paramedic services are creating Community Paramedic programs targeting treatment of long-term care (LTC) patients on-site. We explored the characteristics, clinical course and disposition of LTC patients cared for by paramedics during an emergency call, and the possible impact of Community Paramedic programs. **Methods:** We completed a health records review of paramedic call reports and emergency department (ED) records between April 1, 2016 and March 31, 2017. We utilized paramedic dispatch data to identify emergency calls originating from LTC centers resulting in transport to one of the two EDs of the Ottawa Hospital. We excluded patients with absent vital signs, a Canadian Triage and Acuity Scale (CTAS) score of 1, and whose transfer to hospital were deferrable or scheduled. We stratified remaining cases by month and selected cases using a random number generator to meet our apriori sample size. We collected data using a piloted standardized form. We used descriptive statistics and categorized patients into groups based on the ED care received and if the treatment received fit into current paramedic medical directives. **Results:** Characteristics of the 381 included patients were mean age 82.5 years, 58.5% female, 59.7% hypertension, 52.6% dementia and 52.1% cardiovascular disease. On arrival at hospital, 57.7% of patients waited in offload delay for a median time of 45 minutes (IQR 33.5-78.0). We could identify 4 groups: 1) Patients requiring no treatment or diagnostics in the ED (7.9%); 2) Patients receiving ED treatment within current paramedic medical directives and no diagnostics (3.2%); 3) Patients requiring diagnostics or ED care outside current paramedic

directives (54.9%); and 4) patients requiring admission (34.1%). Most patients were discharged from the ED (65.6%), and 1.1% died. The main ED diagnoses were infection (18.6%) and musculoskeletal injury (17.9%). Of the patients that required ED care but were discharged, 64.1% required x-rays, 42.1% CT, and 3.4% ultrasound. ED care included intravenous fluids (35.7%), medication (67.5%), antibiotics (29.4%), non-opioid analgesics (29.4%) and opioids (20.7%). Overall, 11.1% of patients didn't need management beyond current paramedic capabilities. **Conclusion:** Many LTC patients could receive care by paramedics on-site within current medical directives and avoid a transfer to the ED. This group could potentially grow using Community Paramedics with an expanded scope of practice.

Keywords: community paramedic, long-term care, reducing emergency department visits

LO21

Consistency of CTAS scores by presenting complaint pre and post eCTAS implementation in 35 emergency departments across Ontario

S. McLeod, MSc, PhD, C. Thompson, BSc, MSc, B. Borgundvaag, MD, PhD, L. Thabane, PhD, H. Ovens, MD, S. Scott, MBA, T. Ahmed, MBA, K. Grewal, MD, MSc, J. McCarron, B. Filsinger, BA, N. Mittmann, PhD, A. Worster, MD, MSc, T. Agoritsas, MD, PhD, G. Guyatt, MD, MSc, Schwartz/Reisman Emergency Medicine Institute, Sinai Health, University of Toronto, Toronto, ON

Introduction: eCTAS is a real time electronic triage decision-support tool designed to improve patient safety and quality of care by standardizing the application of the Canadian Triage and Acuity Scale (CTAS). The tool dynamically calculates a recommended CTAS score based on the presenting complaint, vital signs and selected clinical modifiers. The primary objective was to assess consistency of CTAS score distributions across 35 emergency departments (EDs) by 16 presenting complaints pre and post eCTAS implementation. **Methods:** This retrospective cohort study used population-based administrative data from January 2016 to December 2018 from all hospital EDs in Ontario that had implemented eCTAS with at least 9 months of data. Following a 3-month stabilization period, we compared data for 6 months post-eCTAS implementation to the same 6-month period the previous year (pre-implementation) to account for potential seasonal variation, patient volume and case-mix. We included triage encounters of adult (≥ 18 years) patients if they had one of 16 pre-specified high-volume, presenting complaints. A paired-samples t-test was used to determine consistency by estimating the absolute difference in CTAS distribution for each presenting complaint, by each hospital, pre and post eCTAS implementation, compared to the overall average of the 35 EDs. **Results:** There were 183,231 triage encounters in the pre-eCTAS cohort and 179,983 in the post-eCTAS cohort from 35 EDs across the province. Triage scores were more consistent with the overall average after eCTAS implementation in 6 (37.5%) presenting complaints: chest pain (cardiac features) ($p < 0.001$), extremity weakness/symptoms of cerebrovascular accident ($p < 0.001$), fever ($p < 0.001$), shortness of breath ($p < 0.001$), syncope ($p = 0.02$), and hyperglycemia ($p = 0.03$). Triage consistency was similar pre and post eCTAS implementation for the presenting complaints of altered level of consciousness, anxiety/situational crisis, confusion, depression/suicidal/deliberate self-harm, general weakness, head injury, palpitations, seizure, substance misuse/intoxication or vertigo. **Conclusion:** A standardized, electronic

approach to performing triage assessments increased consistency in CTAS scores across many, but not all, high-volume CEDIS complaints. This does not reflect triage accuracy, as there are no known benchmarks for triage accuracy. Improvements in consistency were greatest for sentinel presenting complaints with a minimum allowable CTAS score.

Keywords: consistency, electronic Canadian Triage and Acuity Scale, triage

LO22

Risk-stratification of emergency department syncope by artificial intelligence using machine learning: human, statistics or machine

L. Grant, MD, PhD, P. Joo, MDCM, B. Eng, A. Carrington, MD, M. Nemnom, MSc, V. Thiruganasambandamoorthy, MD, MSc, Jewish General Hospital, Montreal, QC

Introduction: The Canadian Syncope Risk Score (CSRS) is a validated risk tool developed using the best practices of conventional biostatistics, for predicting 30-day serious adverse events (SAE) after an Emergency Department (ED) visit for syncope. We sought to improve on the prediction ability of the CSRS and compared it to physician judgement using artificial intelligence (AI) research with modern machine learning (ML) methods. **Methods:** We used the prospective multicenter cohort data collected for the CSRS derivation and validation at 11 EDs across Canada over an 8-year period. The same 43 candidate variables considered for CSRS development were used to train and validate the four classes of ML models to predict 30-day SAE (death, arrhythmias, MI, structural heart disease, pulmonary embolism, hemorrhage) after ED disposition. Physician judgement was modeled using the two variables, referral for consultation and hospitalization. We compared the area under the curve (AUC) for the three models. **Results:** The proportion of patients who suffered 30-day SAE in the derivation cohort (N = 4030) was 3.6% and in validation phase (N = 2290) was 3.4%. Characteristics of the both cohorts were similar with no shift. The best performing ML model, a gradient boosting tree-based model used all 43 variables as predictors as opposed to the 9 final CSRS predictors. The AUC for the three models on the validation data were: best ML model 0.91 (95% CI 0.87–0.93), CSRS 0.87 (95% CI 0.83–0.90) and physician judgment 0.79 (95% CI 0.74 – 0.84). The most important predictors in the ML model were the same as the CSRS predictors. **Conclusion:** A ML model developed using AI method for risk-stratification of ED syncope performed with slightly better discrimination ability though not significantly different when compared to the CSRS. Both the ML model and the CSRS were better predictors of poor outcomes after syncope than physician judgement. ML models can perform with similar discrimination abilities when compared to traditional statistical models and outperform physician judgement given their ability to use all candidate variables.

Keywords: artificial intelligence, risk-stratification, syncope

LO23

Do point of care ultrasound findings of left ventricular dysfunction predict cardiogenic shock in undifferentiated hypotensive patients?

P. Atkinson, BSc, MBChB, MA, J. Fraser, BN, D. Lewis, MBChB, C. Pham, MD, H. Lamprecht, MBChB, PhD, M. Stander, MBChB, MMed, J. French, MBChB, A. Sibley, MD, R. Henneberry, MD, Dalhousie University, Saint John, NB

Introduction: Patients presenting to the emergency department (ED) with hypotension have a high mortality rate and require careful yet rapid resuscitation. The use of cardiac point of care ultrasound (PoCUS) in the ED has progressed beyond the basic indications of detecting pericardial fluid and activity in cardiac arrest. We examine if finding left ventricular dysfunction (LVD) on emergency physician performed PoCUS reliably predicts the presence of cardiogenic shock in hypotensive ED patients. **Methods:** We prospectively collected PoCUS findings performed in 135 ED patients with undifferentiated hypotension as part of an international study. Patients with clearly identified etiologies for hypotension were excluded, along with other specific presumptive diagnoses. LVD was defined as identification of a generally hypodynamic LV in the setting of shock. PoCUS findings were collected using a standardized protocol and data collection form. All scans were performed by PoCUS-trained emergency physicians. Final shock type was defined as cardiogenic or non-cardiogenic by independent specialist blinded chart review. **Results:** All 135 patients had complete follow up. Median age was 56 years, 53% of patients were male. Disease prevalence for cardiogenic shock was 12% and the mortality rate was 24%. The presence of LVD on PoCUS had a sensitivity of 62.50% (95%CI 35.43% to 84.80%), specificity of 94.12% (88.26% to 97.60%), positive-LR 10.62 (4.71 to 23.95), negative-LR 0.40 (0.21 to 0.75) and accuracy of 90.37% (84.10% to 94.77%) for detecting cardiogenic shock. **Conclusion:** Detecting left ventricular dysfunction on PoCUS in the ED may be useful in confirming the underlying shock type as cardiogenic in otherwise undifferentiated hypotensive patients.

Keywords: echocardiography, hypotension, point of care ultrasound

LO24

Implementing emergency department take-home naloxone programs: a systematic scoping review

J. Koh, MD, D. O'Brien, MSc, L. Slater, MLIS, K. McLaughlin, BScN (Hons.), E. Hyshka, BA, PhD, MA, College of Medicine, University of Saskatchewan, Saskatoon, SK

Introduction: Distributing take-home naloxone (THN) kits from Emergency Departments (EDs) is an important strategy for preventing opioid overdose deaths. However, there is a lack of clear operational guidance for implementing ED-based THN programs. This scoping review had two objectives: 1) identify key strategies for THN distribution in EDs, and 2) develop a theory-informed implementation model that can be used to optimize the effectiveness of ED-based THN programs. **Methods:** We systematically searched health science databases through April 18, 2019. The search strategy combined terms representing the ED, naloxone, and take-home kits/bystander administration. Two reviewers independently screened the search results. We included all peer-reviewed articles that described THN distribution within EDs. A standardized form was used for data extraction. Included studies were coded by two reviewers and mapped to domains of the Consolidated Framework for Implementation Research (CFIR). A third reviewer with content expertise adjudicated disagreements in record screening and data coding. **Results:** Database searching retrieved 717 records after duplicates were removed. 87 full-text studies were assessed for eligibility. Two studies were added through other sources, resulting in a total of 21 studies included in the final review. Of note, 14 studies evaluated existing ED-based THN programs. We synthesized themes that emerged within each CFIR domain and identified four key implementation strategies: 1) develop ED policies on opioid harm reduction; 2)

collaborate with community and government partners to ensure programs meet patient needs; 3) address provider attitudes and knowledge gaps through dedicated training; and 4) establish guidelines to identify patients who are at risk of opioid overdose, and engage at-risk patients to maximize THN acceptance. **Conclusion:** ED-based THN programs must be tailored to local community needs and available hospital resources. Innovative implementation strategies are needed to promote ED provider engagement, and reduce barriers to patient acceptance of THN in the ED. This scoping review highlights key considerations for ED-THN implementation that can guide EDs to establish new programs, or refine existing programs to maximize their effectiveness.

Keywords: naloxone, opioid overdose, scoping review

LO25

Characteristics of frequent users of emergency departments in Alberta and Ontario, Canada: an administrative data study

R. Rosychuk, BSc, MSc, PhD, A. Chen, BSc, MSc, S. Fielding, BSc, MBA, X. Hu, BSc, MSc, PhD, P. McLane, BA, PhD, MA, A. McRae, BSc, MD, PhD, M. Ospina, BSc, MSc, PhD, University of Alberta, Edmonton, AB

Introduction: Frequent users of emergency departments (EDs) are a diverse group of patients with a disproportionate number of ED presentations. This study aimed to compare sociodemographic and clinical characteristics of adult high system users (HSUs) and control groups in two provinces. **Methods:** Cohorts of HSUs were created for Alberta and Ontario by identifying the patients with the top 10% of ED presentations in the National Ambulatory Care Reporting System during April 2015 to March 2016. Random samples of patients not in the HSU groups were selected in each province as controls (4:1 ratio). Sociodemographic and presentation data (e.g., Canadian Triage and Acuity Scale [CTAS], disposition) were extracted and compared using separate logistic regression models. **Results:** In Alberta, 101,250 HSU patients made 686,918 ED presentations (median [med] = 5 interquartile range [IQR] 4,7 presentations per patient), compared with 401,923 controls who made 560,765 ED presentations (med = 1 IQR 1,2 per patient). HSUs were more likely to be female (odds ratio (OR) = 1.20 95% confidence interval (CI) 1.18,1.22), older (OR = 1.03 per 5y 95% CI 1.03,1.03), live closer to hospital (OR = 1.02 per 100km 95% CI 1.00,1.03), and be from the lowest income quintile (OR = 1.39 95% CI 1.37,1.42) than controls. In Ontario, 478,424 HSUs made 2,222,487 ED presentations (med = 4 IQR 3,5 per patient) and 1,714,037 controls made 2,114,070 ED presentations (med = 1 IQR 1,1 per patient). Ontario HSUs were also more likely to be female (OR = 1.13 95% CI 1.12,1.14), older (OR = 1.03 per 5y 95% CI 1.03,1.03), and from the lowest income quintile (OR = 1.41 95% CI 1.40,1.42) than controls, but were less likely to live closer to hospital (OR = 0.93 per 100km 95% CI 0.92, 0.93). Higher acuity was seen in Ontario (CTAS 1/2 vs. others OR = 1.05 95% CI 1.04,1.06) but not for Alberta (CTAS 1/2 vs others OR = 0.75, 95% CI 0.74,0.76). Discharges were less likely in the HSUs compared to controls (Alberta OR = 0.89 95% CI 0.88,0.90; Ontario OR = 0.65 95% CI 0.65,0.66). HSUs were more likely to leave without being seen (Alberta OR = 1.10 95% CI 1.07,1.13; Ontario OR = 1.37 95% CI 1.35,1.40) and against medical advice (Alberta OR = 1.47 95% CI 1.41,1.53; Ontario OR = 1.67 95% CI 1.63,1.71). **Conclusion:** HSUs were more likely to be female, older, and poorer than controls. Ontario HSUs had higher acuity than the other groups. Disposition

differed for HSUs and controls. Further study is required to identify ways to safely reduce ED utilization by HSUs.

Keywords: administrative data, frequent users

LO26

The mean abnormal response rates of laboratory tests ordered in the emergency department: shooting percentage insights from a multicentre study

E. Enwere, PhD, D. Wang, MSc, M. Guo, MSc, C. Naugler, MD, MSc, E. Lang, MD, University of Calgary, Calgary, AB

Introduction: There is ongoing concern about the burden placed on healthcare systems by lab tests. Although these concerns are widespread, it is difficult to quantify the extent of the problem. One approach involves use of a metric known as the Mean Abnormal Response Rate (MARR), which is the proportion of tests ordered that return an abnormal result; a higher MARR value indicates higher yield. The primary objective of this study was to calculate MARRs for tests ordered between April 2014 and March 2019 at the four adult emergency departments (EDs) covering a metropolitan population of 1.3 million. Secondary objectives included identifying tests with highest and lowest MARRs; comparison of MARRs for nurse- and physician-initiated orders; correlation of the number of tests per order requisition to MARR; and correlation of physician experience to MARR. **Methods:** In total, 40 laboratory tests met inclusion criteria for this study. Administrative data on these tests as ordered at the four EDs were obtained and analyzed. Multi-component test results, such as from CBC, were consolidated such that an abnormal result for any component was coded as an abnormal result for the entire test. Repeat tests ordered within a single patient visit were excluded. Physician experience was quantified for 209 ED physicians as number of years since licensure. Analyses were descriptive where appropriate for whole-population data. Risk of bias was attenuated by the focus on administrative data. **Results:** The population dataset comprised 33,757,004 test results on 415,665 unique patients. Of these results, 30.3% were the outcomes of nurse-initiated orders. The 5-year MARRs for the four hospitals were 38.3%, 40.0%, 40.7% and 40.9%. The highest per-test MARRs were for BNP (80.5%) and CBC (62.6%), while the lowest were for glucose (7.9%) and sodium (11.6%). MARRs were higher for nurse-initiated orders than for physician-initiated orders (44.7% vs. 38.1%), likely due to the greater order frequency of high-yield CBC in nurse-initiated orders (38.6% vs. 18.1%). The number of tests per order requisition was inversely associated with MARR ($r = -0.90$, $p < 0.001$). Finally, the number of years since licensure was modestly but significantly associated with MARR ($r = 0.28$, $p < 0.001$). **Conclusion:** This is the first and largest study to apply the MARR in an ED setting. As a metric, MARR effectively identifies differences in test ordering practices on per-test and per-hospital bases, which could be useful for data-informed practice optimization.

Keywords: informatics, laboratory test, mean abnormal response rate

LO27

Relevance of Choosing Wisely Canada non-emergency medicine specialty lists to emergency medicine practice

S. Upadhye, MD, MSc, C. Davies-Schinkel, MSc, S. Pilakka, MD, MSc, Niagara Health Systems, Welland, ON

Introduction: The Choosing Wisely Canada (CWC) initiative is dedicated towards optimizing patient care and reduce unnecessary

resource use. Different specialty organizations create recommendations lists towards these outcomes. The goal of this study was to examine the applicability of non-Emergency Medicine (EM) recommendations towards EM practice. **Methods:** The entire master recommendations listings spreadsheet was downloaded from the CWC website (March 2019; $n = 333$). The EM-specific items from the CAEP checklist were deliberately excluded ($n = 10$). Items were rated by Niagara community EM physicians ($n = 7$) using the previously validated Best Evidence in Emergency Medicine (BEEM) rating scale (7 point Likert scale) to determine potential impact on EM practice. Items rated "6 or 7/7" were determine as "high relevance." Redundant items were consolidated. **Results:** From the retrieved CWC master list, a total of 102 "highly relevant" recommendations were identified (41 items scored 6/7 [12%], 61 scored 7/7 [18%]; total 31%). Redundant items consolidated included antimicrobial avoidance ($n = 18$), opioid avoidance for pain ($n = 11$), reduction of unnecessary imaging ($n = 11$), and avoidance of routine low back imaging ($n = 7$). **Conclusion:** There are a large number of non-EM specialty recommendations highly relevant to EM practice in the CWC database (31%). Quality improvement initiatives looking to operational CWC recommendations in Canadian Emergency Departments should be aware of these as a part of optimizing patient care.

Keywords: Choosing Wisely Canada, emergency medicine, relevance

LO28

Innovating for overcrowding: analyzing the impact of a novel emergency physician role on patient flow

L. Green-Harrison, BSc, Z. Polsky, MD, T. Fung, PhD, E. Lang, MD, C. Patocka, MD, MHPE, University of Alberta, Edmonton, AB

Introduction: Overcrowding in the Emergency Department (ED) results in delays in care, and increased patient morbidity and mortality. Innovative departmental approaches have the potential to make patient flow through the ED more efficient and reduce overcrowding by improving patient throughput. The Calgary zone ED recently piloted a new physician role, the Emergency Physician Lead (EPL), a senior physician working closely with the charge nurse and consulting services to provide physician leadership, and to troubleshoot flow issues and safety breaches such as EMS offload delays and long emergency inpatient (EIP) stays. The objective of this study was to evaluate the efficacy of the EPL by determining its effect on key metrics of patient flow, and by identifying which specific EPL interventions were most effective at improving patient throughput. **Methods:** A retrospective cohort design was used to compare Foothills Medical Centre (FMC) ED patients seen by the EPL from March-June 2019 ($n = 1343$ patients) with a control group from the same period in 2018 ($n = 5530$). An EMR search was used to collect patient data and generate descriptive statistics, which were compared between groups by Mann-Whitney U-test. Patient handover notes left by the EPL were also collected and analyzed by two independent assessors to develop a list of actions taken by the EPL. Each patient was then coded based on the actions in the handover note, and means for each coded group were compared to control to find correlations between action and changes in key flow metrics. **Results:** Patients whose care involved the EPL had a 40% shorter average ED length of stay (ELOS) compared to control (515 vs 865 min, $p < 0.001$). The EPL was especially effective for patients with ELOS above the

90th percentile, with a 58% relative reduction. EPL patients also had lower average times from first contact with the department to first order being placed (79 vs 143 min, $p < 0.001$), and spent less time as EIPs after being admitted (390 vs 515 mins, $p < 0.001$). EPL actions aimed at early ordering of investigations or early management showed the largest relative reductions in ELOS, followed by actions related to resolving issues with consulting services (56% and 48% respectively, $p < 0.001$). **Conclusion:** The EPL role appears to be associated with improvements in several key metrics of patient flow. Specific EPL actions were correlated with marked decreases in length of stay. The EPL may be an effective strategy to improve patient throughput and combat ED overcrowding.

Keywords: flow, overcrowding, throughput

LO29

Interventions at triage to improve emergency department throughput: a systematic review

K. Grant, C. Bayley, BSc, E. Lang, MDCM, G. Innes, MD, University of Alberta, Edmonton, AB

Introduction: Emergency Department (ED) crowding is the primary threat to emergency care quality. Input and outflow factors are important factors, but EDs must optimize throughput efficiency by improving internal processes from triage to disposition, and triage is the first throughput phase. Triage throughput interventions exclude strategies that direct patients away from the ED (these modify input rather than throughput). Previous research has described physicians in triage, team triage, telemedical triage, and nurse practitioner (NP) or physician assistant (PA) led triage, but their impact has never been systematically evaluated. **Methods:** We conducted systematic database searches in Medline, Embase, CINAHL, and the Cochrane Central Register of Controlled Trials without the use of filters or language restrictions of all triage interventions that effected ED throughput (PROSPERO:CRD42019125651). Two independent reviewers screened studies. Study quality was assessed using the Cochrane Risk of Bias tool (version 2) for randomized controlled trials, and the National Heart, Lung, and Blood Institute quality assessment tool for other designs. **Results:** 18 studies met inclusion criteria (Cohen's $k = 0.69$). Study results were not pooled due to high statistical heterogeneity as assessed by chi-squared and I-squared statistics. Studies were grouped into physician led, NP or PA led, and team triage interventions. Six physician in triage interventions reported LOS changes between -82 and +18 minutes. Five NP/PA led triage interventions resulted in LOS changes of -106 to +19 minutes. Five team triage interventions reported LOS reductions of 4 to 34 minutes. One telemedicine triage study reported a non-significant 8 minute increase in LOS. Six physician at triage interventions yielded significant LWBS rate improvement (relative risk (RR)= 0.29-0.82). Team triage interventions generated LWBS rate changes ranging from meaningful improvement (RR=0.58) to substantial deterioration (RR = 1.68). Five studies have low risk of bias, 11 studies have some risk of bias, and 2 studies have high risk of bias (Cohen's kappa = 0.58). **Conclusion:** Fourteen of 18 triage interventions reduced EDLOS and/or LWBS rate. Physician, NP and PA led triage were the most effective triage interventions. To aid widespread adoption, future research should focus on interrupted time series or RCT designs, and more comprehensive descriptions of the contextual factors affecting implementation of these interventions.

Keywords: crowding, throughput, triage

LO30

Optimizing diagnostic testing processes to improve emergency department throughput: a systematic review

K. Grant, C. Bayley, BSc, E. Lang, MDCM, G. Innes, MD, University of Toronto, Toronto, ON

Introduction: Emergency Department (ED) crowding is an intensifying crisis. While input, throughput, and output factors all contribute to crowding, throughput factors are the most dependent on ED staff and process. Diagnostic testing is a fundamental ED process that has not been systematically evaluated. We present a systematic review of interventions designed to reduce ED length of stay (LOS) by optimizing laboratory or imaging turnaround time, or by introducing point-of-care testing (POCT). **Methods:** We conducted systematic database searches in Medline, Embase, CINAHL, and the Cochrane Central Register of Controlled Trials without filters or language restrictions, of all interventions on diagnostic technology that affected ED throughput (PROSPERO:CRD42019125651). Studies were screened by two independent reviewers. Study quality was assessed using the Cochrane ROB-2 tools for randomized controlled trials (RCTs), and the National Heart, Lung, and Blood Institute tool for all other study designs. **Results:** 18 studies met inclusion criteria (Cohen's kappa = 0.69). Study results were not pooled due to high statistical heterogeneity as assessed by chi-squared and I-squared statistics. 12 POCT intervention studies reported LOS changes ranging from -114 to +8 minutes (-26.8% to +3.8%), although three were non-significant findings. Four studies that initiated POCT or lab-ordering at triage reported LOS reductions ranging from 22 to 174 minutes, but only one of these, at 29 minutes (16%), was statistically significant. One study of improved laboratory troponin processing reported a LOS reduction of 43 minutes (12.3%). Another, which allowed triage nurses to order ankle x-rays using the Ottawa ankle rules, reported a non-significant LOS reduction of 28 minutes for patients with ankle injuries. LOS improvements reflected the population of patients who underwent the testing modality, rather than overall ED LOS. Seven studies had low risk of bias, 11 studies had some risk of bias, and no studies had high risk of bias (Cohen's kappa = 0.58). **Conclusion:** Eleven of 18 diagnostic testing studies reported LOS reductions. POCT was the most common intervention type, and usually reduced EDLOS within relevant patient subsets, while triage-initiated testing generally did not. To aid widespread adoption, future research should focus on interrupted time series or RCT designs, and more comprehensive descriptions of the contextual factors affecting implementation of these interventions.

Keywords: crowding, point-of-care testing, throughput

LO31

Triage drift: Variation in application of the Canadian Triage Acuity Scale between triage nurses compared to triage paramedics in response to overcrowding pressures in an emergency department

M. Kovacs, BSc, S. Campbell, MBChB, Dalhousie University, Halifax, NS

Introduction: CTAS is a validated five-level triage score utilized in EDs across Canada and internationally. Moderate interrater reliability between prehospital paramedic and triage nurse application of CTAS during clinical practice has been found. This study is the first assessment of the variation in distribution of CTAS scores with increasing departmental pressure as measured by the NEDOCs scale comparing triage allocations made by triage nurses with those made by triage

paramedics. **Methods:** We conducted a retrospective, observational cohort study of EDIS data of all patients triaged in the Halifax Infirmary Emergency Department from January 1, 2017-May 30, 2017 and January 1, 2018 - May 30, 2018. CTAS score assignment by nursing and paramedic triage staff were compared with increasing levels of ED overcrowding, as determined by the department NEDOCs score. **Results:** Nurses were more likely to assign higher acuity scores in all situations of department crowding; there was a 3% increased probability that a nurse, as compared to a paramedic, would triage as emergent when the ED was not overcrowded (Pearson chi-square (1) = 4.21, $p < 0.05$, Cramer's $v = 0.028$, $n = 5314$), and a 10% increased probability that a nurse, as compared to a paramedic, would triage a patient as emergent when EDs were overcrowded (Pearson chi-square(1) = 623.83, $p < 0.001$, Cramer's $v = 0.11$, $n = 56\ 018$). **Conclusion:** Increasing levels of ED overcrowding influence triage nurse CTAS score assignment towards higher acuity to a greater degree than scores assigned by triage paramedics.

Keywords: allied health personnel, Canadian Triage and Acuity Scale, triage

LO32

Artificial intelligence to predict disposition to improve flow in the emergency department

L. Grant, MD, PhD, X. Xue, MSc, Z. Vajhi, MSc, A. Azuelos, MD, S. Rosenthal, MD, D. Hopkins, MD, R. Aroutunian, MD, B. Unger, MD, A. Guttman, MD, M. Afilalo, MD, McGill University, Montreal, QC

Introduction: Emergency department (ED) crowding is a major problem across Canada. We studied the ability of artificial intelligence methods to improve patient flow through the ED by predicting patient disposition using information available at triage and shortly after patients' arrival in the ED. **Methods:** This retrospective study included all visits to an urban, academic, adult ED between May 2012 and June 2019. For each visit, 489 variables were extracted including triage data that had been collected for use in the Canadian Triage Assessment Scale (CTAS) and information regarding laboratory tests, radiological tests, consultations and admissions. A training set consisting of all visits from April 2012 up to December 2018 was used to train 5 classes of machine learning models to predict admission to the hospital from the ED. The models were trained to predict admission at the time of the patient's arrival in the ED and every 30 minutes after arrival until 6 hours into their ED stay. The performance of models was compared using the area under the ROC curve (AUC) on a test set consisting of all visits from January 2019 to June 2019. **Results:** The study included 536,332 visits and the admission rate was 15.0%. Gradient boosting models generally outperformed other machine learning models. A gradient boosting model using all available data at 2 hours after patient arrival in the ED yielded a test set AUC 0.92 [95% CI 0.91-0.93], while a model using only data available at triage yielded an AUC 0.90 [95% CI 0.89-0.91]. The quality of predictions generally improved as predictions were made later in the patient's ED stay leading to an AUC 0.95 [95% CI 0.93-0.96] at 6 hours after arrival. A gradient boosting model with 20 variables available at 2 hours after patient arrival in the ED yielded an AUC 0.91 [95% CI 0.89-0.93]. A gradient boosting model that makes predictions at 2 hours after arrival in ED using only variables that are available at all EDs in the province of Quebec yielded an AUC 0.91 [95% CI 0.89-0.92]. **Conclusion:** Machine learning can predict admission to a hospital from the ED using variables that area collected as part of

routine ED care. Machine learning tools may potentially be used to help ED physicians to make faster and more appropriate disposition decisions, to decrease unnecessary testing and alleviate ED crowding. **Keywords:** artificial intelligence, emergency department crowding, emergency department disposition

LO33

Sharing and teaching electrocardiograms to minimize infarction
J. McLaren, MD, A. Taher, MD, MPH, L. Chartier, MDCM, MPH, University of Toronto, Toronto, ON

Background: Every 30-minute delay to ST-Elevation Myocardial Infarction (STEMI) reperfusion increases one-year mortality by 7.5%. A local audit found that the third of patient electrocardiograms (ECGs) not initially meeting classic STEMI criteria had an ECG-to-Activation (ETA) time of over 90 minutes, more than five times that of classic STEMI. However, three quarters of “STEMI negative” ECGs met STEMI-equivalent patterns or rules for subtle occlusion, uncovering an opportunity for improvement. **Aim Statement:** We aimed to reduce ETA time, from initial emergency department (ED) ECG to activation of the cath lab, for patients whose ECGs did not meet classic STEMI criteria, by 30 minutes within one year (i.e. by Dec 2019). **Measures & Design:** We reviewed all ED Code STEMI over a 35-month pre-intervention period. Root Cause analyses, including Ishikawa diagram and Pareto chart, led to our Plan-Do-Study-Act cycles: 1) a survey to engage our team; 2) a Grand Rounds presentation as an educational strategy; and 3) weekly web-based feedback to all ED physicians on STEMI-equivalents and subtle occlusions, using recent local cases. Our outcome measures were ETA times, stratified by ECGs not initially meeting STEMI criteria (primary) and those that did (secondary). Our process measures were the number of website visits and page views. Our balancing measure was the proportion of Code STEMI without culprit lesion. We used Statistical Process Control (SPC) charts with usual special cause variation rules. **Evaluation/Results:** ETA time for the 37.5% of 56 ECGs that did not meet classic STEMI criteria decreased from 97.5 to 53.7 minutes (min), a 43.8-min absolute decrease ($p = 0.037$), while those meeting STEMI criteria remained the same (16.5 to 18.2min, $p = 0.75$). SPC charts did not show special cause variation. There were 2,634 page views (65.9/week) and 1,092 visits (27.3/week), in a group of 80 physicians—i.e. a third of the group each week. There was no change in Code STEMI without culprit lesions (28.0 % to 23.3%, $p = 0.41$). **Discussion/Impact:** We reduced ETA time by 43.8min for the one third of patients with culprit lesions not initially meeting classic STEMI criteria, a magnitude associated with mortality impact. To do so, we used a multi-modal educational strategy including a novel web-based feedback approach to all ED physicians. Local feedback and education on this challenging-to-diagnose subgroup, guided by ETA time as a quality metric, could be replicated in other centres.

Keywords: electrocardiogram, quality improvement and patient safety, ST elevation myocardial infarction

LO35

A province-wide quality improvement collaborative for treatment of children's pain in Alberta's emergency departments

J. Thull-Freedman, BA, MD, MSc, E. Pols, BN, A. McFetridge, BN, S. Libbey, BSc, K. Lonergan, BSc, B. Lethebe, BSc, MSc, S. Ali, BSc, MDCM, A. Stang, BSc, MBA, MD, MSc, Alberta Children's Hospital/University of Calgary, Calgary, AB

Background: Pediatric pain is often under-treated in emergency departments (EDs), causing short and long-term harm. In Alberta EDs, children's pain outcomes were unknown. A recent quality improvement collaborative (QIC) led by our team improved children's pain care in 4 urban EDs. We then spread to all EDs in Alberta using the Institute for Healthcare Improvement Framework for Going to Full Scale. **Aim Statement:** To increase the proportion of children <12 years who receive topical anesthetic before needle procedures from 11% to 50%; and for children <17 years with fractures: to 1) increase the proportion receiving analgesia from 31% to 50%; 2) increase the proportion with pain score documentation from 24% to 50%, and 3) reduce time to analgesia from 60 to 30 minutes, within 1 year. **Measures & Design:** All 97 EDs in Alberta that treat children were invited. Each was asked to form a project team, attend webinars, develop key driver diagrams and perform PDSA tests of change. Sites were given a monthly list of randomly selected charts for audit and entered data in REDCap for upload to a provincial run chart dashboard. Baseline performance measurement informed aims. Measures included proportion of children <12 years undergoing a lab test who received topical anesthetic, and for children <17 years with fracture, the proportion with a pain score, proportion receiving analgesia and median minutes to analgesia. Length of stay and use of opioids were balancing measures. Control charts were used to detect special cause. Interrupted time series (ITS) was performed to assess significance and trends. **Evaluation/Results:** 36 sites (37%) participated, including rural and urban sites from all regions. 8417 visits were audited. 23/36 sites completed audits before and after tests of change and were analyzed. Special cause occurred for all aims. The proportion receiving topical anesthetic increased from 11% to 30% (ITS $p < 0.001$). For children with fractures, the proportion with pain scores increased from 24% to 34% (ITS $p = 0.21$, underlying trend present), proportion receiving analgesic medication increased from 31% to 39% (ITS $p = 0.41$, underlying trend present) and minutes to analgesia decreased from 60 to 28 (ITS $p < 0.01$). There was no increase in length of stay or use of opioid medications. **Discussion/Impact:** A pragmatic approach encouraging locally led change was well-received and key to success. The QIC method shows promise for improving outcomes in diverse EDs across large geographic areas. Next steps include further spread and sustainability measurement.

Keywords: pain, pediatric, quality improvement and patient safety

LO36

Reducing emergency department bloodwork and eliminating waste

R. Sheps, BA, MD, MSc, V. Antoniu, MSc, MHSc, S. Saraga, BSc, MSc, C. Soong, MD, MSc, G. Wilde-Friel, MN, BScN, D. Dushenski, BSc, MD, Mount Sinai Hospital, Toronto, ON

Background: Patients presenting to the Emergency Department (ED) may be subjected to unnecessary bloodwork. This leads to excessive work for front-line nurses, physicians and laboratory staff, contributing to increased ED length of stay (LOS), patient discomfort, and health care costs. **Aim Statement:** By January 1, 2020, we will reduce the number of targeted blood tests (AST, GGT, aPTT and CK) by 40% in the Mount Sinai ED, as measured by the percent per 1000 ED visits of AST to ALT, GGT to ALT, aPTT to INR and CK to troponin. **Measures & Design:** This was a prospective time series quality improvement study. Using the Model for Improvement, we engaged front-line ED staff, as well as stakeholders from

Consultant, Laboratory and Information Services. Data was analyzed using run chart rules. Intervention: a) Removed rarely used tests from electronic nursing order sets b) Uncoupled order panels c) Developed six presentation-based medical directives with appropriate blood testing. d) Staff education Family of measures Outcomes: percent of targeted uncoupled test per 1000 ED visits for each of AST to ALT, GGT to ALT, aPTT to INR, and CK to troponin; Total number of blood tests ordered per 1000 ED visits Process: number of “separate and hold” tubes; number of blood tubes used in the ED; proportion of staff attending education Balancing: volume of blood drawn; LOS **Evaluation/Results:** Outcome: Estimated relative reduction in proportion of all uncoupled tests per 1000 ED visits by: • 33% AST/ALT • 52% GGT/ALT • 50% CK/troponin • 18% aPTT/INR Total number of lab tests per 1000 ED visits decreased by 7.7% (5742 to 5331). Evidence of special cause variation on all outcomes. Process measures: 1. 100% reduction in weekly “Separate and Hold” tubes (56 to 0). 2. Monthly total of blood tubes used in the ED decreased by 2.8% (11620 to 11300) 3. Attendance pending. Balancing measures: Monthly average volume of blood drawn decreased by 1.4L(2%) from 50.4L to 49.0L; LOS pending **Discussion/Impact:** A multi-pronged intervention resulted in a decrease in blood testing in the ED. We achieved the sub-aim of reducing targeted blood tests and are on track to achieve the overall aim of total lab reduction in the ED by April 2020. Final interventions to be implemented in the coming months include changes to the ED paper record and replacement of the paper add-on order process with an electronic ordering tool. Complete data will be available by April 2020. This intervention is scalable and has the potential to reduce costs and preventable harm to patients.

Keywords: choosing wisely, laboratory testing, quality improvement and patient safety

LO37

Reducing hemolysis of coagulation blood samples in the emergency department

H. Weatherby, BN, MSc, V. Woolner, MN, MSc, L. Chartier, MD, MPH, S. Casey, BN, MHSM, C. Ong, BN, BSc, E. Gaylord, BN, University Health Network, Toronto, ON

Background: Hemolysis of blood samples is the leading cause of specimen rejection from hospital laboratories. It contributes to delays in patient care and disposition decisions. Coagulation tests (prothrombin time/international normalized ratio [PT/INR] and activated partial thromboplastin time [aPTT]) are especially problematic for hemolysis in our academic hospital, with at least one sample rejected daily from the emergency department (ED). **Aim Statement:** We aimed to decrease the monthly rate of hemolyzed coagulation blood samples sent from the ED from a rate of 2.9% (53/1,857) to the best practice benchmark of less than 2% by September 1st, 2019. **Measures & Design:** Our outcome measure was the rate of hemolyzed coagulation blood samples. Our process measure was the rate of coagulation blood tests sent per 100 ED visits. Our balancing measure was the number of incident reports by clinicians when expected coagulation testing did not occur. We used monthly data for our Statistical Process Control (SPC) charts, as well as Chi square and Mann-Whitney U tests for our before-and-after evaluation. Using the Model for Improvement to develop our project’s framework, we used direct observation, broad stakeholder engagement, and process mapping to identify root causes. We enlisted nursing champions to develop our Plan-Do-Study-Act (PDSA) cycles/interventions:

1) educating nurses on hemolysis and coagulation testing; 2) redesigning the peripheral intravenous and blood work supply carts to encourage best practice; and 3) removing PT/INR and aPTT from automatic inclusion in our electronic chest pain bloodwork panel. **Evaluation/Results:** The average rate of hemolysis remained unchanged from baseline (2.9%, $p=0.83$). The average rate of coagulation testing sent per 100 ED visits decreased from 41.5 to 28.8 (absolute decrease 12.7 per 100, $p<0.05$), avoiding \$4,277 in monthly laboratory costs. The SPC chart of our process measure showed special cause variation with greater than eight points below the centerline. **Discussion/Impact:** Our project reduced coagulation testing, without changing hemolysis rates. Buy-in from frontline nurses was integral to the project’s early success, prior to implementing our electronic approach – a solution ranked higher on the hierarchy of intervention effectiveness – to help sustainability. This resource stewardship project will now be spread to a nearby institution by utilizing similar approaches.

Keywords: laboratory testing, quality improvement and patient safety, resource stewardship

LO38

Reducing inappropriate urine culture testing in the emergency department

A. Chan, MD, A. Sarabia, MD, Credit Valley Hospital, Mississauga, ON

Background: Urinary tract infections (UTI) are a common emergency department (ED) presentation. Urine cultures (UC) are frequently ordered to confirm the diagnosis, however, it can be challenging to differentiate between a true infection and asymptomatic bacteriuria (ASB) which does not generally benefit from antibiotics. This over-treatment of ASB leads to serious adverse side effects, growing antimicrobial resistance and increased healthcare costs. By reducing inappropriate ED urine culture testing, we can concomitantly avoid the false positives that contribute to this large-scale problem. **Aim Statement:** We aimed to reduce ED urine culture testing at Credit Valley Hospital, a large community hospital based in Mississauga, Ontario by 30%, from a baseline average of 97 cultures per 1000 ED visits in 2017, to 68 cultures per 1000 ED visits by year end 2019. **Measures & Design:** Multiple PDSA cycles were ran with our multi-disciplinary ED team. Our interventions to encourage rational urine culture testing are three-fold, including (1) medical directive optimization (removal of routine sending of UC), (2) individualized physician feedback and (3) physician education with introduction of a clinical decision aid. Our outcome measure is rate of UC per 1000 ED patient visits with a balance measure of rate of 30-day ED return visit of hospital admission for patients with a UTI. **Evaluation/Results:** Despite a parallel surge in ED volumes, we observed a significant decrease in urine culture testing, from an annual average of 97 cultures per 1000 ED visits to 60 cultures per 1000 ED visits in 2019 year-to-date. There was no increase in the rate of ED 30-day return visit or admission for UTI or a diagnostic equivalent. **Discussion/Impact:** Our multipronged approach effectively decreased the rate of UC testing during the study period. ED physicians provide higher quality care with judicious use of resources to guide diagnosis and management. Active ongoing interventions include our transition to a 2-step UC order protocol (uncoupling urinalysis with culture) using BD vacutainer urine collection products, which will allow for 48 hour storage of uncompromised urine. Further work will leverage our knowledge and experience with optimizing urine culture testing to other culture specimens.

Keywords: asymptomatic bacteriuria, quality improvement and patient safety, urine cultures

LO39

Using an ambulatory zone to improve physician initial assessment times in a tertiary care hospital emergency department

A. Verma, BSc, MD, MHSc, I. Cheng, MD, MSc, PhD, K. Pardhan, MD, L. Notario, BN, MSc, W. Thomas-Boaz, BN, MN, D. Shelton, MD, MSc, Sunnybrook Health Sciences Centre, Toronto, ON

Background: Increasing Emergency Department (ED) stretcher occupancy with admitted patients at our tertiary care hospital has contributed to long Physician Initial Assessment (PIA) times. As of Oct 2019, median PIA was 2.3 hours and 90th percentile PIA was 5.3 hours, with a consequent 71/74 PIA ranking compared to all Ontario EDs. Ambulatory zone (AZ) models are more commonly used in community EDs compared to tertiary level EDs. An interdisciplinary team trialed an AZ model for five days in our ED to improve PIA times. **Aim Statement:** We sought to decrease the median PIA for patients in our ED during the AZ trial period as compared to days with similar occupancy and volume. **Measures & Design:** The AZ was reserved for patients who could walk from a chair to stretcher. In this zone, ED rooms with stretchers were for patient assessment only; when waiting for results or receiving treatment, patients were moved into chairs. We removed nursing assignment ratios to increase patient flow. Our outcome measure was the median PIA for all patients in our ED. Our balancing measure was the 90th percentile PIA, which could increase if we negatively impacted patients who require stretchers. The median and 90th percentile PIA during the AZ trial were compared to similar occupancy and volume days without the AZ. Additional measures included ED Length of Stay (LOS) for non-admitted patients, and patients who leave without being seen (LWBS). Clinicians and patients provided qualitative feedback through surveys. **Evaluation/Results:** The median PIA during the AZ trial was 1.5 hours, compared to 2.1 hours during control days. Our balancing measure, the 90th percentile PIA was 3.7 hours, compared to 5.0 during control days. A run chart revealed both median and 90th percentile PIA during the trial were at their lowest points over the past 18 months. The number of LWBS patients decreased during the trial; EDLOS did not change. The majority of patients, nurses, and physicians felt the trial could be implemented permanently. **Discussion/Impact:** Although our highly specialized tertiary care hospital faces unique challenges and high occupancy pressures, a community-hospital style AZ model was successful in improving PIA. Shorter PIA times can improve other quality metrics, such as timeliness of analgesia and antibiotics. We are working to optimize the model based on feedback before we cycle another trial. Our findings suggest that other tertiary care EDs should consider similar AZ models.

Keywords: patient flow, physician initial assessment, quality improvement and patient safety

LO40

Safe anticoagulation initiation for atrial fibrillation in the emergency department (the SAFE pathway)

C. Kirwan, BSc, S. Ramsden, BSc, A. Kibria, J. Carter, BSc, X. Tong, MD, J. Huang, MD, R. McArthur, PharmD, N. Clayton, RA, K. de Wit, MBChB, MD, MSc, McMaster University, Hamilton, ON

Background: Atrial fibrillation (AF) is a risk for stroke. The Canadian Cardiovascular Society advises patients who are CHADS65 positive should be started on oral anticoagulation (OAC). Our local emergency

department (ED) review showed that only 16% of CHADS65 positive patients were started on OAC and that 2% of our patients were diagnosed with stroke within 90 days. We implemented a new pathway for initiation of OAC in the ED (the SAFE pathway). **Aim Statement:** We report the effectiveness and safety of the SAFE pathway for initiation of OAC in patients treated for AF in the ED. **Measures & Design:** A multidisciplinary group of physicians and pharmacist developed the SAFE pathway for patients who are discharged home from the ED with a diagnosis of AF. Step 1: contraindications to OAC, Step 2: CHADS65 score, Step 3: OAC dosing if indicated. The pathway triggers referral to AF clinic, family physician letter and follow up call from the ED pharmacist. Patients are followed for 90 days by a structured medical record review and a structured telephone interview. We record persistence with OAC, stroke, TIA, systemic arterial embolism and major bleeding (ISTH criteria). Patient outcomes are fed back to the treating ED physician. **Evaluation/Results:** The SAFE pathway was introduced in two EDs in June 2018. In total, 177 patients have had the pathway applied. The median age was 70 (interquartile range (IQR) 61-78), 48% male, median CHADS2 score 2 (IQR 0-2). 19/177 patients (11%) had a contraindication to initiating OAC. 122 patients (69%) had no contraindication to OAC and were CHADS65 positive. Of these 122 patients, 109 were given a prescription for OAC (96 the correct dose, 9 too high a dose and 4 too low a dose). 6 patients declined OAC and the physician did not want to start OAC for 7 patients. 73/122 were contacted by phone at 90 days, 15 could not be reached and 34 have not completed 90 days of follow up since their ED visit. Of the 73 who were reached by phone after 90 days, 65 were still taking an anticoagulant. To date, 1 patient who declined OAC (CHADS2 score of 2) had a stroke within 90 days and one patient prescribed OAC had a gastrointestinal bleed. **Discussion/Impact:** The SAFE pathway appears safe and effective although we continue to evaluate and improve the process.

Keywords: anticoagulation, atrial fibrillation, quality improvement and patient safety

LO41

The development of a standardized provincial massive hemorrhage protocol with a built-in continuous quality improvement framework

C. Yeh, MD, PhD, S. Cope, BSc, T. Thompson, BAHSc, S. McGilvray, MD, A. Petrosoniak, MD, MSc, V. Chin, BSc, K. Karkouti, MD, MSc, A. Nathens, MD, MPH, PhD, K. Murto, MD, S. Beno, MD, A. McDonald, MD, A. Beckett, MD, H. Hanif, BSc, MLT, A. Collins, MD, B. Nascimento, MD, MSc, S. Rizoli, MD, PhD, M. Sholzberg, MDCM, MSc, K. Pavenski, MD, J. Callum, MD, University of Toronto, Toronto, ON

Background: Massive hemorrhage protocols (MHPs) streamline the complex logistics required for prompt care of the bleeding patient, but their uptake has been variable and few regions have a system to measure outcomes from these events. **Aim Statement:** We aim to implement a standardized MHP with uniform quality improvement (QI) metrics to increase uptake of evidence-based MHPs across 150-hospitals in Ontario between 2017 and 2021. **Measures & Design:** We performed ongoing PDSA cycles; 1) stakeholder analysis by surveying the Ontario Regional Blood Coordinating Network (ORBCoN), 2) problem characterization and Ishikawa analysis for key QI metrics based on areas of MHP variability in 150 Ontario hospitals using a web-based survey, 3) creation of a consensus MHP via a modified Delphi process, 4) problem characterization at ORBCoN for

the design of a freely available toolkit for provincial implementation by expert working groups, 5) design of 8 key QI metrics by a modified Delphi process, and 6) identification of process measures for QI data collection by implementation metrics. **Evaluation/Results:** PDSA1-2; 150-hospitals were surveyed. 33% of hospitals lacked MHPs, mostly in smaller sites. Major areas for QI were related to activation criteria, hemostatic agents, protocolized hypothermia management, variable MHP naming, QI metrics and serial blood work requirements. PDSA3; 3 Delphi rounds were held to reach 100% expert consensus for 42 statements and 8 CQI metrics. Major areas for modification were protocol name, laboratory resuscitation targets, cooler configurations, and role of factor VIIa. PDSA4; adaptable toolkit is under development by the steering committee and expert working groups. Implementation is scheduled for Spring 2020. PDSA5; the 8 CQI metrics are: TXA administration < 1 h, RBC transfusion < 15 min, call to transfer for definitive care < 60 min, temp >35°C at end of protocol, Hgb kept between 60-110g/L, transition to group-specific RBC by 90 min, appropriate activation defined by ≥ 6 units RBC in the first 24 hours, and any blood component wastage. **Discussion/Impact:** MHP uptake, content, and tracking is variable. A standardized MHP that is adaptable to diverse settings decreases complexity, improves use of evidence-based practices, and provides a platform for continuous QI. PDSA6 will occur after implementation; we will complete an implementation survey, and design a pilot and feasibility study for prospective tracking of patient outcomes using existing prospectively collected inter-hospital and provincial databases.

Keywords: massive hemorrhage protocol, quality improvement and patient safety, resuscitation systems

LO42

A systematic review of short-term use of therapeutic opioids for children and future opioid use disorders

S. Ali, MD CM, M. Afzalzada-Ahrari, BA, M. Dyson, PhD, D. DaRosa, K. Dong, MD, MSc, A. Drendel, MSc, DO, L. Hartling, PhD, University of Alberta, Edmonton, AB

Introduction: Despite an overall decline in opioid prescriptions in Canada, healthcare visits, hospitalizations, and deaths due to opioid-related harms continue to rise for children. Clinicians urgently require high quality synthesized evidence to inform personalized decisions regarding opioid use for children. The objective of this systematic review was to examine the association between short-term therapeutic exposure to opioids and development of opioid use disorder. **Methods:** A medical librarian conducted a comprehensive search of 10 databases from inception to May 2019. Two authors independently assessed studies for inclusion. Studies were eligible if they reported primary research in English or French, and study participants had short (<14 days) or non-specific duration of therapeutic exposure to opioids before age 18 years. Primary outcome was the development of an opioid use disorder; secondary outcomes included opioid addiction, dependence, misuse, and abuse. Data extraction involved two independent reviewers utilizing a standardized form. Methodological quality was assessed using the NIH tools for observational studies. Results are described narratively. **Results:** The search identified 4,072 unique citations; 82 were selected for review, and 17 were included (3 retrospective cohort, 4 prospective cohort, and 10 cross-sectional). All studies took place in the USA. A total of 1,562,503 participants were analyzed. Nine studies were administered in schools, 3 used administrative data. While most settings were non-specific, 1 study examined opioid use in dentistry, 1 in trauma, and 1 in organized sports. One comparative

study showed an association between short-term therapeutic use and opioid misuse. Two studies showed opioid related adverse events (e.g., overdose) among cohorts exposed to short-term use. The remaining 14 studies did not specify duration of exposure; therefore, confirming whether misuse was due to short-term therapeutic exposure was not possible. **Conclusion:** A small number of studies in this review suggest an association between short-term opioid use and opioid misuse; however, further analysis is underway with consideration of methodological limitations of the individual studies (final results pending). Careful consideration of the risk and benefits of short-term opioid use should be undertaken prior to prescribing opioids. PROSPERO Registration Number: 122681.

Keywords: narcotics, opioid misuse, opioid use disorder

LO43

First Nations emergency care visits in Alberta: Descriptive results of a retrospective cohort study

P. McLane, BA, PhD, MA, C. Barnabe, MD, MSc, B. Holroyd, MBA, MD, A. Colquhoun, MSc, PhD, L. Bill, BScN, K. Fitzpatrick, MSc, K. Rittenbach, PhD, C. Healy, BSc, H. Bull, M. Crawler, L. Firth, T. Jacobs, D. Twin, R. Rosychuk, MSc, PhD, University of Alberta, Edmonton, AB

Introduction: Emergency care serves as an important health resource for First Nations (FN) persons. Previous reporting shows that FN persons visit emergency departments at almost double the rate of non-FN persons. Working collaboratively with FN partners, academic researchers and health authority staff, the objective of this study is to investigate FN emergency care patient visit statistics in Alberta over a five year period. **Methods:** Through a population-based retrospective cohort study for the period from April 1, 2012 to March 31, 2017, patient demographics and emergency care visit characteristics for status FN patients in Alberta were analyzed and compared to non-FN statistics. Frequencies and percentages (%) describe patients and visits by categorical variables (e.g., Canadian Triage Acuity Scale (CTAS)). Means and standard deviations (medians and interquartile ranges (IQR)) describe continuous variables (e.g., distances) as appropriate for the data distribution. These descriptions are repeated for the FN and non-FN populations, separately. **Results:** The data set contains 11,686,288 emergency facility visits by 3,024,491 unique persons. FN people make up 4.8% of unique patients and 9.4% of emergency care visits. FN persons live further from emergency facilities than their non-FN counterparts (FN median 6 km, IQR 1-24; vs. non-FN median 4 km, IQR 2-8). FN visits arrive more often by ground ambulance (15.3% vs. 10%). FN visits are more commonly triaged as less acute (59% CTAS levels 4 and 5, compared to non-FN 50.4%). More FN visits end in leaving without completing treatment (6.7% vs. 3.6%). FN visits are more often in the evening – 4:01pm to 12:00am (43.6% vs. 38.1%). **Conclusion:** In a collaborative validation session, FN Elders and health directors contextualized emergency care presentation in evenings and receiving less acute triage scores as related to difficulties accessing primary care. They explained presentation in evenings, arrival by ambulance, and leaving without completing treatment in terms of issues accessing transport to and from emergency facilities. Many factors interact to determine FN patients' emergency care visit characteristics and outcomes. Further research needs to separate the impact of FN identity from factors such as reasons for visiting emergency facilities, distance traveled to care, and the size of facility where care is provided.

Keywords: First Nations

LO44

Birth cohort hepatitis C screening in an academic emergency department in Canada: preliminary results

S. Friedman, MD, MPH, C. Capraru, MD, K. Bates, BScN, D. Porplycia, BSc, MSc, T. Mazzulli, MD, A. Vanderhoff, BSc, B. Hansen, PhD, H. Shah, MD, H. Janssen, MD, PhD, J. Feld, MD, MPH, University Health Network, Toronto, ON

Introduction: Epidemiologic and modeling studies suggest that between 45 and 70% of individuals with chronic hepatitis C virus (HCV) infection in Canada remain undiagnosed. The Canadian Association for the Study of the Liver (CASL) recommends one-time screening of baby boomers (1945-1975). Screening programs in the US have shown a very high prevalence of previously undiagnosed HCV among patients seen in the emergency department (ED). We sought to assess the feasibility of implementing a targeted birth-cohort HCV screening program in a Canadian ED setting. **Methods:** Patients born from 1945 to 1975 presenting to the ED of a downtown Toronto hospital were offered HCV testing. Patients with life-threatening conditions, unable to provide verbal consent in English or intoxication were excluded. Blood samples were collected by finger prick on Dried Blood Spot (DBS) collection cards and tested for anti-HCV antibody with reflex to HCV RNA. Patients with positive HCV RNA were referred to a liver specialist. **Results:** During a 27-month period (July 2017 - Sept 2019), 8363 patients in the birth cohort presented to the ED during daytime hours. 80% (6714) met eligibility criteria, and 48.4% (3247) were offered testing. Screening was performed by non-medical staff (mean 8/day, median spots on DBS 4). 345 (10.6%) had been previously tested, and 639 (19.7%) declined. 2136 (65.8%) patients underwent testing; median age 58.4 years (40-82), 1117 male (52.3%). Of these, 45 patients (2.1%; 95% CI 1.5%-2.7%) were anti-HCV positive; 32 (76.2%) were HCV RNA positive, 10 (23.8%) negative and 3 not done due to inadequate DBS sample. 26 patients (81.3%) were linked to care and 3 (9.4%) lost to follow-up. HCV prevalence in the ED was significantly higher than the general Canadian population (2.1% vs 0.7%; $p < 0.0001$) but much lower than reported rates in American EDs (2.1% vs 10.3%; $p < 0.0001$). **Conclusion:** Acceptance of HCV screening in the ED birth cohort was high and easily performed using DBS to ensure the majority of positive samples were tested for HCV RNA. Challenges included implementation that limited number of people tested, and linkage to care for HCV positive patients. HCV prevalence among this ED birth cohort was higher than the general population but lower than seen in the ED in the US. This may in part be due to exclusion of individuals with more severe medical issues, refusal by higher risk subgroups, or population and healthcare system differences between countries.

Keywords: hepatitis C, screening

LO45

Women's perspectives on early pregnancy complications and supportive care needs: a qualitative multi-site study

K. Dainty, PhD, B. Seaton, MSc, V. Rojas-Luengas, BSc, S. McLeod, MSc, M. Tunde-Byass, MD, E. Tolhurst, MD, C. Varner, MD, MSc, Mount Sinai Hospital - University of Toronto, Toronto, ON

Introduction: Women experiencing early pregnancy loss or threatened loss frequently seek care in emergency departments (ED) or early pregnancy clinics (EPC). The dearth of existing qualitative studies has left understudied questions about how these women perceive their healthcare and which strategies best meet their supportive care

needs, particularly in the Canadian context. The objective of this study was to deepen our understanding of these women's experiences and gain insight into how clinicians and healthcare services can lessen the impact of this traumatic event on patients and their families.

Methods: We conducted a descriptive qualitative study of women who presented to the ED or EPC at an urban tertiary care hospital and an urban community hospital for early pregnancy loss or threatened loss. Purposive sampling was used to recruit patients for in-depth, one-on-one telephone interviews conducted 4-6 weeks after the index visit. Data collection and analysis were concurrent and continued until thematic saturation had occurred. Data analysis was led by two qualitative researchers with support from a multi-disciplinary research team following standard thematic analysis techniques. **Results:** Interviews were completed with 59 women between July 2018 and August 2019. Participants ranged in age from 22 to 47 years and reflect the diversity of the multicultural city where the study occurred. Our analysis revealed that the medicalization and normalization of early pregnancy complications among ED and EPC clinicians is at odds with women's general lack of knowledge about the frequency, personal risk, causation, duration, and physical intensity of the miscarriage experience. Women identified the value of rapid access to appointments, point of care ultrasound, detailed care plans, and knowledgeable advice as key to lessening the physical and emotional trauma related to early pregnancy loss. **Conclusion:** This research highlights the physical, emotional, and psychological complexity of a medical situation frequently minimized within the current healthcare system. The results impart important knowledge about which aspects of ED and EPC care are most valued by women experiencing early pregnancy loss or threatened loss and demonstrate the clear need for women and their families to be provided with more education about the totality of the early pregnancy experience, including the possibility of pregnancy complications and loss.

Keywords: early pregnancy loss, miscarriage, patient experience

LO46

Prognostic value of single serum progesterone in the evaluation of symptomatic pregnant patients: a systematic review and meta-analysis

B. Ghaedi, MSc, S. Ameri, MD, K. Abdulkarim, BSc, V. Thiruganasambandamoorthy, MSc, Ottawa Hospital Research Institute, Ottawa, ON

Introduction: Pain and bleeding complicate 30% of pregnancies threatening viability. The objective of this systematic review is to evaluate the role of a single progesterone level in predicting viability.

Methods: We comprehensively searched MEDLINE, Embase (OVID), CINAHL and Cochrane databases from inception to July 2019. We included English language studies that enrolled symptomatic first trimester pregnant patients, measured progesterone and reported viability (miscarriage, ectopic or viable). We excluded studies with patients who had progesterone treatment, or conception after induced ovulation/invitro fertilization. We extracted patient characteristics, study setting, mean progesterone, the cut off value and outcome (viability). The quality of the included studies was assessed using Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool. We extracted data for 2X2 tables and report mean, standard deviation (SD), sensitivity, specificity, positive and negative predictive values (PPV, NPV). **Results:** Of the 689 studies screened, 51 studies with 15783 patients were included (1 randomized control trial, 36 prospective, 9 retrospective, 5 prospective case control studies) and 7553

were viable pregnancies. Of the 31 studies ($n = 10998$) that reported ectopic, 1661 patients were diagnosed with ectopic pregnancy. In 35 studies ($n = 6003$) that reported mean and SD, the levels were higher in viable (26.7 ± 11.2 ng/ml) than non-viable (9.5 ± 5.9 ng/ml; $p < 0.001$) or ectopic pregnancy (9.5 ± 6.8 ng/ml ($p < 0.001$)). The pooled diagnostic characteristics at different cut-off values were: <6.3 ng/mL (9 studies; $N = 6033$) sensitivity 65.0% (95% CI 63.5, 66.5), specificity 97.3% (95% CI 95.5, 98.5), PPV 99.4% (95% CI 99.1, 99.7) and NPV 27.4 (95% CI 26.6, 28.4); <10 ng/mL (12 studies with 5743 participants) sensitivity 65.0% (95% CI 63.5, 66.5), specificity of 97.3% (95% CI 95.5, 98.5), PPV 99.4% (95% CI 99.1, 99.7) and NPV 27.4 [95% CI 26.5, 29.4]; 11–20 ng/mL (24 studies with 7141 participants) sensitivity 77.3% (95% CI 76.2, 78.4), specificity 64.6% (95% CI 63.2, 65.9), PPV 73.2% [95% CI 72.3, 73.9] and NPV 69.5% (95% CI 70.7, 72.5). There was low risk of bias for patient selection, index test and low concern regarding applicability. The highest risk (82% of studies) was due to outcome ascertainment bias due to non-blinding of index and additional tests. **Conclusion:** A single progesterone value is useful in predicting viability of pregnancy among symptomatic patients.

Keywords: ectopic pregnancy, pregnancy viability, progesterone

LO47

Hematochezia in children with acute gastroenteritis in the emergency department: clinical phenotype, etiologic pathogens, and resource utilization

M. Böhrer, BSc, MD, E. Fitzpatrick, MN, K. Hurley, MD, J. Xie, MD, MPH, B. Lee, MD, X. Pang, PhD, L. Chui, PhD, P. Tarr, MD, S. Ali, MDCM, O. Vanderkooi, MD, S. Freedman, MDCM, MSc, Dalhousie University / IWK Health Centre, Halifax, NS

Introduction: Acute bloody diarrhea obligates rapid and accurate diagnostic evaluation; few studies have described such cohorts of children. **Methods:** We conducted a planned secondary analysis employing the Alberta Provincial Pediatric EnTeric Infection TEam (APPETITE) acute gastroenteritis study cohort to describe the characteristics of children with acute bloody diarrhea, compared to a cohort of children without hematochezia. Children <18 years of age presenting to 2 pediatric tertiary care emergency departments (EDs) in Alberta, with ≥ 3 episodes of diarrhea and/or vomiting in the preceding 24 hours and <7 days of symptoms were consecutively recruited. Stools were tested for 17 viruses, bacteria and parasites. Primary outcomes were clinical characteristics and pathogens identified. Secondary outcomes included interventions and resource utilization. **Results:** Of 2257 children enrolled between October 2015 and August 2018, hematochezia before or at the index ED visit was reported in 122 (5.4%). Compared to children with nonbloody diarrhea, children with hematochezia had longer illness duration [59.5 vs. 41.5 hrs, difference 10.6, 95% CI 3.5, 19.9], more diarrheal episodes in a 24-hour period [8 vs. 5, difference 3, 95% CI 2, 4], and less vomiting [55.7% vs. 91.1%; difference -35.3%; 95% CI -44.7, -26.3]. They received more intravenous fluids [32.0% vs. 18.3%; difference 13.7%, 95% CI 5.5, 23.0], underwent non-study stool testing [53.7% vs. 4.8%; difference 49.0%, 95% CI 39.6, 58.0], experienced longer ED visits [4.1 vs. 3.3 hours, difference 0.9, 95% CI 0.3, 1.0] and were more likely to have repeat healthcare visits within 14 days [54.8% vs. 34.2%; difference 20.6%, 95% CI 10.8, 30.1]. A bacterial enteric pathogen was found in 31.9% of children with hematochezia versus 6.6% without bloody diarrhea (difference 25.4%, 95% CI

17.2, 34.7). In children with hematochezia, the most commonly detected bacteria were *Salmonella* spp. ($N = 15$), Shiga toxin-producing *E. coli* ($N = 9$), *Campylobacter* spp. ($N = 7$), and *Shigella* spp. ($N = 5$). Viruses were detected in 32.8% of children with bloody diarrhea, most commonly adenovirus ($N = 15$), norovirus ($N = 14$), sapovirus ($N = 8$) and rotavirus ($N = 7$). **Conclusion:** Children with hematochezia differed clinically from those without hematochezia and required more healthcare resources. While bacterial etiologies are common, several viruses were also detected.

Keywords: acute bloody diarrhea, enteric pathogens, paediatrics

LO48

Pediatric cannabinoid hyperemesis syndrome in the emergency department: a 5-year retrospective review

D. Foster, BSc, K. Van Aarsen, MSc, J. Yan, MD, MSc, J. Teefy, MD, T. Lynch, MD, Schulich School of Medicine and Dentistry, Western University, London, ON

Introduction: Cannabinoid Hyperemesis Syndrome (CHS) in pediatric patients is poorly characterized. Literature is scarce, making identification and treatment challenging. This study's objective was to describe demographics and visit data of pediatric patients presenting to the emergency department (ED) with suspected CHS, in order to improve understanding of the disorder. **Methods:** A retrospective chart review was conducted of pediatric patients (12–17 years) with suspected CHS presenting to one of two tertiary-care EDs; one pediatric and one pediatric/adult (combined annual pediatric census 40,550) between April 2014–March 2019. Charts were selected based on discharge diagnosis of abdominal pain or nausea/vomiting with positive cannabis urine screen, or discharge diagnosis of cannabis use, using ICD-10 codes. Patients with confirmed or likely diagnosis of CHS were identified and data including demographics, clinical history, and ED investigations/treatments were recorded by a trained research assistant. **Results:** 242 patients met criteria for review. 39 were identified as having a confirmed or likely diagnosis of CHS (mean age 16.2, SD 0.85 years with 64% female). 87% were triaged as either CTAS-2 or CTAS-3. 80% of patients had cannabis use frequency/duration documented. Of these, 89% reported at least daily use, the mean consumption was 1.30g/day (SD 1.13g/day), and all reported ≥ 6 months of heavy use. 69% of patients had at least one psychiatric comorbidity. When presenting to the ED, all had vomiting, 81% had nausea, 81% had abdominal pain, and 30% reported weight loss. Investigations done included venous blood gas (30%), pregnancy test in females (84%), liver enzymes (57%), pelvic or abdominal ultrasound (19%), abdominal X-ray (19%), and CT head (5%). 89% of patients received treatment in the ED with 81% receiving anti-emetics, 68% receiving intravenous (IV) fluids, and 22% receiving analgesics. Normal saline was the most used IV fluid (80%) and ondansetron was the most used anti-emetic (90%). Cannabis was suspected to account for symptoms in 74%, with 31% of these given the formal diagnosis of CHS. 62% of patients had another visit to the ED within 30 days (prior to or post sentinel visit), 59% of these for similar symptoms. **Conclusion:** This study of pediatric CHS reveals unique findings including a preponderance of female patients, a majority that consume cannabis daily, and weight loss reported in nearly one third. Many received extensive workups and most had multiple clustered visits to the ED.

Keywords: cannabinoid hyperemesis syndrome, nausea and vomiting, pediatrics

LO49

Digital technology distraction for acute pain in children: a meta-analysis

M. Gates, PhD, L. Hartling, PhD, J. Shulhan-Kilroy, MSc, T. MacGregor, MA, S. Guitard, MSc, A. Wingert, MPH, R. Featherstone, MLIS, B. Vandermeer, MSc, N. Poonai, MD, MSc, J. Kircher, MD, S. Perry, MN, T. Graham, MD, MSc, S. Scott, PhD, S. Ali, MD CM, University of Alberta, Edmonton, AB

Introduction: Digital distraction is being integrated into pediatric pain care, but its efficacy is currently unknown. We conducted a systematic review to determine the effect of digital technology distraction on pain and distress for children experiencing acutely painful conditions or medical procedures. **Methods:** We searched eight online databases (MEDLINE, Embase, Cochrane Library, CINAHL, PsycINFO, IEEE Xplore, Ei Compendex, Web of Science), grey literature sources, scanned reference lists, and contacted experts for quantitative studies where digital technologies were used as distraction for acutely painful conditions or procedures in children. Study selection was performed by two independent reviewers with consensus. One reviewer extracted relevant study data and another verified it for accuracy. Appraisal of risk of bias within studies and the certainty of the body of evidence were performed independently in duplicate, with the final appraisal determined by consensus. The primary outcomes of interest were child pain and distress. **Results:** Of 3247 unique records identified by the search, we included 106 studies ($n = 7820$) that reported on digital technology distractors (e.g., virtual reality; videogames) used during common procedures (e.g., venipuncture, minor dental procedures, burn treatments). We located no studies reporting on painful conditions. For painful procedures, digital distraction resulted in a modest but clinically important reduction in self-reported pain (SMD -0.48, 95% CI -0.66 to -0.29, 46 RCTs, $n = 3200$), observer-reported pain (SMD -0.68, 95% CI -0.91 to -0.45, 17 RCTs, $n = 1199$), behavioural pain (SMD -0.57, 95% CI -0.94 to -0.19, 19 RCTs, $n = 1173$), self-reported distress (SMD -0.49, 95% CI -0.70 to -0.27, 19 RCTs, $n = 1818$), observer-reported distress (SMD -0.47, 95% CI -0.77 to -0.17, 10 RCTs, $n = 826$), and behavioural distress (SMD -0.35, 95% CI -0.59 to -0.12, 17 RCTs, $n = 1264$) compared to usual care. Few studies directly compared different distractors or provided subgroup data to inform applicability. **Conclusion:** Digital distraction provides modest pain and distress reduction for children undergoing painful procedures; its superiority over non-digital distractors is not established. Healthcare providers and parents should strongly consider using distractions as a pain-reduction strategy for children and teens during common painful procedures (e.g., needle pokes, dental fillings). Context, child preference, and availability should inform the choice of distractor.

Keywords: digital technology, distraction, pain

LO50

Pain free laceration repairs using intra-nasal ketamine: DosINK 2 clinical trial

S. Rached-Dastous, MD, E. D. Trottier, MD, Y. Finkelstein, BSc, MD, B. Bailey, BSc, MD, MSc, C. Marquis, MSc, BPharm, D. Lebel, MSc, M. Desjardins, MD, SickKids Hospital, Toronto, ON

Introduction: Lacerations are common in children presenting to the emergency department (ED). They are often uncooperative when sutures are needed and may require procedural sedation. Few studies have evaluated intranasal (IN) ketamine for procedural sedation in children, with doses from 3 to 9 mg/kg used mostly for dental

procedures. In a previous dose escalation trial, DosINK-1, 6 mg/kg was found to be the optimal IN ketamine dose for procedural sedation for sutures in children. In this trial, we aim to further evaluate the efficacy of this dose. **Methods:** We conducted a multicentre single-arm clinical trial. A convenience sample of 30 uncooperative children between 1 and 12 years (10 to 30 kg) with no cardiac or kidney disease, active respiratory infection, prior administration of opioid or sedative agents received 6 mg/kg of IN ketamine using an atomizer for their laceration repair with sutures in the ED. The primary outcome was defined as the proportion (95% CI) of patients who achieved an adequate procedural sedation evaluated with the PERC/PECARN consensus criteria. **Results:** Thirty patients were recruited from April 2018 to November 2019 in 2 pediatric ED. The median age was 3.2 (interquartile range(IQR), 1.9 to 4.7) years-old with laceration of more than 2 cm in 20 (67%) patients and in the face in 21 (70%) cases. Sedation was effective in 18 out of 30 children 60% (95%CI, 45 to 80), was suboptimal in 6 patients (20%) with a procedure completed with minimal difficulties, and unsuccessful in the remaining 6 (20%), all without serious adverse event. Similarly, 21/30 (70%) physicians were willing to reuse IN ketamine at the same doses and 25 parents (83%) would agree to the same sedation in the future. Median time to return to baseline status was 58 min (IQR, 33 to 73). One patient desaturated during the procedure and required transitory oxygen and repositioning. After the procedure, 1 (3%) patient had headache, 1 (3%) patient had nausea, and 2 (7%) patients vomited. **Conclusion:** A single dose of 6 mg/kg of IN Ketamine for laceration repair with sutures in uncooperative children is safe and facilitated the procedure in 60% (95%CI, 45 to 80) of patients, was suboptimal in 20% and unsuccessful in 20% of patients. As seen with IV ketamine, an available additional dose of IN ketamine for some children if needed could potentially increase proportion of successful sedation. However, the safety and efficacy of repeated doses needs to be addressed.

Keywords: intranasal ketamine, pediatrics, procedural sedation

LO51

Emergency department use by pregnant women: a population-based study within a universal healthcare system

C. Varner, MD, MSc, A. Park, MSc, D. Little, BSc, J. Ray, MD, MSc, Mount Sinai Hospital - University of Toronto, Toronto, ON

Introduction: Emergency Department (ED) utilization during pregnancy may be common, but data specific to universal healthcare systems like Canada are lacking, where pregnancy care is supposed to be standardized. The objective of this study was to quantify and characterize ED utilization among all Ontarian women who had a recognized pregnancy, including by trimester and within 42 days after pregnancy, and further stratified by pregnancy outcome. **Methods:** Utilizing provincial administrative health databases, this retrospective population-based cohort study included all recognized pregnancies in Ontario conceived between April 1, 2002 and March 31, 2017. Peri-pregnancy ED utilization was defined as any ED visit from 0-42 weeks' gestation, or within 42 days after the end of pregnancy. Modified Poisson regression was used to generate relative risks (RR) and 95% confidence intervals (CI) for the outcome of any peri-pregnancy ED utilization in association with maternal characteristics. **Results:** Peri-pregnancy ED utilization occurred among 1,075,991 of 2,728,236 recognized pregnancies (39.4%), including among 35.8% of livebirths, 47.3% of stillbirths, 73.7% of miscarriages, and 84.8% of threatened abortions. There were 22,802 (0.84%) ectopic

pregnancies among all pregnancies in the cohort. ED utilization peaked in the first trimester and in the first week postpartum. A dose-response effect was seen in the number of peri-pregnancy ED visits in relation to certain maternal characteristics. Women residing in rural areas had an odds ratio (OR) of 3.44 (95% CI 3.39 to 3.49) for ≥ 3 ED visits, compared to those in urban areas. Women with 3-5 (OR 1.99 95% CI 1.97-2.01), 5-6 (OR 3.55, 95% CI 3.49 to 3.61), or ≥ 7 (OR 7.59, 95% CI 7.39 to 7.78) pre-pregnancy comorbidities were more likely to have ≥ 3 peri-pregnancy ED visits than those with 0-2 comorbidities. Of all recognized pregnancies in the cohort, only 106,989 (3.9%) had an injury-related ED visit. **Conclusion:** Peri-pregnancy ED utilization occurs in nearly 40% of pregnancies, notably in the first trimester and immediately postpartum. Efforts are needed to streamline rapid access to ambulatory obstetrical care during these peak periods, when women are vulnerable to either a miscarriage, or a complication after a livebirth.

Keywords: early pregnancy complications, obstetrics, pregnancy

LO52

Distraction in the ED using Virtual reality for Intravenous Needs in Children to Improve comfort- DEVINCI - a pilot RCT

E. D. Trotter, MD, E. Osmanliu, MD, B. Bailey, MD, M. Lagacé, M. Certain, C. Khadra, M. Sanchez, MD, C. Thériault, D. Paquin, C. Cotes-Turpin, S. Le May, PhD, CHU Sainte Justine, Université de Montréal, Montreal, QC

Introduction: Venipuncture is a frequent cause of pain and distress in the pediatric emergency department (ED). Distraction, which can improve patient experience, remains the most studied psychological intervention. Virtual reality (VR) is a method of immersive distraction that can contribute to the multi-modal management of procedural pain and distress. **Methods:** The main objectives of this study were to determine the feasibility and acceptability of Virtual Reality (VR) distraction for pain management associated with venipunctures and to examine its preliminary effects on pain and distress in the pediatric ED. Children 7-17 years requiring a venipuncture in the pediatric ED were recruited. Participants were randomized to either a control group (standard care) or intervention group (standard of care + VR). Principal clinical outcome was the mean level of procedural pain, measured by the verbal numerical rating scale (VNRS). Distress was also measured using the Child Fear Scale (CFS) and the Procedure Behavior Check List (PBCL) and memory of pain using the VNRS. Side effects were documented. **Results:** A total of 63 patients were recruited. Results showed feasibility and acceptability of VR in the PED and overall high satisfaction levels (79% recruitment rate of eligible families, 90% rate of VR game completion, and overall high mean satisfaction levels). There was a significantly higher level of satisfaction among healthcare providers in the intervention group, and 93% of those were willing to use this technology again for the same procedure. Regarding clinical outcomes, no significant difference was observed between groups on procedural pain. Distress evaluated by proxy (10/40 vs 13.2/40, $p=0.007$) and memory of pain at 24 hours (2.4 vs 4.2, $p=0.027$) were significantly lower in the VR group. Venipuncture was successful on first attempt in 23/31 patients (74%) in the VR group and 15/30 (50%) patients in the control group ($p=0.039$). Five of the 31 patients (16%) in the VR group reported side effects. **Conclusion:** The addition of VR to standard care is feasible and acceptable for pain and distress management during venipunctures in the pediatric ED. There was no difference in

self-reported procedural pain between groups. Levels of procedural distress and memory of pain at 24 hours were lower in the VR group.

Keywords: pain management, pediatric, virtual reality

LO53

Emergency department visits for hyperglycemia: through the eyes of the patient

J. Yan, MD, MSc, D. Azzam, BSc, S. Liu, MD, MSc, T. Spaic, MD, MSc, M. Columbus, PhD, K. Van Aarsen, MSc, L. Shepherd, MD, MHPE, Western University, London Health Sciences Centre, London, ON

Introduction: Patients with poorly-controlled diabetes often visit the emergency department (ED) for treatment of hyperglycemia. While previous qualitative studies have examined the patient experience of diabetes as a chronic illness, there are no studies describing patients' perceptions of ED care for hyperglycemia. The objective of this study was to explore the patient experience regarding ED hyperglycemia visits, and to characterize perceived barriers to adequate glycemic control post-discharge. **Methods:** This study was conducted at a tertiary care academic centre in London, Ontario. A qualitative constructivist grounded theory methodology was used to understand the experience of adult patient partners who have had an ED hyperglycemia visit. Patient partners, purposively sampled to capture a breadth of age, sex, disease and presentation frequency were invited to participate in a semi-structured individual interview to probe their experiences. Sampling continued until a theoretical framework representing key experiences and expectations reached sufficiency. Data were collected and analyzed iteratively using a constant comparative approach. **Results:** 22 patients with type 1 or 2 diabetes were interviewed. Participants sought care in the ED over other options because of their concern of having a potentially life-threatening condition, advice from a healthcare provider or family member, or a perceived lack of convenient alternatives to the ED based on time and location. Participants' care expectations centred around symptom relief, glycemic control, reassurance and education, and seeking referral to specialist diabetes care post-discharge. Finally, perceived system barriers that challenged participants' glycemic control included affordability of medical supplies and medications, access to follow-up and, in some cases, the transition from pediatric to adult diabetes care. **Conclusion:** Patients with diabetes utilize the ED for a variety of urgent and emergent hyperglycemic concerns. In addition to providing excellent medical treatment, ED healthcare providers should consider patients' expectations when caring for those presenting with hyperglycemia. Future studies will focus on developing strategies to help patients navigate some of the barriers that exist within our current limited healthcare system, enhance follow-up care, and improve short- and long-term health outcomes.

Keywords: diabetes, hyperglycemia, patient experience

LO54

Emergency department prevalence of intracranial aneurysm on computed tomography angiography (EPIC-ACT)

B. Sheppard, MD, BSc, G. Beller, MD, BA, C. O'Rielly, BS, Charles Wong, MD, BHSc, University of Calgary, Calgary, AB

Introduction: Evidence is accumulating that a CT plus a CT angiogram (CTA) of the head and neck may be adequate to rule out subarachnoid haemorrhage (SAH) in patients with a thunderclap

headache, thus potentially negating the need for lumbar puncture. One of the most widely cited objections to this strategy is the fear of detecting "incidental asymptomatic aneurysms," lesions seen on angiography that are not in fact the cause of the patient's symptoms. Currently existing data on the background rate of aneurysms are based on cadaveric studies, invasive angiography, or MRI, and thus does not reflect the true rate of incidental aneurysms that would be detected using a CT plus CTA strategy. This study characterizes the rate of incidental aneurysms identified on CTA in an emergency department population. **Methods:** In this multicentre retrospective cohort study we analyzed the electronic medical records of all emergency department patients ≥ 18 years of age who underwent CTA of the head and neck over a two month period across four urban tertiary care emergency departments. Two independent reviewers evaluated the final radiology reports and extracted relevant data. The primary outcome of interest was the presence of incidental intracranial aneurysm, defined as a newly diagnosed aneurysm not associated with evidence of acute hemorrhage. Secondary outcomes included aneurysm location and size. **Results:** Of 739 charts meeting inclusion criteria, incidental intracranial aneurysms were detected in 21 cases or 2.85% (95% confidence interval, 1.77 - 4.32). An additional 20 aneurysms were identified but excluded from the analysis as they were previously known ($n=9$) or were associated with evidence of acute hemorrhage ($n=11$) and thus were not considered incidental. Of 21 patients with identified incidental aneurysms, 7 had multiple aneurysms. The most common aneurysm sites were internal carotid artery ($n=13$), middle cerebral artery ($n=6$) and anterior cerebral artery ($n=4$). The average size of incidental aneurysm was 4.1 mm. **Conclusion:** The rate of incidental intracranial aneurysm among emergency department patients undergoing CTA of the head and neck is lower than many previously described estimates obtained through invasive angiography and MRI studies. To our knowledge, this is the first study on the prevalence of incidental intracranial aneurysms in an emergency department specific population and may therefore help guide clinicians when considering using a CT plus CTA rule out strategy for patients presenting with acute headache suspicious for SAH. **Keywords:** aneurysm, angiography, subarachnoid

LO55

Comparison of the age-adjusted D-dimer, clinical probability-adjusted D-dimer, and Wells rule with D-dimer for diagnosing deep vein thrombosis in the emergency department. S. Sharif, MD, C. Kearon, PhD, MB, M. Eventov, MD, P. Sneath, MD, M. Li, MD, K. deWit, MBChB, MSc, McMaster University, Hamilton, ON

Introduction: Diagnosing deep vein thrombosis (DVT) is of critical importance because of its associated morbidity and mortality. Diagnosing DVT can be challenging in the Emergency Department (ED) due to inconsistent adherence to, and utilization of the Wells rule. Both the age-adjusted and clinical probability adjusted D-dimer have been shown to decrease ultrasound (US) utilization rates. We aimed to compare the safety and efficacy of the Wells score with D-dimer to the age-adjusted and clinical probability-adjusted D-dimer in Canadian ED patients tested for DVT. **Methods:** This was a health records review of ED patients investigated for DVT at two EDs over a two-year period. Inclusion criteria were ED physician ordered duplex ultrasonography or D-dimer for investigation of lower limb DVT. Patients under the age of 18 were excluded. DVT was considered to be present during

the ED visit if DVT was diagnosed on duplex ultrasonography and was treated for acute DVT, or if the patient was subsequently diagnosed with pulmonary embolism (PE) or DVT during the next 30 days. Trained researchers extracted anonymized data. The Wells D-dimer, age-adjusted D-dimer, and the clinical probability-adjusted D-dimer rules were applied retrospectively. The rate of duplex ultrasonography imaging and the false negative rate was calculated for each rule. **Results:** Between April 1st 2013 and March 31st 2015, there were 1,198 patients tested for DVT. Of the low and moderate clinical pretest probability patients (Wells score ≤ 2), only 436 had a D-Dimer test and were eligible for our analysis. The average age of the patients was 59, 56% were female, and 4% had a malignancy. 207/436 patients (47.4%, 95% CI 42.8-52.2%) would have had US imaging for DVT if the age-adjusted D-dimer rule was used. 214/436 patients (49.1%, 95% CI 44.4-53.8%) would have had imaging for DVT if the clinical probability-adjusted D-dimer was used. If the Wells rule was used with the standard D-dimer cutoff of 500, 241/436 patients (55.2%, 95% CI 50.6-59.9%) would have had imaging for DVT. The false-negative rate for the Wells rule was 1.5% (95% CI 0.5-4.4%). The false-negative rate for the age-adjusted D-dimer rule was 1.3% (95% CI 0.4-3.8%). The false-negative rate for the clinical-probability adjusted D-Dimer was 1.8% (95% CI 0.7-4.5%). **Conclusion:** In comparison with the approach of the Wells score and D-dimer, both the age-adjusted and clinical probability-adjusted D-dimer diagnostic strategies could reduce the proportion of patients who require US imaging.

Keywords: thrombosis

LO56

Rate of delirium recognition by nurses and physicians in a cohort of 1584 older emergency department patients: how many would have been sent home?

J. Lee, MD, MSc, University of Toronto, Toronto, ON

Introduction: Unrecognized delirium in the ED remains common despite a 3 fold mortality increase for those discharged home. But previous studies have not assessed delirium recognition rate in a multicenter study nor assessed the management plans of ED staff when they fail to recognize delirium. **Objectives:** To document 1) the rate of delirium recognition by nurses and MDs in a national sample and 2) the intended management plans for patients with unrecognized delirium. **Methods:** This is a planned sub-study of a randomized clinical trial at 5 EDs in 4 provinces conducted in English and French. We included people ≥ 65 years old. We excluded those with an ED stay < 4 hours, critical illness, visual impairment or from a nursing home. Research assistants (RAs) assessed delirium using the validated Confusion Assessment Method. RAs then asked ED nurses and physicians if the patient had delirium according to their clinical assessment. RAs also asked how confident they were that the patient could be safely discharged home using a 10 point Likert scale. We report proportions and 95% confidence intervals. RAs notified all ED staff of unrecognized CAM +ve patients prior to actual discharge for safety reasons. **Results:** We recruited 1584 older people; 1496 (92.5%) had complete data. Mean age was 76.5; 49% were female. Nurses performed 1465 delirium assessments. There were 76 CAM +ve patients in our sample (5.2%, 95% CI 4.2 to 6.5%). Nurses recognized delirium in 34/76 (44.7%, 95% CI: 33.3 to 56.6%). MDs assessed 20 CAM +ve patients and recognized the delirium in 10/20 (50.0%, 95% CI: 27.2 to 72.8%). Nurses felt that 11/42 patients with unrecognized delirium could be discharged (26.2% 95% CI: 13.9 to 42.0%). Their median confidence

in the safety of their plan was 7.0/10. MDs felt that 2/10 patients with unrecognized delirium could be discharged (20.0% 95% CI: 2.5 to 55.0%). Their median confidence in the safety of their plan was 7.5/10. **Conclusion:** Despite the potential Hawthorne effect raising initial delirium recognition rates above clinicians' usual practice outside of a study, delirium recognition by both nurses and MDs remains poor in a national sample of ED patients. We also showed that a significant number of these patients could have been discharged with unrecognized delirium. Further research to find novel ways to improve delirium recognition is needed.

Keywords: delirium, recognition

LO57

Pain associated with investigations and procedural interventions commonly administered in the emergency department in older adults: a prospective cohort study

L. Baril, MD, L. Baril, MD, E. Nguyen, L. Santerre, V. Émond, M. Émond, MD, MSc, S. Berthelot, MD, É. Mercier, MD, MSc, Université Laval, Québec, QC

Introduction: Acute pain is frequent among patients visiting the emergency department (ED). In addition to the acute discomfort, pain has been linked to adverse events and poorest outcomes in older adults. However, pain is frequently overlooked by emergency clinicians, particularly in older adults. Advanced age has been linked to poor recognition and under treatment of pain. The contribution of ED investigations and procedures to the patient's pain is unknown. This study aims to determine the intensity of the pain induced by the investigations and procedures commonly performed in the ED. **Methods:** In two EDs, a convenience sample of older adults (≥ 65 years old) with at least two investigations or procedures performed during their ED visit were eligible. Patients were excluded if they were hemodynamically unstable, in palliative care or not oriented in time and space. The pain intensity was assessed at bedside by a research assistant for the following investigations or procedures: blood sampling, intravenous catheter, electrocardiogram, X-rays, computed tomography, bedside ultrasound, urinary catheter, cervical collar and prehospital immobilization mattress. The predetermined sample size was 50 pain assessment per investigation or procedure. The pain intensity was assessed using a numerous rating scale (NRS) ranging from 0 (no pain) to 10 (most severe pain), for each investigation or procedure received. NRS results are presented using median (med) and interquartile range (IQR) and classified as followed: no pain (0), mild pain (1-3), moderate pain (4-6) and severe pain (7-10). **Results:** Between June 2018 and December 2019, 494 patients were screened of which 318 were finally included (exclusion: not oriented (n = 113), refusal (n = 27), palliative care (n = 34), other reasons (n = 12)). The mean age of included patients was 77.8 years old (standard deviation = 8.0), 54.4% were female and 78.6% were living in the community. Only 15 patients (4.7%) were known to have cognitive impairment or dementia and 23 patients (7.2%) were on regular or PRN opioid medication at home. The expected sample size of at least 50 pain score assessment per investigation or procedure was obtained for all interventions with the exception of urinary catheter (n = 23) and immobilization mattress (n = 35). For the other investigations or procedures, the number of pain assessment ranged between 51 (cervical collar) and 231 (blood sampling). All investigations and procedures were associated with a median pain score of 0 with the exception of blood sampling (n = 231, med NRS 1 (IQR 0;3)), intravenous catheter (n = 241, med NRS 1 (IQR 0;4)),

urinary catheter (n = 23, med NRS 4 (IQR 1;6)), cervical collar (n = 51, med NRS 5 (IQR 0;8)) immobilization mattress (n = 35, med NRS 3 (IQR 0;8)). Moderate or severe pain (NRS 4-10) was infrequently reported following most investigations or procedures with the exception of urinary catheter (60.8%), cervical collar (54.9%) and immobilization mattress (48.5%). Cervical collar induced severe pain in 41.8% of the patients. **Conclusion:** Most investigations and procedures commonly administered in the ED to older adults are associated with no pain or low intensity of pain. Severe pain is also infrequently induced by these interventions for most older adults. However, urinary catheter, cervical collar and immobilization mattress are associated with a higher intensity of pain and more than 40% of patients suffering from severe pain following the application of cervical collar. Considering the potential adverse effects of pain and the lack of evidence-based data to support the use of some interventions such as the cervical collar, the decision to use these interventions should be carefully weighted and could include a shared-decision making process. The generalizability of those findings to older adults with cognitive impairment is unknown. Future studies should focus on circumstances in which these procedures are beneficial to the patient to limit the unnecessary pain associated with their use.

Keywords: interventions, older adults, pain

LO58

Using volunteers to improve the experience of older patients in the emergency department

B. Ellis, MBChB, MSc, D. Melady, MD, MEd, N. Foster, MSc, S. Sinha, MD, PhD, V. Lau, BA, S. Saraga, S. McLeod, MSc, PhD, Saskatchewan Health Authority, College of Medicine, University of Saskatchewan, Saskatoon, SK

Introduction: The Maximizing Aging Using Volunteer Engagement in the ED (MAUVE + ED) program connects specially trained volunteers with older patients whose personal and social needs are not always met within the busy ED environment. The objective of this study was to describe the development and implementation of the MAUVE + ED program and the activities performed with older patients by its volunteers. **Methods:** The MAUVE + ED program was implemented in the ED (annual census 65,000) of a large academic tertiary hospital in Toronto, Ontario. Volunteers were trained to identify and approach older patients and others at greater risk for adverse outcomes, including poor patient experience, in the ED and invite such patients to participate in the program. The program is available to all patients >65 years, and those with confusion, patients who were alone, those with mobility issues, and patients with increased length of stay in the ED. Volunteers documented their activities after each patient encounter using a standardized paper-based data collection form. **Results:** Over the program's initial 6-month period, the MAUVE + ED volunteers reported a total of 896 encounters with 718 unique patients. The median (IQR) time a MAUVE volunteer spent with a patient was 10 (5, 20) minutes, with a range of 1 to 130 minutes. The median (IQR) number of patients seen per shift was 7 (6, 9), with a range of 1 to 16 patients per shift. The most common activities the volunteer assisted with were therapeutic activities/social visits (n = 859; 95.9%), orientation activities (n = 501; 55.9%), and hydration assistance (n = 231; 25.8%). The least common were mobility assistance (n = 36; 4.0%), and vision/hearing assistance (n = 13; 1.5%). **Conclusion:** Preliminary data suggest the MAUVE + ED volunteers were able to enrich the experience of older adults and their families/carers in the ED.

Keywords: older patients, patient experience, volunteers

LO59

Reliability of patient reported exposure and outcome data in a prospective cohort study of older adults presenting to the emergency department

N. Selvanayagam, MD, A. Soomro, BSc, C. Varner, MD, MSc, S. McLeod, MSc, N. Clayton, K. de Wit, MBChB, MD, MSc, McMaster University, Hamilton, ON

Introduction: Participant interviews are often considered the 'gold standard' for measuring outcomes in diagnostic and prognostic studies. Participant exposure data are frequently collected during study interviews, but the reliability of this information often remains unknown. The objective of this study was to compare patient-reported medication exposures and outcomes to data extracted from electronic medical records (EMRs) to determine reliability. **Methods:** This was a secondary data analysis from a prospective observational cohort study enrolling older (≥ 65 years) patients who presented to one of three emergency departments after a fall. After patients had consented to participate in the study, they were asked about their use of antiplatelet and anticoagulation medications (exposures of interest). During follow up, participants were asked if a physician had told them they had bleeding in their head (diagnosis of intracranial hemorrhage). Patient-reported responses were compared to data extracted from a structured EMR review. Trained research assistants extracted medication exposure and outcome data from the hospital EMRs in duplicate for all visits to any hospital within 42 days. Inter-rater agreement was estimated using Cohen's kappa (K) statistics with 95% confidence intervals (CIs). **Results:** 1275 patients completed study interviews. 1163 (91%) responded to questioning about antiplatelet use and 1159 (91%) to anticoagulant use. Exact agreement between patient reported antiplatelet use compared to EMR review was 77%, with $K = 0.50$ (95% CI: 0.44 to 0.55). For anticoagulation use, exact agreement was 87%, with $K = 0.68$ (95% CI: 0.63 to 0.72). 986 (78%) patients had a follow up interview after 42 days. Exact agreement between patient reported intracranial bleeding and EMR review was 95%, with $K = 0.30$ (95% CI: 0.15 to 0.45). Using the EMR review as the reference standard, the sensitivity and specificity of patient reported intracranial bleeding was 34% (95% CI: 20 to 52%) and 97% (95% CI: 96 to 98%), respectively. **Conclusion:** In this population of older adults who presented to the ED after a fall, patient reported use of antiplatelet and anticoagulant medications was not a reliable method to identify medication use. Patients who were diagnosed with intracranial bleeding were particularly poor at reporting this diagnosis.

Keywords: intracranial bleeding, measurement, patient-reported

LO60

Frailty and associated prognosis among older emergency department patients with suspected infection – a prospective, observational cohort study

S. Fernando, MD, MSc, K. Guo, BSc, M. Lukasik, MSc, B. Rochweg, MD, MSc, D. Cook, MD, MSc, K. Kyremanteng, MD, MHA, J. Perry, MD, MSc, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Prognostication and disposition among older Emergency Department (ED) patients with suspected infection remains challenging. Frailty is increasingly recognized as a predictor of poor prognosis among critically ill patients, however its association with

clinical outcomes among older ED patients with suspected infection is unknown. **Methods:** We conducted a multicentre prospective cohort study at two tertiary care EDs. We included older ED patients (≥ 75 years) presenting with suspected infection. Frailty at baseline (prior to index illness) was explicitly measured for all patients by the treating physicians using the Clinical Frailty Scale (CFS). We defined frailty as a CFS 5-8. The primary outcome was 30-day mortality. We used multivariable logistic regression to adjust for known confounders. We also compared the prognostic accuracy of frailty against the Systemic Inflammatory Response Syndrome (SIRS) and Quick Sequential Organ Failure Assessment (qSOFA) criteria. **Results:** We enrolled 203 patients, of whom 117 (57.6%) were frail. Frail patients were more likely to develop septic shock (adjusted odds ratio [aOR]: 1.83, 95% confidence interval [CI]: 1.08-2.51) and more likely to die within 30 days of ED presentation (aOR 2.05, 95% CI: 1.02-5.24). Sensitivity for mortality was highest among the CFS (73.1%, 95% CI: 52.2-88.4), as compared to SIRS ≥ 2 (65.4%, 95% CI: 44.3-82.8) or qSOFA ≥ 2 (38.4, 95% CI: 20.2-59.4). **Conclusion:** Frailty is a highly prevalent prognostic factor that can be used to risk-stratify older ED patients with suspected infection. ED clinicians should consider screening for frailty in order to optimize disposition in this population.

Keywords: frailty, geriatrics, sepsis

LO61

A modified Delphi study to identify trauma care modifiers for older adults

K. Yadav, MD, MSc, V. Boucher, MSc, N. Le Sage, MD, PhD, C. Malo, MD, MSc, E. Mercier, MD, MSc, P. Voyer, PhD, RN, J. Clement, MD, M. Emond, MD, MSc, University of Ottawa / The Ottawa Hospital, Ottawa, ON

Introduction: Older (age ≥ 65 years) trauma patients suffer increased morbidity and mortality. This is due to under-triage of older trauma victims, resulting in lack of transfer to a trauma centre or failure to activate the trauma team. There are currently no Canadian guidelines for the management of older trauma patients. The objective of this study was to identify modifiers to the prehospital and emergency department (ED) phases of major trauma care for older adults based on expert consensus. **Methods:** We conducted a modified Delphi study to assess senior-friendly major trauma care modifiers based on national expert consensus. The panel consisted of 24 trauma care providers across Canada, including medical directors, paramedics, emergency physicians, emergency nurses, trauma surgeons and trauma administrators. Following a literature review, we developed an online Delphi survey consisting of 16 trauma care modifiers. Three online survey rounds were distributed and panelists were asked to score items on a 9-point Likert scale. The following predetermined thresholds were used: appropriate (median score 7-9, without disagreement); inappropriate (median score 1-3; without disagreement), and uncertain (any median score with disagreement). The disagreement index (DI) is a method for measuring consensus within groups. Agreement was defined a priori as a DI score < 1 . **Results:** There was a 100% response rate for all survey rounds. Three new trauma care modifiers were suggested by panelists. Of 19 trauma care modifiers, the expert panel achieved consensus agreement for 17 items. The prehospital modifier with the strongest agreement to transfer to a trauma centre was a respiratory rate < 10 or > 20 breaths/minute or needing ventilatory support (DI = 0.24). The ED modifier with the strongest level

of agreement was obtaining a 12-lead electrocardiogram following the primary and secondary survey for all older adults (DI=0.01). Two trauma care modifiers failed to reach consensus agreement: transporting older patients with ground level falls to a trauma centre and activating the trauma team based solely on an age ≥ 65 years.

Conclusion: Using a modified Delphi process, an expert panel agreed upon 17 trauma care modifiers for older adults in the prehospital and ED phases of care. These modifiers may improve the delivery of senior-friendly trauma care and should be considered when developing local and national trauma guidelines.

Keywords: delphi, geriatrics, trauma

LO62

Cannabis-induced psychotic disorder at a Canadian tertiary care emergency department

K. Skoblenick, MD, MSc, PhD, A. Rumley, MD, MSc, A. Gauri, MSc, M. Marsh-Joyal, MD, University of Alberta, Edmonton, AB

Introduction: Acute psychosis is a disruptive change in mental state that requires the mobilization of significant resources for its immediate treatment and ongoing management in the emergency department (ED). Cannabis-induced psychotic disorder (CIP) is one potential cause; however, the diagnosis may be overlooked due to limited understanding of the etiology of CIP. **Methods:** This study employed a retrospective cohort analysis of all CIP cases admitted from a tertiary care ED in Edmonton, Alberta between 10/2016 and 10/2018 – the month cannabis was legalized in Canada. Charts were identified based on a most responsible diagnosis of CIP, as defined by ICD-10 code F12.5. Two reviewers abstracted data using a standardized form, which was entered into a database; 10% of charts were analyzed by both reviewers to examine inter-rater reliability. Patients were excluded if there was any documentation of methamphetamine use within the week prior to presentation. Outcomes included management, symptom profile, and length of stay. **Results:** In total there were 44 cases of CIP identified in 40 unique patients during the two-year period. The largest age group of patients ($n=14$, 35%) were between 15-20 years old and the median length of admission was 6 days. A minority of patients ($n=13$, 32.5%) had a previous psychiatric diagnosis. A distinct clinical picture evolved during the summation of patient symptoms in the ED with 65% of patients ($n=26$) exhibiting persecutory delusions and 52.5% endorsing auditory hallucinations ($n=21$). Only four patients were found to have visual hallucinations, three of which also had auditory hallucinations. Most patients ($n=34$, 85%) were treated with an antipsychotic medication in the ED and during their time as inpatients, but only 70% of patients were prescribed an antipsychotic medication at the time of discharge ($n=28$). **Conclusion:** This study is the first of its kind describing a cohort of patients with CIP in a Canadian ED setting. The patients presenting to the ED who would later be diagnosed CIP were more likely to be 15-20 years old, experiencing persecutory delusions, and unlikely to be experiencing isolated visual hallucinations. With the recent legalization of cannabis in Canada, further prospective research is required to determine any changes in the characteristics, incidence, and prevalence of CIP, as well as data from other centers to look for any regional differences in the presentation and management of CIP.

Keywords: cannabis, psychosis, substance-induced psychosis

LO63

Evaluation of epinephrine secondary effects in a Canadian emergency department anaphylaxis adult cohort

S. Gabrielli, MSc, M. Ben-Shoshan, MD, MSc, A. Lachance, MD, M. Rhéaume, MD, L. Londei-Leduc, MD, R. Goldman, MD, E. Chan, MD, J. Upton, MD, MPH, E. Hochstadter, MD, A. Bretholz, MD, A. O'Keefe, MD, D. Chu, MD, PhD, J. Morris, MD, MSc, McGill University Health Centre, Montreal, QC

Introduction: There are few large-scale studies assessing the true risk of epinephrine use during anaphylaxis in adults. We aimed to assess the demographics, clinical characteristics, and secondary effects of epinephrine treatment and to determine factors associated with major and minor secondary effects associated with epinephrine use among adults with anaphylaxis. **Methods:** From May 2012 to February 2018, adults presenting to the Hôpital du Sacré-Coeur de Montréal (HSCM) emergency department (ED) with anaphylaxis were recruited prospectively as part of the Cross-Canada Anaphylaxis Registry (C-CARE). Missed cases were identified through a previously validated algorithm. Data were collected on demographics, clinical characteristics, and management of anaphylaxis using a structured chart review. Multivariate logistic regression models were compared to estimate factors associated with side effects of epinephrine administration. **Results:** Over a 6-year period, 402 adult patients presented to the ED at HSCM with anaphylaxis. The median age was 38 years (Interquartile Range [IQR]: 27, 52) and 40.4% were males. The main trigger for anaphylaxis was food (53.0%). A total of 286 patients (71.1%) received epinephrine treatment, of which 23.9% were treated in the pre-hospital setting, 47.0% received treatment in the ED, and 5.0% received epinephrine in both settings. Among patients treated with epinephrine, major secondary effects were rare (1.4% of patients), including new changes to electrocardiogram, arrhythmia, and neurological symptoms. Minor secondary effects due to epinephrine were reported in 50.0% of patients, mainly inappropriate sinus tachycardia (defined as a rate over 100 beats/minute in 30.1%). Major cardiovascular secondary effects were associated with regular use of beta-blockers (aOR 1.10 [95%CI, 1.02, 1.18]), regular use of ACE-inhibitors (aOR 1.16 [95%CI, 1.07, 1.27]), and receiving more than two doses of epinephrine (aOR 1.09 [95%CI, 1.00, 1.18]). The model was adjusted for age, history of ischemic heart disease, trigger of anaphylaxis, presence of asthma, sex, and reaction severity. Inappropriate sinus tachycardia was more likely in females (aOR 1.18 [95%CI, 1.04, 1.33]) and palpitations, tremors, and psychomotor agitation were more likely in females (aOR 1.09 [95%CI, 1.00, 1.19]) and among those receiving more than two doses of epinephrine (aOR 1.49 [95%CI, 1.14, 1.96]). The models were adjusted for age, regular use of medications, history of ischemic heart disease, triggers of anaphylaxis, presence of asthma, reaction severity, and IV administration of epinephrine. **Conclusion:** The low rate of occurrence of major secondary effects of epinephrine in the treatment of anaphylaxis in our study demonstrates the overall safety of epinephrine use.

Keywords: anaphylaxis, epinephrine, secondary effects

LO64

A systematic review of interventions to influence opioid prescribing from the emergency department

M. Tran, BHSc, C. Thompson, MSc, C. Walsh, MLIS, S. McLeod, MSc, B. Borgundvaag, MD, PhD, University of Toronto, Toronto, ON

Introduction: The opioid crisis has reached epidemic levels in Canada, driven in large part by prescription drug use. Emergency

physicians are frequent prescribers of opioids; therefore, the emergency department (ED) represents an important setting for potential intervention to encourage rational and safe prescribing. The objective of this study was to systematically review the literature on interventions aimed to influence opioid prescribing in the ED. **Methods:** Electronic searches of Medline and Cochrane were conducted and reference lists were hand-searched. All quantitative studies published in English from 2009 to 2019 were eligible for inclusion. Two reviewers independently screened the search output to identify potentially eligible studies, the full texts of which were retrieved and assessed for inclusion. Outcomes of interest included opioid prescribing rate (proportion of ED visits resulting in an opioid prescription at discharge), morphine milligram equivalents per prescription and variability among prescribers. **Results:** The search strategy yielded 797 potentially relevant citations. After eliminating duplicate citations and studies that did not meet eligibility criteria, 34 potentially relevant studies were retrieved in full text. Of these, 28 studies were included in the review. The majority (26, 92.9%) of studies were based in the United States and two (7.1%) were from Australia. Four (14.3%) were randomized controlled trials. The interventions were classified into six categories: prescribing guidelines ($n = 10$), regulation/rescheduling of opioids ($n = 6$), prescribing data transparency ($n = 4$), education ($n = 4$), care coordination ($n = 3$), and electronic medical record changes ($n = 1$). The majority of interventions reduced the opioid prescribing rate from the ED (21/28, 75.0%), although regulation/rescheduling of opioids had mixed effectiveness, with 3/6 (50%) studies reporting a small increase in the opioid prescribing rate post-intervention. Education had small yet consistent effects on reducing the opioid prescribing rate. **Conclusion:** A variety of interventions have attempted to improve opioid prescribing from the ED. These interventions include prescribing guidelines, regulation/rescheduling, data transparency, education, care coordination, and electronic medical record changes. The majority of interventions reduced the opioid prescribing rate; however, regulation/rescheduling of opioids demonstrated mixed effectiveness.

Keywords: intervention, opioid prescribing, systematic review

LO65

Assessing opioid-prescribing patterns for low back pain patients before and after the implementation of clinician performance indicators in the emergency department

F. Yang, MD, J. Dreyer, MDCM, K. Van Aarsen, London Health Sciences, London, ON

Introduction: Canada is in the midst of an opioid crisis. The number of apparent opioid-related deaths between January and March 2018 increased by 44% compared to the same period in 2016. The increasing use of prescription opioids and higher doses of opioids can lead to opioid addiction, toxicity and even death. Opioids are commonly prescribed for low back pain management in the ED, but the variability in opioid-prescribing patterns suggested an opportunity for improvement. Our centre implemented Clinician Performance Indicators (CPI) in 2015. CPIs were reported to each ED physician every 3 months and included the percentage of patients who were prescribed opioids. The intent was to raise awareness of opioid-prescribing patterns at our institution. Therefore, we evaluated opioid-prescribing patterns for patients with low back pain (LBP) before and after the CPI implementation. **Methods:** Data were obtained retrospectively for patients discharged from the ED from July 2015 to December 2018 with LBP-associated ICD 10 codes. We excluded admitted

patients, those with specialist consultations, and patients who left without being seen. The primary outcome was opioid prescribing patterns for patients with LBP before and after CPI implementation. We performed a descriptive analysis of the data and compared the prescribing rates pre-implementation (July-Dec 2015) to post-implementation (July-Dec 2016) following a 6-month wash-out period. Moreover, we analyzed opioid-prescribing patterns over an extended period until December 2018. **Results:** After the exclusion criteria were applied, 8993 patients were included in the analysis. 53.5% were female and the mean (SD) age was 48.3 (19.78). During the three years of the study period, the percentage of LBP patients who received opioids showed a decreasing trend. Comparison of the pre and post CPI implementation periods showed a decrease in opioid prescriptions (42.0% vs 35.5%, 95%CI 2.9% to 10.2%). There was variation in opioids prescribed at our institution, the most common being hydromorphone (29.9%), followed by acetaminophen-oxydione (24.2%) and acetaminophen-tramadol (20.0%). **Conclusion:** The implementation of CPIs positively impacted physicians' opioid-prescribing patterns for patients presenting with LBPs at our institution. Future studies are required to further improve the effectiveness of CPIs in influencing opioid-prescribing patterns.

Keywords: clinician performance indicator, low back pain, opioid

LO66

Strengthening team communication may decrease medico-legal risk for physicians in the emergency department

A. MacIntyre, Q. Yang, MSc, R. De Gorter, BSc, S. Lee, MD, MHSc (Ed), L. Calder, MD, MSc, The Canadian Medical Protective Association, Ottawa, ON

Introduction: In a busy emergency department (ED), effective communication is integral to the provision of safe medical care. Physicians working in the ED interact with multiple team members including patients, allied healthcare professionals and other physicians, who all need to understand their verbal and written instructions. Our study's objective was to identify and describe communication problems occurring in the ED setting, and how these problems contributed to patient safety events and increased medico-legal risk for physicians. **Methods:** The Canadian Medical Protective Association (CMPA) is a not-for-profit, medico-legal organization which represented over 97,000 physicians at the time of this study. We conducted a retrospective descriptive analysis where we extracted five years (2013-2017) of CMPA data describing closed medico-legal cases occurring in the ED involving physicians (any specialty) who experienced complaints due to communication issues. We then applied an internal contributing factor framework to identify data themes. Data were summarized using descriptive statistics. **Results:** We identified 517 eligible cases involving 521 patients (some cases involved >1 patient). We found that 99.8% (520/521) of patients experienced some form of healthcare-related harm in the ED. Specifically, there was poor communication between: the physician and patient or patient's family (202/517, 39.1%); two or more physicians (79/517, 15.3%), and physicians and other healthcare providers (55/517, 10.6%). Inadequate documentation was observed in more than half of the cases (324/517, 62.7%) and poor team communication affected physicians' decision making process (326/517, 63%) in areas such as deficient assessments, inadequate investigations, failure or delay to attend to the patient, and disposition decisions. **Conclusion:** Team communication issues are prevalent among physician medico-legal

cases occurring in the ED. Efforts to strengthen communication skills may enhance patient safety and reduce medico-legal risk.

Keywords: communication, emergency department, patient safety

LO67

Alcohol-related emergency department visits by youth aged 12-24: demographics and resource utilization at Kingston Health Sciences Centre

H. Murray, MD, MSc, L. Erlikhman, BA, T. Graham, BSc, M. Walker, PhD, Queen's University, Kingston, ON

Introduction: Recent evidence shows an increase in alcohol-related emergency department (ED) visits among youth. We sought to quantify the impact of ED visits (type and frequency, patient characteristics and resource use) related to alcohol in our centre. **Methods:** This was a chart review of patients aged 12-24 with alcohol-related ED visits between Sept 2013-Aug 2017. The National Ambulatory Care Reporting System (NACRS) database was searched for visits alcohol related ICD-10 codes. The Canadian Hospital Injury Reporting and Prevention Program (CHIRPP) database was also searched using the keyword alcohol. Duplicate visits were removed. Visits were excluded if patients had a history of psychosis, were held in the ED for psychiatric assessment, were homeless, were inmates from a correctional institute, if alcohol use was not mentioned and for complaints of sexual assault/intimate partner violence. Data was abstracted by two reviewers using a standard form with predetermined variables. Differences were resolved with third party adjudication. Interrater reliability of the reviewers was assessed with Kappa scores through duplicate review of 10% of randomly selected charts. A further 10% were assessed by a 3rd reviewer for extraction accuracy. **Results:** 3,256 ED visits were identified with 777 removed via predefined exclusion criteria. 2,479 visits were reviewed with a male predominance (54.3%). More than half of all patients (50.9%) arrived by ambulance. Assigned CTAS levels were Resuscitation: 1% Emergent: 9.9% Urgent: 48.2% Less Urgent: 35.7% Non-Urgent: 4.2% (missing 1%). The median LOS was 2.9 hrs (IQR 1.8-4.6). All visits were sub-classified into mutually exclusive categories: injury (51.8%), acute intoxication (45.1%) and mental health issue (3.2%). Males were more likely to present with injury (62.4% vs 42.6%, $p < 0.01$). Females were more likely to present with acute intoxication (53.3% vs 46.7%, $p < 0.01$) and mental health issues (59.5% vs 40.5%, $P = 0.01$). ED resource use was notable: 483 (19.4%) had imaging tests and 1216 (49.1%) had some medical intervention (blood test, fluids or medication). 57 (2.3%) patients were admitted and there was one death from an alcohol related MVC. **Conclusion:** Alcohol-related ED visits by youth are common in our centre and utilize substantial prehospital and in-hospital resources. Identification of effective harm reduction strategies should be a research priority.

Keywords: acute alcohol intoxication, substance use/misuse, youth

LO68

Kelowna emergency department buprenorphine/naloxone for opioid use disorder: a program evaluation study

M. Jones, MD, MPH, B. Bailey, MD, MPH, W. Nevers, BSc, PharmD, M. Hill, MD, L. Lappalainen, MD, D. Williams, MD, University of Toronto, Toronto, ON

Introduction: Emergency department (ED) buprenorphine/naloxone inductions for opioid use disorder are an effective and safe way to initiate addictions care in the ED. Kelowna General Hospital's ED buprenorphine/naloxone (KEDSS) program was implemented

in September 2018 in order to respond to a community need for accessible and evidence-based addictions care. The objective of our program evaluation study was to examine the implementation of the first five months of the KEDSS program through evaluating patient characteristics and service outcomes. **Methods:** The KEDSS treatment pathway consists of a standardized protocol (pre-printed order set) to facilitate buprenorphine/naloxone induction and stabilization in the acute care setting (ED and inpatient wards) at Kelowna General Hospital, a community academic hospital. All patients referred to the outpatient addictions clinic via the order set during September 2018-January 2019 (the first 5 months) were included in the study population. A retrospective descriptive chart review was completed. Outcome measures included population characteristics (sociodemographic information, clinical characteristics) and service outcomes (number of patients initiated, patient follow-up). Descriptive statistics and bivariate analyses using t-tests or Pearson's χ^2 statistic, as appropriate, were conducted to compare the ED-initiated group with the inpatient-initiated group. **Results:** During the first five months of the KEDSS program, a total of 35 patients (26% female, mean age 36.6 years, 54% homeless) were started on the treatment pathway, 16 (46%) in the ED. Compared to the inpatient-initiated group, the ED-initiated group were less likely to have psychiatric comorbidities (ED 1.0 vs. inpatient 1.5, $p = 0.002$), require methadone or sustained-release oral morphine (ED 13% vs. inpatient 37%, $p = 0.048$), and have attended follow-up (ED 56% vs. inpatient 84%, $p = 0.004$). **Conclusion:** This study provides a preliminary look at a new opioid agonist therapy (OAT) treatment pathway (KEDSS) at Kelowna General Hospital, and provides insight into the population that is accessing the program. We found that the majority of patients who are started on buprenorphine/naloxone in the ED are seen in follow-up at the addictions clinic. Future work will examine ongoing follow-up and OAT adherence rates in the study population to quantify the program's impact on improving access to addictions treatment within this community hospital setting.

Keywords: program evaluation, addictions, buprenorphine-naloxone

LO69

Haloperidol versus ondansetron for hyperemesis due to cannabis (HaVOC): a randomized, controlled clinical trial

A. Ruberto, MD, M. Sivilotti, MD, MSc, S. Forrester, MD, A. Hall, MD, MMed, F. Crawford, BSc, MD, A. Day, MSc, Queen's University at Kingston, Kingston, ON

Introduction: One of the most common adverse effects of habitual cannabis use is hyperemesis—recurrent bouts of protracted vomiting, retching and abdominal pain superimposed on a baseline of daily nausea and anorexia. Largely anecdotal evidence supports the use of haloperidol, benzodiazepines or topical capsaicin over traditional antiemetics, yet little is known about the cause or optimal treatment of this newly recognized disorder. We report the results of one of the first clinical trials on so-called cannabis hyperemesis syndrome (NCT03056482). **Methods:** We approached adults with a working diagnosis of hyperemesis due to cannabis, provided they had ongoing emesis for >2 hours, a cyclic pattern of 3+ episodes in the last 2 years, and near daily use of cannabis by inhalation. We excluded those who were pregnant, deemed unreliable, or using opioids. Subjects provided written consent to be randomized during the index or any subsequent visit to either haloperidol (with a nested randomization to either 0.05 mg/kg or 0.1 mg/kg) or ondansetron 8 mg intravenously in a quadruple-blind fashion, and to be followed for 7 days. The primary

outcome was the average reduction from baseline in abdominal pain and nausea (each measured on a 10-cm VAS) at 2 hours. While the original trial design allowed for crossover, the primary analysis used only the first treatment period since fewer than the prespecified threshold of 20% of subjects crossed over. **Results:** We enrolled 33 subjects, of whom 30 (16 men, 29+/-11 years old, using 1.5+/-0.9 g/day since age 19+/-2 years) were treated at least once (haloperidol 13, ondansetron 17). Haloperidol at either dose was superior to ondansetron (difference 2.3 cm [95%CI 0.6, 4.0]; $p = 0.01$), with similar improvements in both pain and nausea, as well as less rescue antiemetics (27% vs 61%; $p = 0.04$), and shorter time to ED departure (3.1+/-1.7 vs 5.6+/-4.5 hours; $p = 0.03$ Wilcoxon rank sum). There were two (haloperidol) vs six (ondansetron) return visits for ongoing nausea/vomiting, as well as two return visits for acute dystonia, both in the higher dose haloperidol group. **Conclusion:** Haloperidol is superior to ondansetron for the acute symptomatic treatment of patients with ongoing hyperemesis attributed to habitual cannabis use. The efficacy of this agent over ondansetron provides insight into the mechanism of this new disorder, now almost a daily diagnosis in many Canadian emergency departments.

Keywords: cannabis, cannabis hyperemesis syndrome, hyperemesis

LO70

Emergency department use and migration patterns of people experiencing homelessness

R. Hossain, MD, I. Burcul, BSc, J. Dai, BSc, R. Hossain, MD, S. Strobel, MD, MA, Z. Ma, BHSc, S. Jamani, University of Toronto, Toronto, ON

Introduction: Understanding how homeless patients interact with healthcare systems can be challenging. The nature of the population is such that identifying and following these persons can be severely limited by data. Previous studies have used survey data which relies on self-reporting and selected samples such as those persons admitted to homeless shelters (Gray et al. 2011). Other studies have been able to leverage administrative data but only for selected local geographic areas (Somers et al. 2016, Tompkins et al 2003). It is possible that the current literature has not examined a large proportion of homeless persons and their healthcare use. This is concerning because this population can have higher associated medical costs and greater medical resource utilization especially with regards to psychiatric and emergency department (ED) resources (Tulloch et al. 2012, Forchuk et al, 2015). **Methods:** Administrative health data (2010 to 2017) is used to analyze ambulatory care records for homeless individuals in Ontario, Canada. Uniquely, we are able to use ED contacts as a way of identifying homeless migrations from region to region within Ontario. Using a network analysis we identify high impact ED nodes and discrete hospital networks where homeless patients congregate. We are also able to more fully characterize this population's demographics, health issues, and disposition from the ED. **Results:** We provide a more complete understanding of migration patterns for homeless individuals, across Ontario and their concomitant ED use and hospitalizations. The three most frequented regions in Ontario ($n = 640,897$) were Toronto Central (35.96%), Hamilton Niagara Halimand Brant (8.9%) and Champlain (7.84%). In subsequent visits, the majority of patients presented to different EDs, however a subgroup who always presented to the same site was present. Over the 7 year period, migration between visits occurred most often between urban areas, and increased as a whole. **Conclusion:** The results of the study allow for the enhancement care coordination

for vulnerable populations and enhance the availability and delivery of services for sub-groups of homelessness whose care needs may differ based on migration patterns. Services can be coordinated between jurisdictions for homeless individuals, and appropriate referrals can be made across the health care system. Further evidence is provided for a novel method of mapping migration among the homeless and its associations and effects on ED use.

Keywords: data, homelessness, migration

LO71

The effect of boarding time in ED on length of stay for psychiatric patients

D. Lane, PhD, E. Lang, MD, L. Roberts, MD, MSc, University of Saskatchewan, Saskatoon, SK

Introduction: The Emergency Departments (ED) is a gateway to the health care system for many psychiatric patients. As a consequence of hospital administrative factors and overcrowding, admitted psychiatric patients are often boarded in the ED while waiting for an inpatient bed. There is currently a lack of evidence to quantify the effect that ED boarding has on psychiatric patients. The primary objective of this study is to determine whether a patient's length of stay is related to longer ED boarding time. **Methods:** This study is a retrospective cohort using data from an administrative source, which was obtained from patient records captured in the Sunrise Clinical Manager EMR used across Calgary, Alberta EDs from 2014-2018. A hierarchical Bayesian regression analysis was used to model the several patient-level and hospital-level factors. The mean and variance was defined by the exposure of interest, namely hours in the Emergency Department after admission to psychiatry unit expressed as a continuous variable. An interaction between this exposure and patient-level confounders was used to model the changing effect of a patient's severity in the ED on their boarding time. **Results:** The median boarding time for patients in our study was 6.6 hours (standard deviation 17.3), while the average was 13.6 hours. Patients who were boarded for greater than 6 hours more frequently required an anti-psychotic (37% vs 11%; SMD 0.651), sedative (52% vs 29%; SMD 0.483) or restraints (18% vs. 14%; SMD 0.102). In crude analysis there was no difference in median length of stay for patients that were boarding more than 6 hours compared to those boarded for less than 6 hours (8 days vs 9 days; SMD 0.012). The rate ratio for length of stay is 1.05 with 95% posterior interval 1.04 - 1.06 for each 24 hour increase in boarding time. This means that for each 1 day worth of boarding time, the length of stay (in days) increases 1.05 times (or 0.05 days/day boarding time). **Conclusion:** Boarding time is associated with a small but absolute increase in length of stay for psychiatric patients. Decreasing boarding time could have ripple effects for ED efficiency and overall patient outcomes.

Keywords: boarding time, length of stay, psychiatry

LO72

Spotting potential opportunities for teachable moments

H. Alrimawi, MB BCh, S. Sample, BHSc, MD, T. Chan, MD, MHPE, McMaster University, Hamilton, ON

Introduction: With the transition of Emergency Medicine into competency based medical education (CBME), entrustable professional activities (EPAs) are used to evaluate residents on performed clinical duties. This study aimed to determine if implementing a case-based orientation, designed to increase recognition of available EPAs, into CBME orientation would help residents increase the number of

EPAs completed. **Methods:** We designed an intervention consisting of clinical cases that were reviewed by national EPA experts who identified which EPAs could be assessed from each case. A case-based session was incorporated into the 2019 CBME orientation for The McMaster Emergency Medicine Program. Postgraduate Year (PGY)1 residents read the cases and discussed which EPAs could be obtained with PGY2/faculty facilitators. The number of EPAs completed in the first two blocks of PGY1 was determined from local program data and Student's t-test was used to compare averages between cohorts. **Results:** We analyzed data from 22 trainees (7 in 2017, 8 in 2018, and 7 in 2019). In the first two blocks of PGY1, the intervention cohort (2019) had a significantly higher average number of EPAs completed per trainee (47.4 [SD 11.8]) than the historical cohort (25.3 [SD 6.7]) ($p < 0.001$) (Cohen's $d = 2.3$). No significant difference existed in the number EPAs obtained between the 2017/2018 cohorts, with averages of 24.3 [SD 6.8] and 26.1 [SD 7.0] per trainee respectively ($p = 0.6$). **Conclusion:** Implementation of a case-based orientation led by CBME-experienced facilitators nearly doubled the EPA acquisition rate of our PGY1s. The consistent EPA acquisition by the 2017/2018 cohorts suggest that the post-intervention increase was not solely due to developed familiarity with the CBME curriculum.

Keywords: competency based medical education, entrustable professional activity, orientation

LO73

Are women under-represented in emergency medicine residency programs across Canada?

K. Lien, MD, L. Yau, MD, K. Van Aarsen, MSc, A. Wakabayashi, MSc, M. Bhimani, MD, MSc, Western University, London, ON

Introduction: 2018 data from the Canadian Medical Association website shows that of practicing emergency physicians country-wide, only 31% were female. While there are some studies that examine the number and proportion of Canadian female applicants applying to surgical specialties, there are very few studies that are specific to emergency medicine (EM), and none that are Canadian in scope. Given the changing gender ratio of graduating medical students in Canada, the primary objective of this study is to assess the mean proportion and trends in proportion of females who applied and matched to English-language Canadian EM programs including Canadian College of Family Physicians emergency medicine certificate (CCFP-EM) and Fellow of the Royal College of Physicians of Canada emergency medicine (FRCPC-EM), family medicine (CCFP) programs, and all specialties combined. **Methods:** A retrospective data analysis on residency match results from 2013-2019 inclusively was performed. Data was accessed through a freedom of information request from the Canadian resident matching service (CaRMS). The mean proportions and trends in the proportions of females applying and matching to CCFP-EM, FRCPC-EM, CCFP, and all specialties were computed. Cochran-Armitage trend of test was used for analysis. **Results:** From 2013-2019, the mean (SD) percentage of females who applied and matched respectively were as follows: CCFP-EM [44.4 (3.5);46.0(4.5)]; FRCPC-EM [41.3(4.1);44.0 (4.5)], CCFP [56.5 (1.3);61.0(1.9)], all specialties [54.0(1.1);55.5(0.9)]. There was a significant increase in the proportion of female applying to the FRCPC-EM ($p < 0.0001$), CCFP ($p = 0.0002$), and all disciplines ($p = 0.0013$). There was no significant change in the proportion of females applying for the CCFP-EM program ($p = 0.6435$). **Conclusion:** Our study shows that there is an increasing trend in the

percentage of female applicants in all programs except the CCFP-EM program, where it remained statistically the same over time. There was a consistent percentage of applied versus matched female applicants over time for both CCFP-EM and FRCPC-EM programs. However, the percentage of females applying or matching to both CCFP-EM and FRCPC-EM programs remained less than 50%. Further research could focus on evaluating reasons for program choice, in order to further increase the percentage of female medical students and residents applying and matching to both emergency medicine programs.

Keywords: Canadian resident matching service, gender, residency

LO75

Does the Ottawa emergency department shift observation tool give more useful information – assessing the utility of transitioning to a novel, entrustability based assessment tool in the emergency department

S. Dewhirst, MD, W. Cheung, MD, MMed, N. Dudek, MD, T. Wood, PhD, J. Frank, MD, MA(Ed), University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: The Ottawa Emergency Department Shift Observation Tool (O-EDShOT) was recently developed to assess a resident's ability to safely run an ED shift and is supported by multiple sources of validity evidence. The O-EDShOT uses entrustability scales, which reflect the degree of supervision required for a given task. It was found to discriminate between learners of different levels, and to differentiate between residents who were rated as able to safely run the shift and those who were not. In June 2018 we replaced norm-based daily encounter cards (DECs) with the O-EDShOT. With the ideal assessment tool, most of the score variability would be explained by variability in learners' performances. In reality, however, much of the observed variability is explained by other factors. The purpose of this study is to determine what proportion of total score variability is accounted for by learner variability when using norm-based DECs vs the O-EDShOT. **Methods:** This was a prospective pre-/post-implementation study, including all daily assessments completed between July 2017 and June 2019 at The Ottawa Hospital ED. A generalizability analysis (G study) was performed to determine what proportion of total score variability is accounted for by the various factors in this study (learner, rater, form, pgv level) for both the pre- and post-implementation phases. We collected 12 months of data for each phase, because we estimated that 6-12 months would be required to observe a measurable increase in entrustment scale scores within a learner. **Results:** A total of 3908 and 3679 assessments were completed by 99 and 116 assessors in the pre- and post- implementation phases respectively. Our G study revealed that 21% of total score variance was explained by a combination of post-graduate year (PGY) level and the individual learner in the pre-implementation phase, compared to 59% in the post-implementation phase. An average of 51 vs 27 forms/learner are required to achieve a reliability of 0.80 in the pre- and post-implementation phases respectively. **Conclusion:** A significantly greater proportion of total score variability is explained by variability in learners' performances with the O-EDShOT compared to norm-based DECs. The O-EDShOT also requires fewer assessments to generate a reliable estimate of the learner's ability. This study suggests that the O-EDShOT is a more useful assessment tool than norm-based DECs, and could be adopted in other emergency medicine training programs.

Keywords: assessment, entrustability, Ottawa Emergency Department Shift Observation Tool

LO76**Effect of task interruptions training on the quality of simulated ALS**

J. Truchot, MD, PhD, D. Michelet, MD, D. Drummond, MD, PhD, Y. Freund, MD, PhD, P. Plaisance, MD, PhD, Université Laval, CHU Hôpital Enfant Jésus, Québec, QC

Introduction: Task interruptions are reportedly frequent disturbances for emergency physicians performing advanced life support (ALS). The aim of this study was to evaluate the benefit of adding task interruptions in ALS simulated training session. **Methods:** We conducted a multi centered randomized controlled trial in four emergency departments of a university hospital in Paris, France. Each emergency team included one resident, one nurse and one emergency physician. The teams were randomized for the nature of their training session: control (without interruption) or realistic (with interruptions). The interruption consisted of an interfering family member speaking a foreign language, and of repetitive phone calls during ALS. After the first training session, teams were evaluated on a second realistic session with task interruptions. The primary outcome was non-technical skills assessed with the TEAM score during this evaluation session. We also measured the no flow time, and the Cardiff score, which reflects the quality of ALS: including chest compression depth and rate, no flow time. **Results:** On a total of 23 included teams, 12 had a control training session and 11 with task interruptions. Baseline characteristics and TEAM score were similar between the two groups (Mean difference: 3.3 [-2.2; 8.9]; $p = 0.26$). During the evaluation session, the TEAM score was lower for “realistic” teams (mean difference -8 [95% confidence interval -13; -3]). We also report a higher no flow time and similar overall Cardiff score. **Conclusion:** In this simulated ALS study, the presence of disturbances during simulation seemed to worsen the quality of training. This study highlights the negative consequences of task interruptions in emergency medicine.

Keywords: advanced life support, simulation, task interruptions

LO77**Performance enhancing psychological skills in clinical simulation**

E. Johannessen, BHSc, MASc, T. Davies, MSc, PhD, A. Valeriano, BHSc, E. Blackmore, MD, A. Belyea, BSc, F. Gilic, MD, Queen's University, Kingston, ON

Introduction: Clinical simulations are designed to evoke feelings of stress and uncertainty in order to mimic challenges that learners will face in the real world. When not managed properly, these sources of extraneous cognitive load cause a burden on working memory, leading to a hindered ability to acquire new information. The “Beat the Stress Fool” (BTSF) protocol is a performance-enhancing tool designed to reduce cognitive overload during acute care scenarios. It involves breathing exercises, positive self-talk, visualization, and deliberate articulations. This study aims to validate the BTSF protocol as a method for reducing cognitive load using both psychometric and physiologic measures. **Methods:** Data collection took place during the Queen's University “Nightmares-FM” course. This clinical simulation program involves team-based scenarios designed to teach the fundamentals of acute care to first-year family medicine residents. Participants were divided equally into experimental and control groups based on pre-existing cohorts. Participants completed a baseline state-trait anxiety inventory and a demographics survey. The experimental group was guided through the BTSF protocol prior to

each of 16 simulations; in both groups, physiologic and psychometric cognitive load measurements were collected for the alternating team leader. Galvanic skin response (GSR) and heart rate (HR) were collected during a 15-second baseline and throughout each simulation using a Shimmer 3 GSR+ wearable sensor. Self-reported cognitive load was assessed after each scenario using the 9-point Paas scale.

Results: The mean Paas scores for the BTSF group were significantly lower than the control group (6.2 vs 6.9, $p < 0.05$), indicating lower subjective cognitive load. GSR signal magnitude ($p = 0.086$), spike amplitude ($p = 0.066$), and spike density ($p = 0.584$) were also lower in the BTSF group. There was no difference in HR between groups. There was not a significant correlation between self-reported cognitive load and the normalized physiologic measures. **Conclusion:** The results demonstrate the effectiveness of the BTSF protocol in lowering the amount of perceived mental effort required to perform clinical simulation tasks. These findings were mirrored in the galvanic skin response signal, though our study was likely underpowered for significance. This is the first study to validate a proof-of-concept for the BTSF protocol in learners during simulated training.

Keywords: cognitive load, physiologic measures, psychometric measures

LO78**Ready for launch? A survey of readiness factors among 2019 Competence By Design launch disciplines**

W. Cheung, MD, MMed, A. Hall, MD, MMed, T. Dalseg, MD, A. Oswald, MD, MMed, L. Cook, MD, MEd, MSc, E. Van Melle, PhD, J. Frank, MD, MA(Ed), University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: A critical component for successful implementation of any innovation is an organization's readiness for change. Competence by Design (CBD) is the Royal College's major change initiative to reform the training of medical specialists in Canada. The purpose of this study was to measure readiness to implement CBD among the 2019 launch disciplines. **Methods:** An online survey was distributed to program directors of the 2019 CBD launch disciplines one month prior to implementation. Questions were developed based on the R=MC2 framework for organizational readiness. They addressed program motivation to implement CBD, general capacity for change, and innovation-specific capacity. Questions related to motivation and general capacity were scored using a 5-point scale of agreement. Innovation-specific capacity was measured by asking participants whether they had completed 33 key pre-implementation tasks (yes/no) in preparation for CBD. Bivariate correlations were conducted to examine the relationship between motivation, general capacity and innovation specific capacity. **Results:** Survey response rate was 42% ($n = 79$). A positive correlation was found between all three domains of readiness (motivation and general capacity, $r = 0.73$, $p < 0.01$; motivation and innovation specific capacity, $r = 0.52$, $p < 0.01$; general capacity and innovation specific capacity, $r = 0.47$, $p < 0.01$). Most respondents agreed that successful launch of CBD was a priority (74%). Fewer felt that CBD was a move in the right direction (58%) and that implementation was a manageable change (53%). While most programs indicated that their leadership (94%) and faculty and residents (87%) were supportive of change, 42% did not have experience implementing large-scale innovation and 43% indicated concerns about adequate support staff. Programs had completed an average of 72% of pre-implementation tasks. No difference was found between disciplines ($p = 0.11$). Activities related to

curriculum mapping, competence committees and programmatic assessment had been completed by >90% of programs, while <50% of programs had engaged off-service rotations. **Conclusion:** Measuring readiness for change aids in the identification of factors that promote or inhibit successful implementation. These results highlight several areas where programs struggle in preparation for CBD launch. Emergency medicine training programs can use this data to target additional implementation support and ongoing faculty development initiatives.

Keywords: Competence by Design, implementation, residency education

LO79

The variable landscape of resident selection: A study of Canadian Royal College emergency medicine training programs

M. Hale, MD, W. Cheung, MD, MMed, J. Frank, MD, MA(Ed), University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Little is known about how Royal College emergency medicine (RCEM) residency programs are selecting their residents. This creates uncertainty regarding alignment between our current selection processes and known best practices and results in a process that is difficult to navigate for prospective candidates. We seek to describe the current selection processes of Canadian RCEM programs. **Methods:** An online survey was distributed to all RCEM program directors and assistant directors. The survey instrument included 22 questions consisting of both open-ended (free text) and closed-ended (Likert scale) elements. Questions sought qualitative and quantitative data from the following 6 domains; paper application, letters of reference, elective selection, interview, rank order, and selection process evaluation. Descriptive statistics were used. **Results:** We received responses from 13/14 programs for an aggregate response rate of 92.9%. A candidate's letter of reference was identified as the single most important item from the paper application (38.5%). Having a high level of familiarity with the applicant was considered to be the most important characteristic of a reference letter author (46.2%). Respondents found that providing a percentile rank of the applicant was useful when reviewing candidate reference letters. Once the interview stage is reached, 76.9% of programs stated that the interview was weighted at least as heavily as the paper application; 53.8% weighted the interview more heavily. Once final candidate scores are established for both the paper application and the interview, 100% of programs indicated that further adjustment is made to the rank order list. Only 1/13 programs reported ever having completed a formal evaluation of their selection process. **Conclusion:** The information gained from this study helps to characterize the landscape of the RCEM residency selection process. We identified significant heterogeneity between programs with respect to which application elements were most valued. Canadian emergency medicine residency programs should re-evaluate their selection processes to achieve improved consistency and better alignment with selection best practices.

Keywords: emergency medicine, residency, selection

LO80

Perfecting practice for rare procedures: a simulation-based, multi-centre randomized trial

A. Petrosniak, MD, MSc, C. Hicks, MD, MEd, S. Gray, MD, MPH, M. McGowan, MHK, J. Sherbino, MD, MEd, S. Monteiro, PhD, St. Michael's Hospital, University of Toronto, Toronto, ON

Introduction: Mastery learning, which deconstructs a complex task into sequential sub-steps combined with deliberate practice to achieve each step in sequence, represents an important method to enhance simulation-based procedural skills training. However, the evidence to support the effectiveness of this theory to improve learning is lacking. This study compared mastery learning using deliberate practice with self-guided practice on skill performance of a rarely performed, life-saving procedure, a bougie-assisted cricothyroidotomy (BAC). **Methods:** In this multi-centre, randomized study at five North American emergency medicine (EM) residency training programs, we assigned 166 EM postgraduate trainees to either mastery learning and deliberate practice (ML + DP) or self-guided practice for BAC. Three blinded airway experts independently evaluated BAC skill performance by video review before (pre-test) and after (post-test) each training session. The primary outcome was post-test skill performance using a 5-point global rating score (GRS). A secondary outcome, defined a priori, was performance time to complete the BAC skill (chronometry). **Results:** There was no significant difference in post-test BAC performance after ML + DP or self-guided practice. Performance scores improved for both groups by 13% from the pre-test to post-test ($F(1,138) = 43, p < 0.001$). Overall, time to complete the BAC improved significantly from pre-test (87.6 seconds) to post-test (54.1 seconds), ($F(1,149) = 122, p < 0.001$). At post-test, the ML + DP group performed the skill 7.4 seconds faster than the self-guided practice group ($F(1,150) = 6.77, p < 0.01$). **Conclusion:** Mastery learning coupled with deliberate practice provides systematic and focused feedback during skill acquisition. However, it is resource intensive and its efficacy is not fully defined. In this study, ML + DP did not result in improved global performance; it did result in faster performance times, a relevant finding for time-sensitive procedures. These results are important for educators who seek to optimize technical skills training in a competency-based model of medical education. Our findings suggest that time-sensitive procedures might benefit from ML + DP teaching strategies to enhance time to procedural performance.

Keywords: deliberate practice, procedural skills, simulation

LO81

The use of in situ simulation to improve emergency department staff comfort with the management of high acuity, low occurrence cases

M. Bilic, BSc, K. Hassall, BSc, MEd, M. Hastings, BScN, C. Fraser, BScN, MHM, G. Rutledge, BSc, MD, E. Hanel, MSc, MB, McMaster University, Hamilton, ON

Introduction: In the emergency department (ED), high-acuity presentations encountered at low frequencies are associated with reduced staff comfort. Previous studies have shown that simulation can improve provider confidence with practical skills and management of presentations in various fields of medicine. The present study examined the effect of in situ simulation on interprofessional provider comfort with the identification and management of high-acuity low-frequency events in the ED. It further assessed the feasibility of implementing weekly simulation as an interprofessional education initiative in a high-volume ED. **Methods:** This was a retrospective pre-test post-test quasi-experimental design. Weekly in situ simulation events were facilitated by an interdisciplinary team in a high-volume ED in Hamilton, Ontario that sees an average of 185 patients per day. To date, 34 simulation events were held between January 18, 2019 and November 22, 2019, and included neonatal, paediatric and

obstetric emergencies, and adult codes. There was an average of 20 patients presenting to the ED during these events. Events included a debrief, and typically lasted 60 minutes in total. Participants included individuals from various disciplines working on shift at the time of the event. Questionnaires were administered via email following the event, in which participants were asked to rank their comfort with emergency codes before and after the simulation using two 5-point Likert scales. The data from 39 questionnaires was analyzed. T-tests were used to analyze differences in self-reported comfort scores. **Results:** Questionnaire responders included nurses (41%), respiratory therapists (26%), resident physicians (10%), paramedics (3%), attending physicians (3%), students of various disciplines (10%) and other (7%). 38% of participants reported increases in comfort following simulation when compared to prior. Using the 5-point scale, the average reported score for comfort pre-simulation was 3.59 (95% CI 3.30–3.88), and the average post-simulation score was 3.97 (95% CI 3.76–4.19, $p = 0.03$). **Conclusion:** Our results demonstrate that weekly interprofessional in situ simulation is feasible in a high-volume ED, and significantly improves self-reported provider comfort with the identification and management of high-acuity, low-frequency events. This warrants the implementation of this simulation design to improve staff confidence and has implications for its potential role in improving team dynamics and patient safety.

Keywords: Interprofessional, Simulation

LO82

Exploring eye-tracking technology to assess competency in point-of-care ultrasound

W. Lee, MMed, J. Chenkin, MD, MEd, Sunnybrook Health Sciences Centre, Toronto, ON

Introduction: Assessment of point-of-care ultrasound (POCUS) competency has been reliant on practical, visual and written examinations performed 1-on-1 with an examiner. These tools attempt to assess competency through subjective ratings, checklists and multiple-choice questions that are labour intensive using surrogate measures. Eye-tracking has been used on a limited basis in various fields of medicine for training and assessment. This technology explores visual processing and holds great promise as a tool to monitor training progress towards the development of expertise. We hypothesize that eye-tracking may differentiate novices and experts as they progress to become competent in interpretation of POCUS images and provide an objective measure in assessment of competency. **Methods:** Medical students, residents and attending physicians working in an academic emergency department were recruited. Participants viewed a series of 16 ultrasound video clips in a POCUS protocol for Focused Assessment using Sonography in Trauma (FAST). The gaze pattern of the participants was recorded using a commercially available eye-tracking device. The primary outcome was the gaze parameters including total gaze time in the area of interest (AOI), average time to fixation on the AOI, number of fixations in the AOI and average duration of first fixation on the AOI. Secondary outcome was the accuracy on the interpretation of the FAST scan. **Results:** Four novices and eight experts completed this study. The total gaze time in the AOI (mean $\pm$ SD) was 76.72 $\pm$ 18.84s among experts vs 53.64 $\pm$ 10.33s among novices ($p = 0.048$), average time to fixation on the AOI was 0.561 $\pm$ 0.319s vs 1.048 $\pm$ 0.280s ($p = 0.027$),

number of fixations in the AOI was 158.9 $\pm$ 29.0 vs 121.8 $\pm$ 17.5 ($p = 0.042$) and average duration of first fixation was 0.444 $\pm$ 0.119s vs 0.390 $\pm$ 0.024s ($p = 0.402$). The accuracy of the answers was 79.7 $\pm$ 14.1% vs 45.3 $\pm$ 21.9% ($p = 0.007$). **Conclusion:** In this pilot study, eye tracking shows potential to differentiate between POCUS experts and novices by their gaze patterns. Gaze patterns captured by eye tracking may not necessarily translate to cognitive processing. However, it allows educators to visualise the thought processes of the learner by their gaze patterns and provide insight on how to guide them towards competency. Future studies are needed to further validate the metrics for competency in POCUS applications.

Keywords: eye tracking, medical education, ultrasound

LO83

Effect of the transition to an entrustability scale on assessor stringency and leniency on daily encounter cards in emergency medicine

S. Dewhurst, MD, W. Cheung, MD, MMed, N. Dudek, MD, T. Wood, PhD, J. Frank, MD, MA(Ed), University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Workplace based assessments (WBAs) are integral to emergency medicine residency training. However many biases undermine their validity, such as an assessor's personal inclination to rate learners leniently or stringently. Outlier assessors produce assessment data that may not reflect the learner's performance. Our emergency department introduced a new Daily Encounter Card (DEC) using entrustability scales in June 2018. Entrustability scales reflect the degree of supervision required for a given task, and are shown to improve assessment reliability and discrimination. It is unclear what effect they will have on assessor stringency/leniency – we hypothesize that they will reduce the number of outlier assessors. We propose a novel, simple method to identify outlying assessors in the setting of WBAs. We also examine the effect of transitioning from a norm-based assessment to an entrustability scale on the population of outlier assessors. **Methods:** This was a prospective pre-/post-implementation study, including all DEC's completed between July 2017 and June 2019 at The Ottawa Hospital Emergency Department. For each phase, we identified outlier assessors as follows: 1. An assessor is a potential outlier if the mean of the scores they awarded was more than two standard deviations away from the mean score of all completed assessments. 2. For each assessor identified in step 1, their learners' assessment scores were compared to the overall mean of all learners. This ensures that the assessor was not simply awarding outlying scores due to working with outlier learners. **Results:** 3927 and 3860 assessments were completed by 99 and 116 assessors in the pre- and post-implementation phases respectively. We identified 9 vs 5 outlier assessors ($p = 0.16$) in the pre- and post-implementation phases. Of these, 6 vs 0 ($p = 0.01$) were stringent, while 3 vs 5 ($p = 0.67$) were lenient. One assessor was identified as an outlier (lenient) in both phases. **Conclusion:** Our proposed method successfully identified outlier assessors, and could be used to identify assessors who might benefit from targeted coaching and feedback on their assessments. The transition to an entrustability scale resulted in a non-significant trend towards fewer outlier assessors. Further work is needed to identify ways to mitigate the effects of rater cognitive biases.

Keywords: assessment, entrustability, rater bias

LO84

The incidence of fall-related intracranial bleeding in older adults taking anticoagulants, antiplatelets and neither medication: a meta-analysis

K. de Wit, MBChB, MD, MSc, D. Nishijima, MD, S. Mason, MBChB, MD, R. Jeanmonod, MD, S. Parpia, PhD, C. Varner, MD, MSc, M. Mercuri, BSc, PhD, M. Kuczawski, F. Germini, MD, MSc, Y. Kagoma, MD, É. Mercier, MBChB, MSc, McMaster University, Hamilton, ON

Introduction: It is unclear whether anticoagulant or antiplatelet medications increase the risk for intracranial bleeding in older adults after a fall. Our aim was to report the incidence of intracranial bleeding among older adults presenting to the emergency department (ED) with a fall, among patients taking anticoagulants, antiplatelet medications, both medications and neither medication. **Methods:** This was a systematic review and meta-analysis, PROSPERO reference CRD42019122626. Medline, EMBASE (via OVID 1946 - July 2019), Cochrane, Database of Abstracts of Reviews of Effects databases and the grey literature were searched for studies reporting on older adults who were evaluated after a fall. We included prospective studies conducted in the ED where more than 80% of the cohort were 65 years or older and had fallen. We contacted study authors for aggregate data on intracranial bleeding in patients prescribed anticoagulant medication, antiplatelet medication and neither medication. Incidences of intracranial bleeding were pooled using random effect models, and I² index was used to assess heterogeneity. **Results:** From 7,240 publication titles, 10 studies met inclusion criteria. The authors of 8 of these 10 studies provided data (on 9,489 patients). All studies scored low or moderate risk of bias. The pooled incidence of intracranial bleeding among patients taking an anticoagulant medication was 5.1% (n = 5,016, 95% Confidence Interval (CI): 4.1 to 6.3%) I² = 42%, a single antiplatelet 6.4% (n = 2,148, 95% CI: 5.4 to 7.6%) I² = 75%, both anticoagulant and antiplatelet medications 5.9% (n = 212, 95% CI: 1.3 to 13.5%) I² = 72%, and neither of these medications 4.8% (n = 1,927, 95% CI: 3.5 to 6.2%) I² = 50%. A sensitivity analysis restricted to patients who had a head CT in the ED reported incidences of 6.1% (n = 3,561, 95% CI: 3 to 8.3%), 8.4% (n = 1,781, 95% CI: 5.5 to 11.8%), 6.7% (n = 206, 95% CI 1.5 to 15.2%) and 6.6% (n = 1,310, 95% CI: 5.0 to 8.4%) respectively. **Conclusion:** The incidence of fall-related intracranial bleeding in older ED patients was similar among patients who take anticoagulant medication, antiplatelet medication, both and neither medication, although there was heterogeneity between study findings.

Keywords: antithrombotics, falls, intracranial bleeding

LO85

Unhelmeted injured cyclists in the emergency department: demographics, cycling behaviour, and attitudes towards helmet use

S. Friedman, MD, MPH, D. Porplycia, BSc, MSc, B. Varriano, BSc, MSc, University Health Network, Toronto, ON

Introduction: We seek to characterize unhelmeted injured cyclists presenting to the emergency department (ED): demographics, cycling behaviour, and attitudes towards helmet use. **Methods:** This was a prospective cohort study in a downtown teaching hospital, from May 2016 - Sept 2019. Injured cyclists presenting to the ED were recruited if they were not wearing a helmet at time of injury and over age 18. Exclusion criteria included intoxication, inability to consent, or admission to hospital. A standardized survey was

administered by a research coordinator. Descriptive statistics were used to summarize the data, and survey responses reported as percentages. **Results:** We surveyed a convenience sample of 68 unhelmeted injured cyclists (UICs) with mean age of 33.6 years (range 18 to 68, median 29.5 years). Ratio of males to females was 1:1. The majority of UICs cycled most days per week or every day in non-winter months (89.6 %, n = 60). Cycling in Toronto was perceived as somewhat dangerous (45.6%, n = 31) or very dangerous (5.9%, n = 4) by most, and very safe (2.94 %, n = 2) or somewhat safe (19.12%, n = 13) by few. Almost a third (29.4 %, n = 20) had been in a cycling accident in the prior year, some of these (15.0%, n = 3) prompting an ED visit. All cyclists were riding their personal bike (100 %, n = 68) at time of injury, and most (98.5%, n = 67) had planned to cycle when they departed home that day. Purpose of trip was primarily for commuting to work (50%, n = 34), social activities (19.1%, n = 13), school (7.4%, n = 5), and recreation (7.4%, n = 5). Bicycle helmet ownership was low (41.2 %, n = 28). UICs reported rarely (10.3%, n = 7) or never (64.7%, n = 44) wearing a helmet when cycling. Reported factors discouraging helmet use included inconvenience (33.8%, n = 23), lack of ownership (32.4%, n = 22), discomfort (29.4%, n = 20), and 'messed hair' (14.7%, n = 10). Few characterized helmets as unnecessary (10.3%, n = 7) or ineffective (1.5%, n = 1). The majority had a college diploma or more advanced education (77.9%, n = 53), and spoke English at home (85.3%, n = 58). **Conclusion:** Unhelmeted injured cyclists surveyed were frequent commuter cyclists who do not regard cycling as safe, yet choose not to wear helmets for reasons largely related to convenience rather than perceptions regarding safety or necessity. Initiatives to increase helmet use in this subgroup should address the reasons given for not wearing a helmet, potentially using principles of adult education and behavioral economics.

Keywords: bicycle, health promotion, injury prevention

LO86

Lack of association between four biomarkers and the presence of persistent post-concussion symptoms after a mild traumatic brain injury

N. Le Sage, MD, PhD, N. Le Sage, MD, PhD, J. Frenette, PhD, J. Chauny, MD, MSc, S. Berthelot, MD, MSc, P. Archambault, MD, MSc, J. Perry, MD, MSc, J. Lee, MD, MSc, E. Lang, MD, MSc, A. McRae, MD, PhD, X. Neveu, MSc, P. Tardif, MSc, V. Boucher, MSc, É. Mercier, MD, MSc, M. Émond, MD, MSc, Université Laval, Quebec City, QC

Introduction: Mild Traumatic Brain Injury (mTBI) is a common problem: each year in Canada, its incidence is estimated at 500-600 cases per 100 000. Between 10 and 56% of mTBI patients develop persistent post-concussion symptoms (PPCS) that can last for more than 90 days. It is therefore important for clinicians to identify patients who are at risk of developing PPCS. We hypothesized that blood biomarkers drawn upon patient arrival to the Emergency Department (ED) could help predict PPCS. The main objective of this project was to measure the association between four biomarkers and the incidence of PPCS 90 days post mTBI. **Methods:** Patients were recruited in seven Canadian ED. Non-hospitalized patients, aged ≥14 years old with a documented mTBI that occurred ≤24 hrs of ED consultation, with a GCS ≥13 at arrival were included. Sociodemographic and clinical data as well as blood samples were collected in the ED. A standardized telephone questionnaire was administered at 90 days post ED visit. The following biomarkers were analyzed using enzyme-linked immunosorbent assay (ELISA): S100B protein, Neuron Specific

Enolase (NSE), cleaved-Tau (c-Tau) and Glial fibrillary acidic protein (GFAP). The primary outcome measure was the presence of persistent symptoms at 90 days after mTBI, as assessed using the Rivermead Post-Concussion symptoms Questionnaire (RPQ). A ROC curve was constructed for each biomarker. **Results:** 1276 patients were included in the study. The median age for this cohort was 39 (IQR 23-57) years old, 61% were male and 15% suffered PPCS. The median values (IQR) for patients with PPCS compared to those without were: 43 pg/mL (26-67) versus 42 pg/mL (24-70) for S100B protein, 50 pg/mL (50-223) versus 50 pg/mL (50-199) for NSE, 2929 pg/mL (1733-4744) versus 3180 pg/mL (1835-4761) for c-Tau and 1644 pg/mL (650-3215) versus 1894 pg/mL (700-3498) for GFAP. For each of these biomarkers, Areas Under the Curve (AUC) were 0.495, 0.495, 0.51 and 0.54, respectively. **Conclusion:** Among mTBI patients, S100B protein, NSE, c-Tau or GFAP during the first 24 hours after trauma do not seem to be able to predict PPCS. Future research testing of other biomarkers is needed in order to determine their usefulness in predicting PPCS when combined with relevant clinical data.

Keywords: biomarkers, mild traumatic brain injury, persistent post-concussion symptoms

LO87

Influence of co-injuries on post-concussion symptoms after a mild traumatic brain injury

V. Ouellet, V. Boucher, MSc, F. Beauchamp, X. Neveu, MSc, P. Archambault, MD, MSc, S. Berthelot, MD, MSc, J. Chauny, MD, MSc, E. de Guise, PhD, M. Émond, MD, MSc, J. Frenette, PhD, E. Lang, MD, MSc, J. Lee, MD, MSc, É. Mercier, MD, MSc, L. Moore, PhD, M. Ouellet, PhD, J. Perry, MD, MSc, N. Le Sage, MD, PhD, Université Laval, Quebec City, QC

Introduction: Each year, 3/1000 Canadians sustain a mild traumatic brain injury (mTBI). Many of those mTBI are accompanied by various co-injuries such as dislocations, sprains, fractures or internal injuries. A number of those patients, with or without co-injuries will suffer from persistent post-concussive symptoms (PPCS) more than 90 days post injury. However, little is known about the impact of co-injuries on mTBI outcome. This study aims to describe the impact of co-injuries on PPCS and on patient return to normal activities. **Methods:** This multicenter prospective cohort study took place in seven large Canadian Emergency Departments (ED). Inclusion criteria: patients aged ≥ 14 who had a documented mTBI that occurred within 24 hours of ED visit, with a Glasgow Coma Scale score of 13-15. Patients who were admitted following their ED visit or unable to consent were excluded. Clinical and sociodemographic information was collected during the initial ED visit. A research nurse then conducted three follow-up phone interviews at 7, 30 and 90 days post-injury, in which they assessed symptom evolution using the validated Rivermead Post-concussion Symptoms Questionnaire (RPQ). Adjusted risk ratios (RR) were calculated to estimate the influence of co-injuries. **Results:** A total of 1674 patients were included, of which 1023 (61.1%) had at least one co-injury. At 90 days, patients with co-injuries seemed to be at higher risk of having 3 symptoms ≥ 2 points according to the RPQ (RR: 1.28 95% CI 1.02-1.61) and of experiencing the following symptoms: dizziness (RR: 1.50 95% CI 1.03-2.20), fatigue (RR: 1.35 95% CI 1.05-1.74), headaches (RR: 1.53 95% CI 1.10-2.13), taking longer to think (RR: 1.50 95% CI 1.07-2.11) and feeling frustrated (RR: 1.45 95% CI 1.01-2.07).

We also observed that patients with co-injuries were at higher risk of non-return to their normal activities (RR: 2.31 95% CI 1.37-3.90). **Conclusion:** Patients with co-injuries could be at higher risk of suffering from specific symptoms at 90 days post-injury and to be unable to return to normal activities 90 days post-injury. A better understanding of the impact of co-injuries on mTBI could improve patient management. However, further research is needed to determine if the differences shown in this study are due to the impact of co-injuries on mTBI recovery or to the co-injuries themselves.

Keywords: co-injuries, mild traumatic brain injury, post-concussion syndrome

LO88

S100B serum protein level for the detection of clinically significant intracranial hemorrhage in patients with mild traumatic brain injury: a prospective cohort study

J. Blais-L'Écuyer, MD, J. Blais-L'Écuyer, MD, É. Mercier, MD, MSc, P. Tardif, MSc, P. Archambault, MD, MSc, J. Chauny, MD, MSc, S. Berthelot, MD, MSc, J. Frenette, PhD, J. Perry, MD, MSc, I. Stiell, MD, MSc, M. Émond, MD, MSc, J. Lee, MD, MSc, E. Lang, MD, MSc, A. McRae, MD, MSc, V. Boucher, MSc, N. Le Sage, MD, PhD, Université Laval, Quebec City, QC

Introduction: Clinical assessment of patients with mTBI is challenging and overuse of head CT in the emergency department (ED) is a major problem. During the last decades, studies have attempted to reduce unnecessary head CTs following a mTBI by identifying new tools aiming to predict intracranial bleeding. S100B serum protein level might be helpful reducing those imaging since a higher level of S-100B protein has been associated with intracranial hemorrhage following a mTBI in previous literature. The main objective of this study was to assess whether the S100B serum protein level is associated with clinically important brain injury and could be used to reduce the number of head CT following a mTBI. **Methods:** This prospective multicenter cohort study was conducted in five Canadian ED. MTBI patients with a Glasgow Coma Scale (GCS) score of 13-15 in the ED and a blood sample drawn within 24-hours after the injury were included. S-100B protein was analyzed using enzyme-linked immunosorbent assay (ELISA). All types of intracranial bleedings were reviewed by a radiologist who was blinded to the biomarker results. The main outcome was the presence of clinically important brain injury. **Results:** A total of 476 patients were included. Mean age was 41 ± 18 years old and 150 (31.5%) were female. Twenty-four (5.0%) patients had a clinically significant intracranial hemorrhage while 37 (7.8%) had any type of intracranial bleeding. S100B median value (Q1-Q3) of was: 0.043 $\mu\text{g/L}$ (0.008-0.080) for patients with clinically important brain injury versus 0.039 $\mu\text{g/L}$ (0.023-0.059) for patients without clinically important brain injury. Sensitivity and specificity of the S100B protein level, if used alone to detect clinically important brain injury, were 16.7% (95% CI 4.7-37.4) and 88.5% (95% CI 85.2-91.3), respectively. **Conclusion:** S100B serum protein level was not associated with clinically significant intracranial hemorrhage in mTBI patients. This protein did not appear to be useful to reduce the number of CT prescribed in the ED and would have missed many clinically important brain injuries. Future research should focus on different ways to assess mTBI patient and ultimately reduce unnecessary head CT.

Keywords: biomarker, head computed tomography, mild traumatic brain injury

LO89

Describing the evolution of post-concussion symptoms after sports-related mTBI

F. Beauchamp, V. Boucher, MSc, X. Neveu, MSc, V. Ouellet, P. Archambault, MD, MSc, S. Berthelot, MD, MSc, J. Chauny, MD, MSc, E. de Guise, PhD, M. Émond, MD, MSc, J. Frenette, PhD, E. Lang, MD, MSc, J. Lee, MD, MSc, É. Mercier, MD, MSc, L. Moore, PhD, M. Ouellet, PhD, J. Perry, MD, MSc, N. Le Sage, MD, PhD, Université Laval, Quebec City, QC

Introduction: Mild traumatic brain injury (mTBI) is a serious public health issue and as much as one third of mTBI patients could be affected by persistent post-concussion symptoms (PPCS) three months after their injury. Even though a significant proportion of all mTBIs are sports-related (SR), little is known on the recovery process of SR mTBI patients and the potential differences between SR mTBI and patients who suffered non-sports-related mTBI. The objective of this study was to describe the evolution of PPCS among patients who sustained a SR mTBI compared to those who sustained non sport-related mTBI. **Methods:** This Canadian multicenter prospective cohort study included patients aged ≥ 14 who had a documented mTBI that occurred within 24 hours of Emergency Department (ED) visit, with a Glasgow Coma Scale score of 13-15. Patients who were hospitalized following their ED visit or unable to consent were excluded. Clinical and sociodemographic information was collected during the initial ED visit. Three follow-up phone interviews were conducted by a research nurse at 7, 30 and 90 days post-injury to assess symptom evolution using the validated Rivermead Post-concussion Symptoms Questionnaire (RPQ). Adjusted risk ratios (RR) were calculated to demonstrate the impact of the mechanism of injury (sports vs non-sports) on the presence and severity of PPCS. **Results:** A total of 1676 mTBI patients were included, 358 (21.4%) of which sustained a SR mTBI. At 90 days post-injury, patients who suffered a SR mTBI seemed to be significantly less affected by fatigue (RR: 0.70 (95% CI: 0.50-0.97)) and irritability (RR: 0.60 (95% CI: 0.38-0.94)). However, no difference was observed between the two groups regarding each other symptom evaluated in the RPQ. Moreover, the proportion of patients with three symptoms or more, a score ≥ 21 on the RPQ and those who did return to their normal activities were also comparable. **Conclusion:** Although persistent post-concussion symptoms are slightly different depending on the mechanism of trauma, our results show that patients who sustained SR-mTBI could be at lower risk of experiencing some types of symptoms 90 days post-injury, in particular, fatigue and irritability. **Keywords:** mild traumatic brain injury, post-concussion symptoms, sports-related injury

LO90

Predictors of post-concussion syndrome in adults with acute mild traumatic brain injury presenting to the emergency department: a secondary analysis of a randomized controlled trial

C. Varner, MD, MSc, C. Thompson, MSc, K. de Wit, MD, MSc, B. Borgundvaag, MD, PhD, R. Houston, BSc, S. McLeod, MSc, Mount Sinai Hospital - University of Toronto, Toronto, ON

Introduction: The emergency department (ED) is the first point of health care contact for most head injured patients. Although early and spontaneous resolution occurs in most patients with mild traumatic brain injury (MTBI), between 15-30% develop post-concussion syndrome (PCS). To date, clinical prediction tools do not yet exist to accurately identify adult MTBI patients at risk of PCS. The objective

of this study was to identify predictors of PCS within 30 days in adults with acute MTBI presenting to the ED. **Methods:** This was a secondary analysis of a randomized controlled trial conducted in three Canadian EDs evaluating prescribed light exercise compared to standard care. Adult (18-64 years) patients with a MTBI sustained within the preceding 48 hours were eligible for enrollment. Participants completed follow-up questionnaires at 7, 14, and 30 days. The primary outcome was the presence of PCS at 30 days, defined as the presence of ≥ 3 symptoms on the Rivermead Post-concussion Symptoms Questionnaire (RPQ) at 30 days. Backward, stepwise, multivariable logistic regression with a removal criterion probability of 0.05 was conducted to determine predictor variables independently associated with PCS at 30 days. Likelihood ratio tests were used to determine appropriate inclusion of variables in the multivariable model. Results are reported as odds ratios (OR) with 95% confidence intervals (CIs). **Results:** A total of 367 patients were enrolled, 18 (4.9%) withdrew, and 108 (29.4%) were lost to follow-up. Median (IQR) age was 32 (25 to 48) years, and 201 (57.6%) were female. Of the 241 patients who completed follow-up, 49 (20.3%) had PCS at 30 days. Headache at ED presentation (OR = 6.59; 95% CI: 1.31 to 33.11), being under the influence of drugs or alcohol at the time of injury (OR = 4.42; 95% CI: 1.31 to 14.88), the injury occurring via bike or motor vehicle collision (OR = 2.98; 95% CI: 1.39 to 6.40), history of anxiety or depression (OR = 2.49; 95% CI: 1.23 to 5.03), and the sensation of numbness or tingling at ED presentation (OR = 2.25; 95% CI: 1.04 to 4.88), were independently associated with PCS at 30 days. **Conclusion:** Five variables were found to be significant predictors of PCS. Although MTBI is a self-limited condition in the majority of patients, patients with these risk factors should be considered high risk and flagged for early follow-up. There continues to be an urgent need for a clinical prognostic tool that accurately identifies adult patients at risk for PCS early in their injury.

Keywords: concussion, mild traumatic brain injury, post-concussion syndrome

LO91

Opioid poisoning and opioid use disorder in older trauma patients

R. Daoust, MD, MSc, J. Paquet, PhD, L. Moore, PhD, A. Cournoyer, MD, M. Emond, MD, MSc, S. Gosselin, MD, G. Lavigne, PhD, DMD, A. Boulanger, MD, J. Mac-Thiong, MD, J. Chauny, MD, Université de Montréal, Montréal, QC

Introduction: Patients hospitalized following a trauma will be frequently treated with opioids during their stay and after discharge. We examined the relationship between acute phase (< 3 months) opioid use after discharge and the risk of opioid poisoning (OP) or opioid use disorder (OUD) in older trauma patients. **Methods:** In a retrospective multicenter cohort study conducted on registry data, we included all patients aged 65 years and older admitted (hospital stay > 2 days) for injury in 57 trauma centers in the province of Quebec (Canada) between 2004 and 2014. We searched for OP and OUD from ICD-9 and ICD-10 code diagnosis that resulted in a hospitalization or a medical consultation after their initial injury. Patients that filled an opioid prescription within a 3-month period after sustaining the trauma were compared to those who did not fill an opioid prescription during that period using Cox proportional hazards regressions. **Results:** A total of 70,314 participants were retained for analysis; median age was 82 years (IQR: 75-87), 68% were women, and 34% of the patients filled an opioid prescription within 3-months of the

initial trauma. During a median follow-up of 2.6 years (IQR: 1-5), 192 participants (0.30%; 95%CI: 0.25%-0.35%) were hospitalized for OP and 73 (0.10%; 95%CI: 0.07%-0.13%) were diagnosed with OUD. Having filled an opioid prescription within 3-months of injury was associated with an increased hazard ratio of OP (2.6; 95%CI: 1.9-3.5) and OUD (4.0; 95%CI: 2.3-7.0). However, history of OP (2.7; 95%CI: 1.2-6.1), of substance use disorder (4.3; 95%CI: 2.4-7.9), or of opioid prescription filled (2.7; 95%CI: 2.1-3.5) before trauma were also related to OP or OUD. **Conclusion:** Opioid poisoning and opioid use disorder are rare events after hospitalization for trauma in older patients. However, opioids should be used cautiously in patients with history of substance use disorder, opioid poisoning or opioid use during the past year.

Keywords: opioid poisoning, opioid use disorder, trauma

LO92

The effect of prehospital intravenous fluids on mortality in trauma: a systematic review and meta-analysis

M. Davison, MD, MSc, M. Schenk, MD, R. Ohle, MD, D. Savage, MD, PhD, J. Scully, HBA, S. Regalado, MA, MSt, A. Affleck, MD, Northern Ontario School of Medicine, Sudbury, ON

Introduction: Hemorrhage is the primary cause of death in 39% of trauma patients. In prehospital trauma management, there is debate over pursuing a 'scoop-and-run' approach versus early intravenous (IV) fluid therapy. We evaluated the literature regarding the effect of prehospital IV fluid therapy on mortality in adult trauma patients. **Methods:** A librarian-assisted search was conducted in PubMed, Medline and Embase. The population was adults with blunt and/or penetrating trauma. The intervention was total prehospital IV fluid volume 0-500 mL, and the control was prehospital fluid volume >500 mL. The outcome of interest was in-hospital mortality. Randomized controlled trials (RCTs), cohort and case-matched studies were included. Two reviewers used the Cochrane Risk of Bias (RoB) and Risk of Bias in Non-randomized Studies of Interventions (ROBINS-I) tools to evaluate biases, and kappa was calculated for inter-rater agreement. A summary relative risk (RR) of in-hospital mortality was calculated and heterogeneity (I²) analysis performed using RevMan 5 software. **Results:** Four RCTs and eleven observational studies were identified, with n = 15,448 patients. Two RCTs and four observational studies were excluded due to non-English language, and the location or volume of IV fluid administered, leaving eight studies with n = 4,568 patients. Inter-rater agreement was high with the ROBINS-I (unweighted κ =0.8841) and RoB tool (unweighted κ =0.8276). Two studies found decreased mortality, one found increased mortality, and five found no significant relationship to mortality with 0-500 mL prehospital IV fluid. The summary relative risk of mortality with 0-500 mL IV fluid compared to >500 mL IV fluid was not significant (RR = 0.98 [0.87, 1.11]). The heterogeneity for all studies was high (I² = 84%), but was low (I² = 0%) with removal of two studies. **Conclusion:** The majority of studies did not find a relationship between the volume of prehospital IV fluids and in-hospital mortality. Study heterogeneity was low except for two studies: this may be explained by mortality only being recorded at emergency department discharge in one study, and the high rate of penetrating gunshot and stabbing wounds in the other. There is a paucity of high-quality RCTs on the topic, and many studies are at significant risk of bias. Further research is needed to delineate the best approach to IV fluid therapy in adult trauma patients.

Keywords: intravenous fluid, prehospital, trauma

LO93

A single center randomized control trial of intravenous lidocaine for the management of traumatic rib fractures

P. Patton, MD, MSc, K. Vogt, MD, MSc, N. Parry, MD, F. Priestap, MSc, I. Ball, MD, MSc, Western University, London, ON

Introduction: Traumatic rib fractures (RF) are a common occurrence with 10% incidence in all trauma patients and are associated with significant morbidity and mortality. Adequate analgesia is paramount for preventing pulmonary complications and reducing morbidity and mortality. There is evidence of intravenous (IV) lidocaine's effectiveness and safety in the post-operative thoracic and abdominal surgical patient and we hypothesize that it may be ideal in trauma patients with RF. We evaluated IV lidocaine's analgesic efficacy in this population. **Methods:** A single-centre, double-blind, randomized control trial comparing a 72-96 hour IV lidocaine infusion plus standard analgesics to placebo infusion plus standard analgesics. Participants were adult trauma patients diagnosed with two or more RFs requiring hospital admission. A total of 36 patients were enrolled over 5 months in 2019. The study was powered to detect a 20% reduction in pain scores, which is determined to be clinically significant. **Results:** The primary outcome was mean pain score at rest and with movement, as measured on the Visual Analog Scale (VAS). There were consistent trends toward reduced VAS pain scores at rest and with movement in the lidocaine group as compared to placebo group with mean scores of 3.49 [SD 2.02 95% CI] and 7.08 [SD 1.71 95% CI] in the lidocaine group and 3.83 [SD 1.93 95% CI] and 8.03 [SD 1.44 95% CI] in the placebo group, at rest (p value 0.624) and with movement (p value 0.110), respectively. Secondary outcomes were patient satisfaction as measured on the VAS which demonstrated a score of 7.79 [SD 1.82 95% CI] in the lidocaine group and 6.63 [SD 1.77 95% CI] (p = 112) in the placebo group, and total morphine equivalents (ME) used (including breakthrough doses) that demonstrated a trend towards a reduction in the lidocaine group with 210.9 mg [SD 180.0 95% CI] compared to the placebo with total ME used of 309.9 mg [SD 221.8 95% CI]. Other secondary outcomes were protocol adherence, incidence of respiratory failure, hospital and ICU length of stay, mortality, incidence of lidocaine toxicity, and treatment regimens (non-opioid analgesics). **Conclusion:** These results demonstrate a trend towards lidocaine's analgesic benefit during rest and the critical times of patient movement and mobility, which has been demonstrated to be paramount in the reduction of respiratory complications from rib fractures. The results also tend towards a reduction in morphine equivalents, although the trial was not powered to demonstrate this.

Keywords: pain management, traumatic rib fractures

LO94

Evaluation of stroke and bleeding outcomes among patients managed in the emergency department for newly diagnosed atrial fibrillation

S. Niaz, MD, C. Kirwan, BSc, N. Clayton, RA, M. Mercuri, BSc, PhD, K. de Wit, MBChB, MD, MSc, McMaster University, Hamilton, ON

Introduction: Atrial Fibrillation (AF) is the most common arrhythmia seen in patients presenting to the emergency department (ED). AF increases the risk of ischemic stroke which can be mitigated by anticoagulant prescription. National guidelines advise that emergency physicians initiate anticoagulation when AF is first diagnosed. We aimed to evaluate the 90-day incidence of stroke and major bleeding

among emergency patients discharged home with a new diagnosis of AF. **Methods:** This was a health records review of patients diagnosed with AF in two EDs. We included patients $\geq$ age 18, with a new diagnosis of AF who were discharged from the ED, between 1st May 2014 and 1st May 2017. Using a structure review we collected data on CHADS65 and CHADS2 scores, contraindications to direct oral anticoagulant (DOAC) prescription and initiation of anticoagulation in the ED. Patient charts were reviewed for the diagnosis of stroke, transient ischemic attack (TIA), ischemic gut, ischemic limb or other systemic embolism within 90 days of the index ED presentation. We extracted data on major bleeding events within 90 days, defined by the International Society of Thrombosis and Haemostasis criteria. All data were extracted in duplicate for validation. **Results:** We identified 399 patients fulfilling the inclusion criteria, median age 68 (IQR 57-79), 213 (53%) male. 11 patients were already prescribed an anticoagulant for another indication and 19 had a contraindication to prescription of a DOAC. 48/299 (16%) CHADS65 positive patients were initiated on an anticoagulant, 3 of whom had a contra-indication to initiation of anticoagulation in the ED (1 dual antiplatelet therapy, 2 liver cirrhosis). 1/100 CHADS65 negative patients was initiated on anticoagulation. The median CHADS2 score was 1 (IQR 0-2). Among the 49 patients initiated on anticoagulation, 3 patients had a stroke/TIA within 90 days, 6.1% (95% CI; 2.1-16.5%). There were no bleeding events 0.0% (95% CI; 0.0-7.3%). Among the 350 patients who were not initiated on anticoagulation in the ED, 4 patients had a stroke/TIA 1.1% (95% CI; 1.1-2.9%) within 90 days and 2 patients had a major bleeding event. **Conclusion:** Prescription of anticoagulation for new diagnoses of AF was under-utilized in these EDs. The 90-day stroke/TIA rate was high, even among those given an anticoagulant prescription in the ED. No patient had an anticoagulant-associated bleeding event.

Keywords: anticoagulation, atrial fibrillation, stroke

Moderated Poster Presentations

MP01

Just another day on the job: Workforce experience with violence in emergency departments and urgent care centres

R. Tarraf, MSc, PhD, M. Stiphout, MSc, A. Fraser, MPH, H. Hair, MBA, E. Lang, MD, B. Holroyd, MBA, MD, S. Hastings, MSc, PhD, Alberta Health Services, Calgary, AB

Introduction: Compared to other areas in Alberta Health Services (AHS), internal data show that emergency departments (EDs) and urgent care centres (UCCs) experience a high rate of workforce violence. As such, reducing violence in AHS EDs and UCCs is a key priority. This project explored staff's lived experience with patient violence with the goal of better understanding its impact, and what strategies and resources could be put in place. **Methods:** To obtain a representative sample, we recruited staff from EDs and a UCC (n = 6) situated in urban and rural settings across Alberta. As the interviews had the potential to be upsetting, we conducted in-person interviews in a private space. Interviews were conducted with over 60 staff members including RNs, LPNs, unit clerks, physicians, and protective services. Data collection and analysis occurred simultaneously and iteratively until saturation was reached. The analysis involved data reduction, category development, and synthesis. Key phrases and statements were first highlighted. Preliminary labels were then assigned to the data and data was then organized into meaningful clusters. Finally, we identified common themes of participants' lived

experience. Triangulation of sources, independent and team analysis, and frequent debriefing sessions were used to enhance the trustworthiness of the data. **Results:** Participants frequently noted the worry they carry with them when coming into work, but also said there was a high threshold of acceptance dominating ED culture. A recurring feature of this experience was the limited resources (e.g., no peace officers, scope of security staff) available to staff to respond when patients behave violently or are threatening. Education like non-violent crisis intervention training, although helpful, was insufficient to make staff feel safe. Participants voiced the need for more protective services, the addition of physical barriers like locking doors and glass partitions, more investment in addictions and mental health services (e.g., increased access to psychiatrists or addictions counsellors), and a greater shared understanding of AHS' zero tolerance policy. **Conclusion:** ED and UCC staff describe being regularly exposed to violence from patients and visitors. Many of these incidents go unreported and unresolved, leaving the workforce feeling worried and unsupported. Beyond education, the ED and UCC workforce need additional resources to support them in feeling safe coming to work.

Keywords: lived experience, workforce safety, Workforce-directed violence

MP02

The impact of adoption of an electronic health record on emergency physician work: a time motion study

S. Calder-Sprackman, MD, MSc, G. Clapham, BA, T. Kandiah, BHSc, J. Choo-Foo, BSc, S. Aggarwal, J. Sweet, BSc, K. Abdulkarim, C. Price, BHSc, V. Thiruganasambandamoorthy, MSc, MBBS, E. Kwok, MD, MSc, MHA, University of Ottawa, Ottawa, ON

Introduction: Adoption of a new Electronic Health Record (EHR) can introduce radical changes in task allocation, work processes, and efficiency for providers. In June 2019, The Ottawa Hospital transitioned from a primarily paper based EHR to a comprehensive EHR (Epic) using a "big bang" approach. The objective of this study was to assess the impact of the transition to Epic on Emergency Physician (EP) work activities in a tertiary care academic Emergency Department (ED). **Methods:** We conducted a time motion study of EPs on shift in low acuity areas of our ED (CTAS 3-5). Fifteen EPs representing a spectrum of pre-Epic baseline workflow efficiencies were directly observed in real-time during two 4-hour sessions prior to EHR implementation (May 2019) and again in go live (August 2019). Trained observers performed continuous observation and measured times for the following EP tasks: chart review, direct patient care, documentation, physical movement, communication, teaching, handover, and other (including breaks). We compared time spent on tasks pre Epic and during go live and report mean times for the EP tasks per patient and per shift using two tailed t-test for comparison. **Results:** All physicians had a 17% decrease in patients seen after Epic implementation (2.72/hr vs 2.24/hr, $p < 0.01$). EPs spent the same amount of time per patient on direct patient care and chart review (direct patient care: 9min06sec/pt pre vs 8min56sec/pt go live, $p = 0.77$; chart review: 2min47sec/pt pre vs 2min50sec/pt go live, $p = 0.88$), however, documentation time increased (5min28sec/pt pre vs 7min12sec/pt go live, $p < 0.01$). Time spent on shift teaching learners increased but did not reach statistical significance (31min26sec/shift pre vs 36min21sec/shift go live, $p = 0.39$), and time spent on non-patient-specific activities –

physical movement, handover, team communication, and other – did not change (50min49sec/shift pre vs 50min53sec/shift go live, $p = 0.99$). **Conclusion:** Implementation of Epic did not affect EP time with individual patients – there was no change in direct patient care or chart review. Documentation time increased and EP efficiency (patients seen per hr on shift) decreased after go live. Patient volumes cannot be adjusted in the ED therefore anticipating the EHR impact on EP workflow is critical for successful implementation. EDs may consider up staffing 20% during go live. Findings from this study can inform how to best support EDs nationally through transition to EHR.

Keywords: electronic health record, health informatics, time motion study

MP03

Clearing the air: A retrospective cohort study of cannabis-related harms in urban Alberta emergency departments following legalization

M. Yeung, C. Weaver, BSc, E. Lang, MD, R. Saah-Haines, PhD, K. Janz, MD, University of Calgary, Calgary, AB

Introduction: Non-medical cannabis recently became legal on October 18th, 2018 to Canadian adults. The impact of legalization on Emergency Departments (EDs) has been identified as a major concern. The study objective was to identify changes in cannabis-related ED visits and changes in co-existing diagnoses associated with cannabis-related ED visits pre- and post-legalization for the entire urban population of Alberta. Urban Alberta was defined as Calgary and Edmonton, inclusive of Sherwood Park and St. Albert given the proximity of some Edmontonians to their EDs) encompassing 12 adult EDs and 2 pediatric EDs. **Methods:** Retrospective data was collected from the National Ambulatory Care Reporting System, and from the HealthLink and the Alberta Poison and Drug Information Service (PADIS) public telehealth call databases. An interrupted time-series analysis was completed via segmented regression calculation in addition to incident rate and relative risk ratio calculation for the pre- and post-legalization periods to identify both differences among the entire urban Alberta population and differences among individuals presenting to the ED. Data was collected from October 1st, 2013 up to July 31st, 2019 for ED visits and was adjusted for natural population increase using quarterly reports from the Government of Alberta. **Results:** The sample included 11 770 pre-legalization cannabis-related visits, and 2962 post-legalization visits. Volumes of ED visits for cannabis-related harms were found to increase post-legalization within urban EDs (IRR 1.45, 95% CI 1.39, 1.51; absolute level change: 43.48 visits per month in urban Alberta, 95% CI 26.52, 60.43), and for PADIS calls (IRR 1.87, 95% CI 1.55, 2.37; absolute level change: 4.02 calls per month in Alberta, 95% CI 0.11, 7.94). The increase in visits to EDs equates to an increase of 2.72 visits per month, per ED. Lastly, increases were observed for cannabinoid hyperemesis (RR 1.23, 95% CI 1.10, 1.36), unintentional ingestion (RR 1.48, 95% CI 1.34, 1.62), and in individuals leaving the ED pre-treatment (RR 1.28, 95% CI 1.08, 1.49). Decreases were observed for coingestant use (RR 0.77, 95% CI 0.73, 0.81) and hospital admissions (RR 0.88, 95% CI 0.80, 0.96). **Conclusion:** Overall, national legalization of cannabis appears to be correlated with a small increase in cannabis-related ED visits and poison control calls. Post-legalization, fewer patients are being admitted, though cannabinoid hyperemesis appears to be on the rise.

Keywords: cannabis, legalization, policy

MP04

Predicting future ED needs – population trends may not be enough!

S. Weerasinghe, PhD, S. Campbell, MBChB, Dalhousie University, Halifax, NS

Introduction: As the population of Canadian cities grows, public policy planners frequently base predictions of future demand on population trends. We aimed to discover the relationship between demographically defined ED visit rate (EDVR) trends in an academic ED with corresponding population trends in the catchment area. **Methods:** We used administrative data to conduct a retrospective cohort time series to analyze per capita EDVR trends based on CTAS, age, gender and housing status for the period 2006-2015. These were adjusted for population growth using age-gender standardized rates from 2011 census data. All EDVR and Standardized estimates were extrapolated for 100,000 population. **Results:** There were 646 731 visits during the study period, increasing by 25.6% from 56 757 in 2006 to 71 289 in 2015, with an annual incremental linear trend of 1893/year (CI:1593-2192). The highest CTAS2 EDVR increase, 521/year, (95%CI: 433-608) was by non-homeless patients older than 49. CTAS2 visits and the rate in all non-homeless patients increased by 335/year, (95% CI 280-391), while homeless patients less than 30 showed the highest CTAS2 EDVR annual rate increase (1183/year, CI:1448-2218). From 2008-2015, the annual linear per capita CTAS5 EDVR declined by 121/year (CI:79-163). The population of adults in Halifax increased by 1.2%/yr with a linear trend of 4149/year (CI:4012-4287). The highest linear increasing trend was for those older than 49 (2604/year CI:2494-2714), followed by 30-50-year old group (1223/year, CI:1138-1309) with the lowest trend for those aged less than 30 (322/year, CI:170-473). Standardized and non-standardized rate decline (CTAS5) and incline (CTAS2) were statistically similar and were not influenced by population changes. The population older than 49 increased by 38% over the 10 year period, whereas the CTAS2 visit change increased by 250%. If the CTAS2 EDVR trend continues, this rate in 2027 will double that of 2015, even if the population in the catchment area remains stable. **Conclusion:** EDVR trends show an increase in CTAS2 visits driven chiefly by older patients. This trend exceeds the trend suggested by Canadian Foundation for Healthcare Improvement and is significantly more than predicted by population demographic changes. Healthcare administrators will need to bear these disparities in mind as they prepare for future ED capabilities.

Keywords: emergency demands, population trends

MP05

Validation of the Canadian clinical practice guideline clinical decision aid for acute aortic syndrome

B. Paige, BSc, MD, A. Maeng, MD, HBA, D. Savage, MD, PhD, R. Ohle, MSc, MBBCh MA, Northern Ontario School of Medicine, Sudbury, ON

Introduction: Acute aortic syndrome (AAS) is a rare clinical syndrome with a high mortality encompassing acute aortic dissection, intramural hematoma and penetrating atherosclerotic ulcer. Up to 38% of cases are misdiagnosed on first presentation. There is a large variation in use of computed tomography to rule out AAS. The Canadian clinical practice guideline for the diagnosis of AAS was developed in order to reduce the frequency of misdiagnoses. As part of the guideline, a clinical decision aid was developed to facilitate clinician decision-making based on practice recommendations. Our

objective was to validate the sensitivity of this clinical decision aid. **Methods:** Our validation cohort was recruited from a retrospective review of all cases of AAS diagnosed at three tertiary care emergency departments and one cardiac referral center from 2002-2019. Inclusion criteria: >18 years old, non-traumatic, symptoms <14 days and AAS confirmed on computed tomography, transesophageal echocardiography, intraoperatively or postmortem. The clinical decision aid assigns an overall score of 0-7 based on high risk pain features, risk factors, physical examination and clinical suspicion. Sensitivity with 95% confidence intervals are reported. Based on a national survey, a miss rate of <1% was predefined for the validation threshold. **Results:** Data was collected from 2002-2019 yielding 222 cases of AAS (mean age of 65 (SD 14.1) and 66.7% male). Kappa for data abstraction was 0.9. Of the 222 cases of AAS (type A = 125, type B = 95, IMH = 2), 35 (15.7%) were missed on initial assessment. Patients were risk stratified into low (score = 0, 2 (0.9%)) moderate (score = 1, 42 (18.9%)) and high risk (score ≥ 2 , 178 (80.2%)) groups. A score ≥ 1 had a sensitivity of 99.1% (95% CI 96.8-99.9%) in the detection of AAS. The clinical decision aid missed 0.9% (95% CI 0.3-3%) of cases. **Conclusion:** The Canadian clinical practice guideline's AAS clinical decision aid is a highly sensitive tool that uses readily available clinical information. Although the miss rate was <1%, the 95% confidence intervals crossed the predefined threshold. Further validation is needed in a larger population to ensure the miss rate is below an acceptable level.

Keywords: acute aortic syndrome, aortic dissection, vascular

MP06

Using electrocardiogram-to-activation time to assess emergency physicians' diagnostic delay of acute coronary occlusion

J. McLaren, MD, L. Chartier, MDCM, MPH, University of Toronto, Toronto, ON

Introduction: Electrocardiogram (ECG) diagnosis of acute coronary occlusion has been broadening in recent years, from classic ST-Elevation Myocardial Infarction (STEMI) criteria to STEMI-equivalents and rules for subtle occlusions. However, there is no quality metric focused on emergency physicians' decision-making. We hypothesized that the time from initial emergency department (ED) ECG to activation of Code STEMI could quantify diagnostic delay associated with automated interpretation, classic STEMI criteria, and other signs of occlusion. **Methods:** This multi-centre retrospective study reviewed all ED Code STEMI patients with confirmed culprit lesions from two urban academic EDs over a three-year period (Jan 2016 to Dec 2018). We reviewed charts to calculate ECG-to-Activation (ETA) time, measured from the time stamp on the initial ED ECG to the time a Code STEMI was activated (based on the hospital call centre log). We examined ECGs to determine: 1) if automated computer interpretation labelled "STEMI" or not; and 2) whether they met classic STEMI criteria, STEMI-equivalent patterns, or rules for subtle occlusion, based on a priori criteria from published guidelines or studies. All ECGs were reviewed by the lead author (JTM) and those not obviously meeting classic STEMI criteria were independently reviewed by the other author. **Results:** There were 180 Code STEMI from the ED with culprit lesions, including 177 with complete information. Average ETA time was 46.5 minutes (95% Confidence Interval [CI] 36.3-56.7min). Automated interpretation labelled 55.4% of initial ECGs as "STEMI" (ETA 13.9 min, 95%CI 9.8-18.0min), and 44.6% not as "STEMI" (ETA 86.9min, 95%CI 67.9-105.9min).

Initial ECGs included 62.1% with classic STEMI criteria (ETA 17.3min, 95%CI 12.8-21.8min), 11.3% with STEMI-equivalents (ETA 49.5min, 95%CI 29.5-69.5min), 18.1% with subtle occlusions (ETA 118.3min, 95%CI 81.5-155.1min) and 8.5% with no initial sign of occlusion (ETA 102.9min, 95%CI 53.9-151.9min). Inter-rater reliability was very good (Cohen's kappa 0.84). **Conclusion:** Over 90% of Code STEMI patients with culprit lesions had initial ECGs diagnostic of acute coronary occlusion, but automated interpretation and classic STEMI criteria only identified 55.4% and 62.1%, respectively. STEMI-equivalents and subtle occlusions were associated with significant diagnostic delays. ETA time can serve as a quality metric for emergency physicians and may help guide ED quality improvement initiatives.

Keywords: acute coronary occlusion, electrocardiogram, ST elevation myocardial infarction

MP07

Identification of barriers and facilitators for implementation of the Canadian Syncope Risk Score

N. Hudek, PhD, B. Rowe, MD, MSc, J. Brehaut, PhD, B. Ghaedi, MSc, P. Nguyen, BSc, J. Presseau, PhD, A. McRae, MD, PhD, J. Yan, MD, MSc, R. Ohle, MD, C. Fabian, MD, N. Le Sage, MD, PhD, E. Mercier, MD, MSc, M. Hegdekar, MD, P. Archambault, MD, M. Sivilotti, MD, MSc, V. Thiruganasambandamoorthy, MSc, Ottawa Hospital Research Institute, Ottawa, ON

Introduction: Wide variability exists in emergency department (ED) syncope management. The Canadian Syncope Risk Score (CSRS) was derived and validated to predict the probability of 30-day serious outcomes after ED disposition. The objective was to identify barriers and facilitators among physicians for CSRS use to stratify risk and guide disposition decisions. **Methods:** We conducted semi-structured interviews with physicians involved in ED syncope care at 8 Canadian sites. We used purposive sampling, contacting ED physicians, cardiologists, internists, and hospitalists until theme saturation was reached. Interview questions were designed to understand whether the CSRS recommendations are consistent with current practice, barriers and facilitators for application into practice, and intention for future CSRS use. Interviews were conducted via telephone or videoconference. Two independent raters coded interviews using an inductive approach to identify themes, with discrepancies resolved through consensus. Our methods were consistent with the Knowledge to Action Framework, which highlights the need to assess barriers and facilitators for knowledge use and for adapting new interventions into local contexts. **Results:** We interviewed 14 ED physicians, 7 cardiologists, and 10 hospitalists/internists across 8 sites. All physicians reported the use of electrocardiograms for patients with syncope, a key component in the CSRS criteria. Almost all physicians reported that the low risk recommendation (discharge without specific follow-up) was consistent with current practice, while less consistency was seen for moderate (15 days outpatient monitoring) and high risk recommendations (outpatient monitoring and/or admission). Key barriers to following the CSRS included a lack of access to outpatient monitoring and uncertainty over timely follow-up care. Other barriers included patient/family concerns, social factors, and necessary bloodwork. Facilitators included assisting with patient education, reassurance of their clinical gestalt, and optimal patient factors (e.g. reliability to return, support at home, few comorbidities). **Conclusion:** Physicians are receptive to using the CSRS tool for risk stratification and decision support. Implementation should address identified barriers, and adaptation

to local settings may involve modifying the recommended clinical actions based on local resources and feasibility.

Keywords: knowledge translation, risk-stratification, syncope

MP08

Using administrative data to explore emergency department management of patients presenting with acute atrial fibrillation/flutter: Is Shock-First a more effective strategy than Drug-Shock?

B. Rowe, MD, B. Bohlouli, MD, C. Villa-Roel, MD, University of Alberta, Edmonton, AB

Introduction: Atrial fibrillation and flutter (AFF) are the most common arrhythmias managed in the emergency department (ED). Equipoise in cardioversion strategies for patients with recent onset AFF contributes to observed practice variation. Using administrative data, the objective of this study was to explore the pattern of practice and the comparative effectiveness (outcomes and costs) between Shock-First and Drug-Shock approaches in AFF. **Methods:** Adult patients >17 years of age with AFF from one academic Canadian hospital ED were eligible. Using administrative data linkage among the National Ambulatory Care Record System, provincial practitioner claims data repository and a local hospital pharmacy database, patients who received treatment with procainamide and/or electrical cardioversion for AFF were identified. Outcomes including disposition, length of stay, revisit within 72 hours and 30-days, and ED costs were analyzed over a seven-year period. Categorical variables are reported as percentages. Continuous variables are reported as median and interquartile range (IQR). Univariate and multivariate logistic regression analyses were completed and reported as odds ratios (OR) and 95% confidence intervals (CI). **Results:** Overall, 5,372 patients were identified with AFF; the median age was 70 years and 55% were male. The majority of patients had chronic or secondary AFF; however, in 1687 (31%) cardioversion options were employed for presumed recent onset AFF. A Shock-First strategy was most common (1379 {82%}); 308 (18%) received a Drug-Shock approach. Discharge time was 33 minutes (95% CI: 4-63) longer in the Drug-Shock approach compared to the Shock-First approach. Hospital admissions were higher (OR = 2.33; 95% CI: 1.68, 3.24) and revisits within 30-days were lower (OR = 0.74; 95% CI: 0.54, 0.95) in the Drug-Shock group. The Shock-First strategy demonstrated marginally higher costs (median = \$106 CND; 95% CI: \$68.89, \$144.40) in adjusted analyses. **Conclusion:** In patients with acute AFF, when cardioversion was attempted, a Shock-First strategy was employed 80% of the time and resulted in shorter ED length of stay and lower hospitalization; however, higher costs and ED revisits within 30-days were observed. Many factors, including physician and/or patient preferences, influence ED decision-making in patients with AFF and understanding the factors influencing these decisions requires further attention.

Keywords: atrial fibrillation, cardioversion, decision-making

MP09

Predictors of return acute asthma visits among patients receiving guideline recommended discharge management in the emergency department

C. Dhaliwal, MD, T. Haji, MD, G. Leung, BSc, T. Madhura, MD, S. Giangio, MD, D. Radhakrishnan, MD, Western University, London, ON

Introduction: Despite improvements in the recognition of asthma among the pediatric population and the use of preventative therapies,

rates of emergency department (ED) visits and hospitalizations remain high, leading one to question how these acute health care visits for asthma can be further avoided. In this study, we aimed to identify predictors of future repeat acute care visits among children and adolescents who had already received 'best practice' discharge treatments and instructions during their first asthma ED visit. **Methods:** We performed a retrospective single center cohort study of all children ages 1-17 years presenting to the ED at the Children's Hospital of Eastern Ontario in Ottawa, Canada for an acute asthma exacerbation during a 1-year time frame between September 1, 2014 – August 31, 2015. Only children with no prior ED asthma visit and documentation of receipt of a prescription for inhaled corticosteroids and/or a written asthma action plan were included. Multivariable logistic regression was performed to identify predictors of repeat future asthma ED visit or hospitalization in the year following the first ED visit. **Results:** We identified 909 children with an eligible ED visit during the study period, of whom 24% had a repeat asthma ED visit or hospitalization within the subsequent 1 year. Predictors of repeat acute asthma visits included having a nut allergy (OR 1.76, 95% CI: 1.15, 2.70), higher severity symptoms at triage (OR 2.04, 95% CI: 1.23, 3.39), a primary care physician (OR 2.23, 95% CI: 1.26, 3.93), or a prior history of asthma (OR 1.53, 95% CI: 1.03, 2.28). **Conclusion:** In children and adolescents with repeat asthma ED visits and hospitalizations despite having received 'best practice' asthma discharge management at their first ED visit, factors such as having an allergy to nuts, higher severity symptoms at presentation, a prior history of asthma, and having a primary care provider may be used to identify these more high-risk children and adolescents. Such parameters can be used practically to target and apply more intensive preventative interventions to those most in need at the first ED visit, in order to prevent future return visits.

Keywords: asthma, childhood, emergency department

MP10

Does arrival pain severity predict stone characteristics or short-term outcomes in emergency department patients with acute renal colic?

G. Splinter, BSc, K. Gourlay, BSc, J. Hayward, MD, MPH, G. Innes, MD, MSc, University of Alberta, Edmonton, AB

Introduction: Renal colic is among the most painful conditions that patients experience. The main outcome determinants for patients with renal colic are stone size, location and hydronephrosis; however, little is known about the association of pain with these parameters. Our objective was to determine whether more severe pain is associated with larger stones, more proximal stones or more severe hydronephrosis, findings that might suggest the need for advanced imaging, hospitalization or early intervention. **Methods:** We used administrative data and structured chart review to study all adult emergency department (ED) patients in two cities with a renal colic diagnosis over one-year. Patients with missing imaging results or pain scores were excluded. Triage nurses recorded numeric rating scale (NRS) pain scores on arrival. We stratified patients into mild (NRS <4), moderate (NRS 4-7) and severe (NRS 8-10) pain groups, as per CTAS guidelines. Stone size (mm) and location (proximal, middle, distal ureter, or renal) were abstracted from imaging reports, while index admissions were determined from hospital discharge abstracts. We used multivariable linear regression to determine the association of arrival pain with stone characteristics and hydronephrosis severity (primary outcome), and we used multivariable logistic regression to

determine the association of pain with index hospitalization (secondary outcome). We also performed a stratified analysis looking at ureteral vs. kidney (intrarenal) stones. **Results:** We studied 1053 patients, 66% male, with a mean age of 48 years. After controlling for patient and disease characteristics, we found no significant association between pain severity and stone size ($b = -0.0004$; 95%CI: $-0.0015, 0.0008$) or stone location ($b = 0.0045$; 95%CI: $-0.020, 0.029$). Nor did we find an association between pain and hydronephrosis severity ($b = 0.016$; 95%CI: $-0.053, 0.022$, $p = 0.418$). Stratified analyses using a Bonferroni correction for multiple comparisons revealed the same absence of associations in the kidney and ureteral stone subgroups. Arrival pain did not predict index admission (OR = 0.82, 95% CI: 0.59, 1.16). **Conclusion:** Arrival pain scores are not associated with stone size, stone location or hydronephrosis severity, and do not predict index visit hospitalization in ED patients with renal colic. Severe pain should motivate efforts to minimize treatment delays, but do not suggest the need to modify advanced imaging or admission decisions.

Keywords: pain, renal colic, stone

MP11

Emergency physician attitudes on opioid use disorder and barriers to providing buprenorphine/naloxone

D. Webster, MD, T. Meyer, BSc, MD, C. Crain, BSc, J. Fraser, BN, P. Atkinson, MBChB, Dalhousie University, Saint John, NB

Introduction: Buprenorphine/naloxone (buprenorphine) has proven to be a life-saving intervention amidst the ongoing opioid epidemic in Canada. Research has shown benefits to initiating buprenorphine from the emergency department (ED) including improved treatment retention, systemic health care savings and fewer drug-related visits to the ED. Despite this, there has been little to no uptake of this evidence-based practice in our department. This qualitative study aimed to determine the local barriers and potential solutions to initiating buprenorphine in the ED and gain an understanding of physician attitudes and behaviours regarding harm reduction care and opioid use disorder management. **Methods:** ED physicians at a mid-size Atlantic hospital were recruited by convenience sampling to participate in semi-structured privately conducted interviews. Audio recordings were transcribed verbatim and de-identified transcripts were uploaded to NVivo 12 plus for concept driven and inductive coding and a hierarchy of open, axial and selective coding was employed. Transcripts were independently reviewed by a local qualitative research expert and themes were compared for similarity to limit bias. Interview saturation was reached after 7 interviews. **Results:** Emergent themes included a narrow scope of harm reduction care that primarily focused on abstinence-based therapies and a multitude of biases including feelings of deception, fear of diversion, feeling buprenorphine induction was too time consuming for the ED and differentiating patients with opioid use disorder from 'medically ill' patients. Several barriers and proposed solutions to initiating buprenorphine from the ED were elicited including lack of training and need for formal education, poor familiarity with buprenorphine, the need for an algorithm and community bridge program and formal supports such as an addictions consult team for the ED. **Conclusion:** This study elicited several opportunities for improved care for patients with addictions presenting to our ED. Future education will focus on harm reduction care, specifically strategies for managing patients desiring to continue to use substances. Education will focus on addressing the multitude of biases elicited and dispelling common myths. A

locally informed buprenorphine pathway will be developed. In future, this study may be used to advocate for improved formal supports for our department including an addictions consult team.

Keywords: buprenorphine, harm reduction, opioid use disorder

MP12

Abdominal ultrasound image acquisition and interpretation by novice practitioners after minimal training on a simulated patient model

B. Waterman, MD, BAS, K. VanAarsen, MSc, M. Lewell, MD, H. Tien, MD, F. Myslik, MD, M. Peddle, MD, S. Doran, MD, Victoria Hospital, London Health Sciences Centre, London, ON

Introduction: The FAST exam – Focused Assessment with Sonography in Trauma – is a rapid test using ultrasound to identify sonographic evidence of hemorrhage within the abdomen. In the prehospital setting, the information from a FAST examination can help triage patients, direct patients to the most appropriate facilities, assist with management strategies and potentially expedite time to definitive intervention. Few studies examine the accuracy of paramedic-only-performed FAST examinations. However, despite the potential benefits to the Canadian prehospital system, a potential barrier to implementation is the tremendous financial and operational burden if paramedics require prolonged ultrasound training courses. In this study, we conducted a double-blinded observational study comparing the accuracy of paramedic-performed FAST versus physician-performed tests on a sonographic Phantom, after a one-hour didactic training session. **Methods:** The interpretation of paramedic performed FAST exams was compared to the interpretation of physician performed FAST examinations on a mannequin model. The mannequin utilized in this study was a realistic model of a human torso where fluid could be injected into the abdomen to create a realistic ultrasound image of abdominal free fluid. Participants were required to scan the mannequin twice, once with 300 mL of fluid instilled and once with the abdomen free of fluid. Participants were blinded to the status of hemoperitoneum. The primary outcome of the study was accuracy rate of FAST examination by paramedics compared to emergency room physicians. Results were compared using the Chi-square test. Differences in accuracy rate were deemed significant if $p < 0.05$. Total scan time was reported using means, standard deviations and 95% CIs and was compared between groups using standard t-test. **Results:** Fourteen critical care flight paramedics and four emergency physicians were voluntarily recruited. The critical care paramedics were ultrasound-naïve whereas the emergency physicians had ultrasound training. The correct interpretation of FAST scans was comparable between the two groups 85.6% and 87.5% ($\Delta 1.79$ 95%CI -33.85 to 21.82 , $p = 0.90$) for paramedics and emergency physicians respectively. Total scan time differed between groups but did not reach statistical significance. Paramedics took longer to complete the FAST examination with a mean (SD) time to complete the two scans of 10.35 (3.43) minutes compared to 7.34 (2.74) minutes for physicians, ($\Delta 3.01$ minutes 95%CI -0.97 to 7.00 , $p = 0.13$). **Conclusion:** This study determined that critical care paramedics were able use ultrasound to detect free fluid on a simulated mannequin model and interpret the FAST exam with a similar accuracy as experienced emergency physicians following a one hour training course. This suggests the potential use of ultrasound in prehospital programs to determine the most appropriate transport destination and aid in the triage of trauma patients while limiting the financial and logistical burden of ultrasound training.

Keywords: emergency medicine, prehospital and emergency medical services, ultrasound

MP13

Injuries presenting to the ED following jumps from bridges into water: a multi-agency retrospective case series

D. Stephanian, MSc, BSc, D. Shearer, BSc, N. Bandara, BSc, J. Brubacher, MD, MSc, University of British Columbia, Vancouver, BC

Introduction: Suicidal jumps from bridges into water are a unique blunt trauma mechanism. Impact into water produces substantial variation in injuries as compared to falls onto hard surfaces. Outcomes can be further complicated by submersion injuries. We identified cases through a multi-agency review in order to analyze injury patterns seen in EDs. **Methods:** Cases in British Columbia's Lower Mainland of jumps from bridges >12m into water between 2006 and 2017 were identified by retrospective review of Coast Guard and Police records. Records pertaining to identified incidents were located in ambulance and then hospital records. This multi-agency approach was necessary to generate a comprehensive case series, as case identification was not possible at the hospital level. Patient hospital charts were abstracted and injury incidence rates were analyzed. **Results:** Records were available for 41 of 52 patients. The population was 63% (26/41) male, median age 37 (IQR 29-48). Thirty-two cases were admitted to hospital, seven were deceased in the ED, one was discharged, and disposition is unknown for one. Most patients (85%) presented to Level One trauma centers. Bridge heights ranged from 15m to 70m; the mean fall height was 40.1m. Pulmonary injuries were nearly universal, including pneumothorax (51%), haemothorax (22%), and pulmonary infiltrate (34%). The primary cardiovascular concern was cardiac arrhythmia (51%). A quarter of cases had intraabdominal lacerations or ruptures (27%). Vertebral fractures at all levels were frequent (59%), although there was only one case each of cord transection and contusion. Neurological injuries were rare; 59% of patients presented to the ED with GCS ≥ 14 and the incidence of intracranial bleeding was low (7%). Rib fractures were commonly reported (37%) along with other fractures (32%). Body temperature was reported in 24 cases with 3 reports of moderate and 6 reports of mild hypothermia. **Conclusion:** This case series is the first to characterize injury patterns of jumps from bridges into water in Canada. Patterns are similar to reports in the literature from other countries. However, we found lower injury severity, and higher incidences of spinal fractures and cardiac arrhythmias. The low injury severity reflects the survivorship bias inherent to the sample: data was only obtained from patients who survived to be assessed in the ED. These results suggest that patients with this mechanism of injury should be treated for both suspected trauma and cold-water immersion injuries.

Keywords: bridge, multi-agency, trauma

MP14

Quantification of head-neck motion in trauma patients in the emergency department under spinal motion restriction: a prospective observational study

M. Kulas, MD, L. Brueton-Campbell, BSc, E. Weldon, MD, N. McDonald, MPhil, R. Pryce, PhD, University of Manitoba, Winnipeg, MB

Introduction: This was a prospective observational study involving a convenience sample of low-risk trauma patients presenting to a Level 1 Trauma Centre under spinal motion restriction (SMR). To our

knowledge no prior studies have objectively measured head-neck (H-N) motion in trauma patients with suspected spine injuries during emergency department (ED) care. The goal was to establish the feasibility of deploying non-invasive motion sensors on trauma patients in the ED and to provide initial estimates for H-N kinematics under SMR during different phases of treatment. **Methods:** Low-risk adult patients treated by Winnipeg Fire Paramedic Service who sustained non-life threatening trauma with the potential for spine injury were eligible for inclusion. Participants received usual pre-hospital care; application of spine board and/or cervical collar, as determined by local practice protocol. Inertial measurement units (IMUs) were placed on participant's forehead, sternum and stretcher upon arrival to the ED. Data was collected during three phases of care: patient handling (log rolls, transfers, clothing removal); stretcher movement (to imaging, etc); stretcher stationary. IMUs were removed upon disposition decision by the attending physician. IMUs yielded data on H-N motion in terms of linear acceleration (resultant) and angular displacement (rotation + flexion-extension + side-flexion = total). Peak (M $\pm$ SE) displacements and accelerations are reported, with comparisons across treatment phases using repeated measures ANOVA. **Results:** Eleven patients were enrolled in the study (age: 49 $\pm$ 16 years; Injury Severity Score 13.4 $\pm$ 9.9; female = 2). Substantial H-N motion was observed during ED care. Total H-N displacement (28.6 $\pm$ 3.6 deg) and acceleration (7.8 $\pm$ 1.0 m/s²) were higher during patient handling compared to stretcher moving (13.0 $\pm$ 2.5 deg; 4.6 $\pm$ 0.9 m/s²; $p < .05$) but not while the stretcher was stationary (18.9 $\pm$ 3.4 deg; 5.4 $\pm$ 1.2 m/s²; $p > .06$). Similar differences were detected for side-flexion and flexion-extension ($p < .05$), with peak displacements of 11.4 $\pm$ 1.5 deg and 14.6 $\pm$ 2.2 deg during patient handling, respectively. **Conclusion:** IMU use on trauma patients safely described H-N motion kinematics in a small sample of patients with different spectrums of illness during their care in the ED. Future studies utilizing IMUs could inform ED spine motion restriction protocols and compare movement of patients in specific subsets (intoxicated, spinal tenderness, injury severity etc.).

Keywords: emergency department, spinal motion restriction, trauma

MP15

Predictors of emergency department opioid use and variability of prescribing practices in a large multicenter Canadian cohort

T. Lau, MD, BSc(Pharm), J. Hayward, MD, G. Innes, MD, MHSc, University of Calgary, Calgary, AB

Introduction: Emergency department (ED) opioid prescribing has been linked to long-term use and dependence. Anecdotally, significant opioid practice variability exists between physicians and institutions, but this is poorly defined. Our objective was to collate and analyze multicenter data looking at predictors of ED opioid use and to identify potential areas for opioid stewardship. **Methods:** We linked administrative and computerized physician order entry (CPOE) data from all four ED's within our municipality over a one-year period. Eligible patients included those with a Canadian Triage and Acuity Scale (CTAS) pain complaint or an arrival numeric rating scale (NRS) pain score of greater than 3/10. Patients with missing demographic or chief complaint data were excluded. Multiple imputation was used for missing NRS pain scores. We performed descriptive analyses of opioid-treated and non-treated patients, followed by a multivariable logistic regression to identify predictors of ED opioid administration. **Results:** A total of 129,547 patients were studied. The mean age was 47.4 years and 55.4% were female. The median

pain score was 6.6 in the no-opioid group and 8 in the opioid group. The most common pain categories were abdominal pain (23%), trauma (18.2%) and chest pain (15.3%). Overall, opioids were prescribed to 34% of patients. The most common CTAS score was CTAS 3 (44%), CTAS 1-2 42%) and CTAS 4-5 (13.9%). Multivariable predictors of opioid-use included the need for admission (adjusted OR 6.57; CI = 6.34-6.79), NRS pain score (aOR 1.24 per unit increase, CI 1.23-1.25), higher numerical CTAS score (aOR 0.89 per unit increase, CI 0.87-0.91), and chief complaints of back (aOR 7.69, CI 7.1-8.1), abdominal (aOR 5.9, CI 5.6-6.2), and flank pain (OR 3.8, CI 3.5-4). Oral opioids were prescribed in 39.8% of back pain presentations and 18.5% received IV opioids. Increasing age was a predictor but sex was not. There were significant institutional differences in opioid prescribing rates, with Hospital B being the least likely to prescribe opioids (aOR 0.82, CI 0.80-0.85) followed by Hospital C (aOR 0.83, CI 0.79-0.86) compared to the reference standard of Hospital A. Hospital D was most likely to prescribe opioids (aOR 1.32, CI 1.27-1.37). **Conclusion:** Predictors of ED opioid use were characterized using multicenter administrative data. Future research should seek to describe the physician- and site-level factors driving regional variation in opioid-based pain treatment.

Keywords: acute pain, emergency department, opioid

MP16

Oral case presentation: evaluation of a novel curriculum and development of a competency-based assessment tool in Emergency Medicine

T. Wawrykow, MD, MEd, T. McColl, MD, A. Velji, BSc, MD, MEd, BEd, M. Chan, MD, MHPE, Winnipeg, MB

Introduction: The oral case presentation is recognized as a core educational and patient care activity but has not been well studied in the emergency setting. The objectives of this study are: 1) to develop a competency-based assessment tool to formally evaluate the emergency medicine oral case presentation (EM-OCP) competency of medical students and 'transition to discipline' residents, and 2) to develop, implement and evaluate a curriculum to enhance oral case presentation (OCP) communication skills in the emergency medicine (EM) setting. **Methods:** Using data from a literature review, a Canadian Association of Emergency Physicians national survey, and local focus groups, the authors designed an OCP framework, blended learning curriculum, and EM-OCP assessment tool. Ninety-six clerkship students were randomly assigned to receive either the control, the standard clerkship curriculum, or intervention, the blended learning curriculum. At the beginning of their emergency medicine rotation, learners completed a pre-test using a standardized patient (SP) case to assess their baseline OCP skills. The intervention group then completed the EM-OCP curriculum. All students completed post-tests with a different SP at the end of the six-week EM rotation. Audio-recordings of pre and post-tests were evaluated using the assessment tool by two blinded evaluators. **Results:** Using the Kruskal-Wallis test, all students demonstrated improvement in EM-OCP skills between their pre-test and post-test, however, those who received the blended learning curriculum showed significantly greater improvement in synthesis of information ($p = 0.044$), management ($p = 0.006$) and overall entrustment decision score ($p = 0.000$). **Conclusion:** Implementation of a novel EM-OCP curriculum resulted in more effective communication and higher entrustment scores. This curriculum could improve OCP performance not only in

emergency medicine settings but also across specialties where medical students and residents must manage critical patients.

Keywords: communication, competency based medical education, curriculum design

MP17

Evaluation of a national competency-based assessment system in emergency medicine: A CanDREAM study

B. Thoma, MD, MSc, MA, A. Hall, MD, MMed, K. Clark, MD, N. Meshkat, MD, MHSc, W. Cheung, MD, MMed, P. Desautels, MD, C. Ffrench, MD, A. Meiwald, MD, MEd, BN, C. Meyers, MD, C. Patocka, MDCM, MHPE, L. Beatty, MD, T. Chan, MD, MHPE, University of Saskatchewan, Saskatoon, SK

Introduction: In 2018, Canadian postgraduate specialist Emergency Medicine (EM) programs began implementing a competency-based medical education (CBME) assessment system. To support improvement of this assessment program, we sought to evaluate its short-term educational outcomes nationally and within individual programs. **Methods:** Program-level data from the 2018 resident cohort were amalgamated and analyzed. The number of Entrustable Professional Activity (EPA) assessments (overall and for each EPA) and the timing of resident promotion through program stages was compared between programs and to the guidelines provided by the national EM specialty committee. Total EPA observations from each program were correlated with the number of EM and pediatric EM rotations. **Results:** Data from 15 of 17 (88.2%) EM programs containing 9,842 EPA observations from 68 of the 77 (88.3%) Canadian EM specialist residents in the 2018 cohort were analyzed. The average number of EPAs observed per resident in each program varied from 92.5 to 229.6 and correlated strongly with the number of blocks spent on EM and pediatric EM ($r = 0.83$, $p < 0.001$). Relative to the guidelines outlined by the specialty committee, residents were promoted later than expected and with fewer EPA observations than suggested. **Conclusion:** We present a new approach to the amalgamation of national and program-level assessment data. There was demonstrable variation in both EPA-based assessment numbers and promotion timelines between programs and with national guidelines. This evaluation data will inform the revision of local programs and national guidelines and serve as a starting point for further reaching outcome evaluation. This process could be replicated by other national assessment programs.

Keywords: competency based medical education, learning analytics

MP18

Pre-departure and post-elective requirements for global health electives: a survey of Canadian Royal College emergency medicine programs

J. Pritchard, MD, MPH, A. Collier, MD, S. Bartels, MD, MPH, McMaster University, Hamilton, ON

Introduction: Participation in Global Health (GH) electives can improve resourcefulness, cultural and ethical insight, and personal development. Risks to trainees, hosts and institutions may be minimized through pre-departure and post-elective training. In 2016 such training was mandatory in only 3 Canadian residency programs, however there is no published data specific to Canadian Emergency Medicine (EM) programs. This study sought to identify current GH elective requirements and related perceived gaps among Royal College EM programs. **Methods:** We conducted two cross-sectional

surveys in 2019 (one each for Royal College EM PDs and residents) via email regarding training requirements for GH electives. Additionally, a survey link was distributed in the CAEP EM resident newsletter. We also contacted university PGME and/or global health offices to understand and collate university-wide requirements and resources.

Results: Nine PDs responded, with 78% reporting having 1-5 residents participate in GH electives yearly. Many PDs were unsure of the requirements surrounding GH electives; two reported that pre-departure training was required, while none reported requiring post-departure debriefs. Overall, 67% of PDs felt that their residents were moderately prepared for GH electives and 33% felt they were unprepared to some degree. Thirty-three percent believed that improvements should be made to either pre-departure training or both pre- and post-departure training, while 56% were unsure if improvements were needed. Forty-seven out of an estimated 380 residents responded. Thirty-five percent of residents had completed a GH elective during residency. Of residents who participated in a GH elective, only one (6%) reported feeling very prepared; 18 residents (43%) reported there was a need to improve trainings. Residents reported a number of challenges during electives (lack of resources, inadequate supervision, safety issues) and identified priority topics for training. **Conclusion:** Although EM residents are participating in GH electives, the majority of EM residency programs do not require pre- or post-departure training. Some PDs and residents report varying levels of preparedness, and residents acknowledge a variety of challenges during GH electives. This information can be used to inform pre-departure/post-elective GH training or to encourage EM residents to access university-wide training.

Keywords: global health, residency education, residency electives

MP19

Identifying and transmitting the culture of emergency medicine through simulation

E. Purdy, BHSc, MD, MSc, C. Alexander, MD, M. Caughley, MD, S. Bassett, BN, V. Brazil, MBA, MD, Queen's University, Kingston, ON

Introduction: Simulation is commonly used in medical education. It offers the opportunity for participants to apply theoretical knowledge and practice non-technical skills. We aimed to examine how simulation may also help to identify emergency medicine culture and serve as a tool to transmit values, beliefs and practices to medical learners.

Methods: We undertook a focused ethnography of a simulated emergency department exercise delivered to 98 third-year medical students. This ethnography included participant-observation, informal interviews, and document review. Analysis was performed using a recursive method, a simultaneous deductive and inductive approach to data interpretation. We undertook a focused ethnography of a simulated emergency department exercise delivered to 98 third-year medical students. This ethnography included participant-observation, informal interviews, and document review. Analysis was performed using a recursive method, a simultaneous deductive and inductive approach to data interpretation. **Results:** All 20 staff (100%) and 92 of 98 medical students (94%) participated in the study. We identified 7 core values – identifying and treating dangerous pathology, managing uncertainty, patients and families at the center of care, balancing needs and resources at the system level, value of the team approach, education as integral, and emergency medicine as part of self-identity – and 27 related beliefs that characterized emergency medicine culture. We observed that culture was transmitted during the simulation

exercise. **Conclusion:** This study contributes to the characterization of the culture of emergency medicine by identifying core values and beliefs that are foundational to the specialty. Simulation facilitated cultural compression which allowed for ready identification of values, beliefs and practices and also facilitated transmission of culture to learners. This study expands understanding of the culture of emergency medicine and the role of simulation in the process of cultural exchange.

Keywords: culture, ethnography, simulation

MP20

Evaluation of the disruptors during advanced life support in emergency departments

J. Truchot, MD, PhD, D. Michelet, MD, D. Drummond, MD, PhD, P. Plaisance, MD, PhD, Université Laval, CHU Hôpital Enfant Jésus, Québec, QC

Introduction: Simulation is used as a teaching technique in the medical curriculum, and especially for advanced life support (ALS). However, simulated ALS can differ greatly from real life ALS. The aim of this exploratory study was to identify the different disruptors associated with real life ALS. **Methods:** We conducted a cross-sectional, anonymous, online survey that included 32 items. It was distributed by email to emergency physicians from five emergency departments in Paris. The aim of this online survey was to identify the elements perceived as disruptors during ALS. Other aspects of the survey explored the perceived differences between simulated ALS and real life ALS. Descriptive statistics of percentage, mean and standard deviation were used to analyse the data. **Results:** Among 100 surveyed physicians, 43 (43%) answers were analysed. 53% were women with a mean age of 32 ± 3 years old. The identified disruptors from real life ALS were task interruptions mainly from non-medical staff ($n = 16$; 37%), patient's siblings ($n = 5$; 12%), other specialists ($n = 5$; 12%) and the phone calls ($n = 2$; 5%). The situation of ED overcrowding ($n = 12$; 28%) was also mentioned as a potential disruptor. Overall, physicians reported that some technical and non-technical tasks were harder to perform in real life compared to simulated sessions.

Conclusion: This exploratory study allowed the identification of disruptors encountered in real life cases of ALS, and may be used for future simulation-based teaching to enhance realism during sessions

Keywords: advance life support, pedagogy, simulation

MP21

Improving the relational aspects of trauma care through translational simulation

E. Purdy, BHSc, MD, C. Alexander, MD, J. Matulich, BN, V. Brazil, MBA, MD, Queen's University, Kingston, ON

Introduction: Major trauma care is complex, and requires individuals and teams to perform together in time critical, high stakes situations. Scenario based simulation is well established as a strategy for trauma teamwork improvement, but its role in the relational and cultural aspects of trauma care is less well understood. Relational Coordination theory offers a framework through which we aimed to understand the impact of an established trauma simulation program **Methods:** We studied simulation activities using a narrative survey of trauma providers from anaesthesia, emergency medicine, medical imaging, surgery, trauma service, intensive care and pre-hospital providers at Gold Coast University Hospital, in conjunction with data from an ethnography. Data analysis was performed using a recursive approach – a simultaneous deductive approach using the relational coordination

framework and an inductive analysis. **Results:** 95/480 (19.8%) staff completed free text survey questions on simulation. Deductive analysis of data from this narrative survey results using the RC framework domains identified examples of shared goals, shared knowledge, communication, and mutual respect. Two major themes from the inductive analysis – “Behaviour, process and system change”, and “Culture and relationships” – aligned closely with findings from the RC analysis, with additional themes of “Personal and team learning” and the “Impact of the simulation experience” identified. **Conclusion:** Our findings suggest that an established trauma simulation program can have a profound impact on the relational aspects of care and the development of a collaborative culture, with perceived tangible impacts on teamwork behaviours and institutional systems and processes. The RC framework – shared knowledge, shared goals and mutual respect in the context of communication that is timely, accurate, frequent and problem-solving based – can provide a common language for simulation educators to design and debrief simulation exercises that aim to have a translational impact.

Keywords: ethnography, simulation, trauma

MP22

Using galvanic skin response to identify resuscitation expertise in a pulmonary embolism simulation exercise

A. Belyea, BSc, N. Cofie, PhD, N. Dalgarno, PhD, E. Bruder, MD, Queen's University, Kingston, ON

Introduction: As physicians gain expertise in clinical settings, they are able to handle progressively more information, in both complexity and magnitude, as an organized schema. Expert physicians then, will be more likely to function with less cognitive load—the amount of mental effort someone exerts within their short-term working memory. Expert physicians will also retain more working memory capacity to process information during medical emergencies than novice physicians. While a physician's ability to process medical information may have implications for handling medical emergencies, there is a paucity of empirical research examining the link between physicians' expertise and biometric measures of cognitive load. Using galvanic skin response (GSR) as a surrogate measure of cognitive load, we assess whether average cognitive load differs significantly between expert and novice physicians in a pulmonary embolism simulation exercise. **Methods:** We analyzed GSR data ($n = 39$) from a 10-minute simulated pulmonary embolism exercise among 18 faculty physicians and 21 residents. Cluster and factor analyses were used to identify novice, intermediate, advanced, and expert physicians with based on participants' GRS scores. One-way ANOVA was used to analyze group differences. Descriptive statistical techniques were also used to describe the distribution of GRS expertise by participants' level of training. **Results:** Contrary to expectation, we found more than two groups of resuscitation expertise in the simulation exercise. Respectively, we identified 7.7% and 20.5% of participants as novice and expert physicians. About 36% of participants were classified as intermediate (35.9%) physicians while another 36% were classified as having an advanced (35.9%) expertise in resuscitation. All the novice physicians identified were found to be PGY1 and PGY2 resident residents. A third (33.3%) of faculty physicians and 9.5% of residents were identified as experts. As expected, average GSR score for experts ($\bar{x} = 0.60\mu S$, $SD = 0.26$) was significantly ($F = 137.6$, $p < 0.001$) lower than the average GSR for novices ($\bar{x} = 5.55\mu S$, $SD = 0.99$), intermediate ($\bar{x} = 2.84\mu S$, $SD = 0.40$), and advanced ($\bar{x} = 1.57\mu S$, $SD = 0.28$) physicians. **Conclusion:** GSR measures of cognitive load may be used to

identify resuscitation expertise in managing pulmonary embolism and related medical conditions through simulation exercises.

Keywords: cognitive load, resuscitation, simulation

MP23

Mixed methods analysis of an automated e-mail audit and feedback intervention for fostering emergency physician reflection

W. Kennedy, BSc, D. Andruchow, BSc, S. Dowling, MD, K. Lonergan, BSc, T. Rich, MD, C. Patocka, MD, MHPE, University of Calgary, Calgary, AB

Innovation Concept: Emergency physicians (EP) rarely receive timely, iterative feedback on clinical performance that aids their reflective practice. The Calgary zone ED recently implemented a novel email-based alert system wherein an EP is notified when a patient whose ED care they were involved in is admitted to hospital within 72-hours of discharge from an index ED visit. Our study sought to evaluate the general acceptability of this form of audit and feedback and determine whether it encourages practice reflection.

Methods: This mixed methods realist evaluation consisted of two sequential phases. An initial quantitative phase used data from our electronic health record and a survey to examine the general features and acceptability of 72-hour readmission alerts sent from May 2017-2018. A subsequent qualitative phase involved semi-structured interviews exploring the alert's role in greater depth. Quantitative data were summarized using descriptive statistics and qualitative data were analyzed using thematic and template analysis techniques. Results of both phases were used to guide construction of context-mechanism-outcome statements to refine our program theory. **Curriculum, Tool, or Material:** 4024 alerts were sent over a 1-year period, with each physician receiving approximately 17 alerts per year (Q1: 7, Q3: 25, IQR: 18). The top five CEDIS complaints on index presentations were abdominal pain, flank pain, shortness of breath, vomiting and/or nausea, and chest pain (cardiac features). The majority of re-admissions (78.6%) occurred within 48 hours after discharge. Immediate alert survey feedback provided by EP's noted that 52.65% ($N = 471$) of alerts were helpful. Thematic analysis of 17 semi-structured interviews suggests that the alert was generally acceptable to physicians. However, certain EPs were concerned that the alert impacted hire/fire decisions even when leadership didn't endorse this sentiment. Physicians who didn't believe alerts were involved in hire/fire decisions, described greater engagement in the reflective process. Conversely, physicians, who believed alerts were involved in hire/fire decisions, were more likely to defensively change their practice. **Conclusion:** Most EPs noted that timely notification of 72-hour readmissions made them more mindful of documenting discharge instructions. Our implementation of a 72-hour readmission alert was an acceptable format for audit and feedback and appeared to facilitate physician reflection under certain conditions.

Keywords: feedback methods, innovations in EM education, mixed methods

MP24

Contagion: An innovative approach to learning the Orange Book and Choosing Wisely Canada guidelines around antimicrobial treatment

M. Khalid, BSc, S. Shah, BSc, S. Bala, BSc, M. Luterman, BSc, MD, McMaster, Hamilton, ON

Innovation Concept: The Orange Book (OB) identifies drugs approved on the basis of safety and effectiveness by the FDA and

serves as the gold standard reference for correct pharmacological therapies. It ties in closely with Choosing Wisely Canada (CWC) modeling good stewardship in antimicrobial prescriptions. The book focuses on passive didactic learning instead of active learning, which was shown to have a greater influence on prescribing behaviour. Educational video games, a form of active learning, have been shown to improve clinical skills in medical training. Contagion is a role-playing video game providing an active way of teaching antimicrobial components of the OB and CWC guidelines. **Method:** Phase I of Contagion was qualitatively tested on students and physicians at McMaster University for teaching effectiveness, applicability to real-life scenarios, and enjoyability. Post-game play 12 participants scored different aspects of the game on a Likert scale. **Curriculum, Tool, or Material:** The player is a rural physician treating infections in various communities. Each round, the player is given a crate of antibiotics. As communities are infected, the player is provided with clinical symptoms the patients present with. The player must identify the pathology and then correctly treat the communities. The player can treat empirically or order tests to identify the infectious organism. The player strategically navigates which communities to treat as there are limited actions per turn and the player must prevent communities from dying or infecting neighboring regions. Communities tend to build antibiotic resistance over time making first-line treatments unviable, thus careful strategizing and stewardship is essential. Active learning will occur when players are tasked with finding the correct answer to different presentations. After each turn, players will learn about the infecting organism, its phenotypes, and common infectious symptoms. This is considered passive learning. **Conclusion:** Contagion was well-received by physicians and medical students as an active learning tool to teach the OB and CWC guidelines. On preliminary user testing Contagion scored 5 in effectiveness in teaching treatments and 4.6 in teaching stewardship. An objective of this project is to perform large scale testing across schools to demonstrate the effectiveness of the learning components of the game. We hope to eventually create a tool that can be incorporated in continuing medical education for physicians.

Keywords: antibiotic stewardship, innovations in EM education, video-game based learning

MP25

Assessing the learning impact of the Northern City of Heroes public exhibit on bystander cardiopulmonary resuscitation response

M. Moskalyk, R. Ohle, MBChB, MSc, MA, A. Henson, BSc, M. Sci. Com., S. McIsaac, BSc, MBChB, MEd, C. Barriault, BSc, MSc, PhD, B. Doran, BSc, MSc, N. Martin, Queen's University, Kingston, ON

Innovation Concept: In Sudbury, ON 44% of out-of-hospital cardiac arrest (OHCA) patients receive bystander CPR (bCPR), and only 4.7% survive cardiac arrest. The Northern City of Heroes (NCH) community initiative was launched in April 2019 with a goal of improving survival from OHCA through hands-only bCPR in the municipality. One NCH initiative is an interactive exhibit at Science North, a science centre in Sudbury that hosts 250,000 visitors annually. The exhibit employs simulation trainers for CPR, accompanying signage and interactive elements. The goals of the exhibit are to activate bCPR, change and measure behaviours through exhibit interactions on how to deliver excellent CPR, and improve survival rates in OHCA patients. **Methods:** Data is being collected from

3000 visitors using self-reported surveying via SurveyGizmo to assess likelihood of performing bCPR, pre and post interacting with the exhibit. Visitor behaviour will be examined at the exhibit using video-recorded interactions and coding those behaviours using BORIS software. Behavioural data will be analyzed using the Visitor Engagement Framework (VEF) where initiation, transition and breakthrough learning-behaviours are coded and an exhibit Visitor Engagement Profile (VEP) is created. The VEF and VEP are tools used in informal learning settings to assess exhibit impacts on learning. **Curriculum, Tool, or Material:** The use of an easily-apprehensible, hands-on exhibit tool located in a public setting, such as a science centre, creates a platform for engaging large and diverse public audiences. This type of bCPR exhibitry has not been implemented in other similar environments. The informal learning setting allows the science centre staff to engage in personalized interactions that can solidify the quality of learning and confidence in employing the new skills developed. **Conclusion:** The NCH exhibit and new strategies for embedding informal curriculum are powerful tools to reach diverse audiences, build knowledge and skills, and have a measurable impact on bCPR and OHCA survival rates. Data is being captured and tracked by Health Sciences North around the City of Greater Sudbury's bCPR and OHCA survival rates to monitor long-term impacts of the NCH community initiatives. Limitations of the study may be found in the focused demographics as well as the nature of self-reported learning. Future research directions include broader geographical surveying to assess improvements in community response to OHCA as a direct result of an interactive bCPR exhibitry.

Keywords: bystander cardiopulmonary resuscitation, informal learning, innovations in EM education

MP26

The simulated newsroom: a novel educational intervention to teach advocacy skills to resident physicians

B. Bigham, MD, MSc, C. Lavelle, BA, MBChB, J. Hulme, MDCM, MPH, K. Hayman, MD, MPH, University Health Network, Toronto, ON

Innovation Concept: Advocacy is a key competency of Canadian residency education, yet physicians seldom engage with supra-clinical advocacy efforts upon completion of training. Emergency medicine (EM) residency training may not equip graduates with the knowledge and skills required to engage as physician-advocates in their communities. Focused writing workshops may increase the confidence and ability of EM trainees to engage as health advocates. **Methods:** Following a literature review, simulated newsroom workshops were developed by two EM physicians with graduate-level journalism training and workplace experience. Participants were invited to participate in an audio-recorded focus-group and to submit their opinion editorial. Twelve participants registered for the workshops and six attended both sessions and the focus group; four submitted written work. Focus group transcripts and written work were qualitatively analysed to understand acceptability, feasibility, and how students might engage as future health advocates. **Curriculum, Tool, or Material:** The simulated newsroom consisted of participants acting as journalists and the expert facilitator acting as a news editor. The first workshop provided a framework for news judgement in a didactic session, followed by interactive exercises including: prioritization of news pitches, a simulated editorial meeting, and analysis of published news articles. The participants then drafted their own pitches for in situ feedback

from peers and facilitators. Two-weeks later, participants brought their completed articles for peer and expert review before submitting their final article. **Conclusion:** The innovation bolstered resident physician confidence in advocacy through the popular press, and provided demonstrable skills in opinion writing. Participants felt challenged to develop compelling narratives and differentiate this form of advocacy communication from academic writing or prior media training. Participants valued the workshop as a voluntary component of residency education led by peer experts. Through their writing, residents demonstrated an understanding of structural factors that impact patient health and health systems. Future engagement as physician advocates may be tempered by fears of professional repercussions for public engagement; the impact of physician advocacy on population health outcomes is not yet known.

Keywords: advocacy, innovations in EM education

MP27

Using a massive online needs assessment to guide the evolution of the EM Sim Cases website

A. Dinh, BHSc, J. Baylis, MD, B. Thoma, MD, T. Chaplin, MD, A. Petrosioniak, MD, K. Caners, MD, A. Hall, MD, C. Heyd, MD, T. Chan, MD, University of Saskatchewan, College of Medicine, Saskatoon, SK

Innovation Concept: EM Sim Cases is an innovative, open-access website that was created in 2015 to publish medical simulation resources including standardized, peer-reviewed simulation cases. Herein we describe our interim analysis. **Methods:** We performed a massive online needs assessment using a methodology previously described by Chan et. al. to determine how we can shape EM Sim Cases to meet the needs of learners and educators who use it. We engaged with simulation experts from the Emergency Medicine Simulation Education Research Collaborative to design a Google Forms survey using best practices in survey design. We distributed the survey to our target community of practice via Twitter, email, and a blog post published on emsimcases.com. **Curriculum, Tool, or Material:** We received 81 responses from simulation educators representing 8 medical specialties and 13 countries. Most survey respondents identified themselves as staff physicians (n = 44) and specialized in emergency medicine (n = 39). They had 0-21+ years of experience. 37% of respondents (n = 30) stated that material from EM Sim Cases makes up 25% or more of their simulation curriculum. Several respondents noted that using this content made them feel more confident and more current. Respondents praised EM Sim Cases for a well-organized case format, the proper level of detail, consistency between case designs, and the wide variety of cases. Suggested improvements included an opportunity to directly comment on cases and more cases in pediatric, rural, and advanced airway management situations. Suggestions were made to improve the navigability of the website. Respondents wanted to see additional blog content on debriefing strategies and self-made task/skill trainers. **Conclusion:** EM Sim Cases is a novel, free open-access simulation resource. Using a massive online needs assessment we were able to determine future directions including case topics, website reorganization, and educational material. We were also able to capture how impactful a resource like this can be to clinical and educational practice outside of the simulation setting.

Keywords: innovations in EM education, needs assessment, simulation

MP28

Development and validation of a novel three-dimensional printed thorax model simulator for the simulation-based training of tube thoracostomy

V. Brannan, BN, C. Dunne, BSc, MD, A. Dubrowski, PhD, M. Parsons, BSc, MD, Memorial University of Newfoundland, St. John's, NL

Innovation Concept: High-acuity, low-occurrence (HALO) procedures require skilled performance as they treat life-threatening conditions and are associated with significant morbidity when performed incorrectly. Simulation has proven useful for deliberate practice in a low stake setting. Tube thoracostomy is amenable to this approach. Commercially available trainers exist but often have limited realism and are prohibitively expensive particularly to non-academic centers. Three-dimensional (3D) printing produces models suitable for simulation, but no current simulator has been developed and validated for tube thoracostomy. The aim of this study was to develop such, a 3D-printed low-fidelity simulator validated for the simulation-based instruction of tube thoracostomy. **Methods:** The development of the simulator followed an iterative design cycle with collaboration between a design team and an emergency medicine expert. Its validity (face and content) was tested through hands-on practice and surveys completed by 15 acute-care practitioners. Participants performed the procedure on the simulator and then provided feedback through a mixed quantitative/qualitative product evaluation survey on appearance, realism (face validity) and value in procedural training (content validity). Mean values for overall appearance and content validity as a training tool were 4/5 and 4.3/5 respectively. All respondents felt the model was a useful adjunct. All but one stated it was a good replacement for pre-existing trainers. **Curriculum, Tool, or Material:** The model was initially printed in three parts using an Ultimaker 3 and Axiom Airwolf Dual 3D-printer. The ribcage was created using polylactic acid with polyvinyl alcohol support material. Printed sections were bonded using glue at interfaces requiring no flexibility. Flexible joints were made of varying amounts of thermoplastic polyurethane and thermoplastic elastomer. Skin overlay for the whole model was created with a cut out area for replaceable sections that subjects would incise to insert the chest tube. Skin was casted using platinum cured silicone in a 3D-printed mold. Total cost of all materials was roughly 80 CAD. **Conclusion:** The simulator was found to be a useful adjunct for the simulation-based practice of tube thoracostomy. As well, users found the model anatomically realistic and avoided high-cost and ethical issues. Further research will focus on optimization based on feedback and development into a multi-functional simulator for other HALO procedures.

Keywords: simulation-based training, three-dimensional printing, innovations in EM education

MP29

Using the Calgary audit and feedback framework to get the most out of physician practice reports

S. Dowling, MD, A. Peterson, BSc, C. Wong, MD, MSc, L. Cooke, MD, C. Bond, MD, University of Calgary, Calgary, AB

Innovation Concept: The Calgary Audit and Feedback Framework (CAFF) is an innovative tool developed by the Physician Learning Program (PLP). By addressing four key factors –relationships, question choice, data visualization, and facilitation – CAFF addresses common barriers to physicians receiving their practice data. The goal of this study is to assess whether CAFF-facilitated physician

performance improvement (PPI) sessions: 1) improve physicians' receptiveness to their practice data, and 2) encourage physicians to both identify opportunities for practice change and create action plans. **Methods:** Peer facilitators were trained to facilitate PPI sessions using the CAFF model. In Calgary, 51/180 emergency physicians have attended at least one of the six PPI sessions. The sessions were evaluated using surveys, commitment to change forms, and the Feedback Orientation Scale (FOS). The FOS is a scale developed to measure a participant's orientation to performance feedback across the four domains of utility, accountability, social awareness, and feedback self-efficacy. **Curriculum, Tool, or Material:** The PLP has developed and implemented CAFF as a framework to help foster socially constructed learning in audit and group feedback sessions. The CAFF model ensures that the aforementioned four key factors are considered for design and implementation of audit and group feedback. The PLP found that establishing the meaning and credibility of the data is a necessary precursor to reflection and action planning. **Conclusion:** The FOS was completed for 25/32 physicians. The mean FOS score improved by 0.339 ($p < 0.001$; $z = -3.863$). While the mean scores all four domains increased, 'Feedback Self-Efficacy' increased the most by .0620 ($p < 0.001$; $z = -3.999$). Participants reported that examples of changes made by the peer facilitators were particularly helpful. Evaluations from the sessions suggested physicians overwhelmingly agreed or strongly agreed that the peer comparison was valuable, that the reports helped them reflect on their practice, and that the session helped them identify learning opportunities and strategies to change their practice.

Keywords: innovations in EM education, physician practice reports, practice improvement

MP30

Reducing unnecessary oral contrast in patients undergoing enhanced abdomen/pelvis computed tomography in the emergency department: A multicentre project

S. Dowling, MD, H. Johal, MD, R. Morris, MD, D. Nobbee, MD, D. Wang, MSc, E. Lang, MD, MSc, University of Calgary, Calgary, AB

Background: Traditionally, radiologists have routinely recommended oral contrast agents (such as Telebrix®) for patients undergoing a computed tomography of the abdomen/pelvis (CTAP), but recent evidence has shown limited diagnostic benefits for most emergency department (ED) patients. Additionally, the use of oral contrast has numerous drawbacks, including patient nausea/vomiting, risk of aspiration and delays to CTAP completion and increased ED length of stay (LOS). **Aim Statement:** The aim was to safely reduce the number of ED patients receiving oral contrast prior to undergoing CTAP and thereby reduce ED length of stay. **Measures & Design:** An evidence-based ED protocol was developed in collaboration with radiology. PDSA cycle #1 was implementation at a pilot site to identify potential barriers. Challenges identified included the need to change the electronic order sets to reflect the new protocol, improved communication with frontline providers and addition of an online BMI calculator. PDSA cycle #2 was widespread implementation across all 4 ED's in the Calgary zone. The protocol was incorporated into all relevant electronic ED order sets to act as a physician prompt. Using administrative data, we extracted and analyzed data using descriptive and inferential statistics for the outcomes and balancing measures from a period of 12 months pre- and 12 months post-intervention. **Evaluation/Results:** A total of 14,868 and 17,995

CTAP exams were included in the pre and post periods, respectively. There was a reduction in usage of oral contrast from 71% to 30% ($P < 0.0001$) in the pre- and post-study period, respectively. This corresponded to a reduction in average time of CT requisition to CT report completed from 3.30 hours to 2.31 hours (-0.99 hrs, $P = 0.001$) and a reduction in average ED LOS from 11.01 hours to 9.92 hours (-1.08 hrs, $P < 0.0001$). The protocol resulted in a reduction of 19,434.6 patient hrs in the ED. Run charts demonstrate change was sustained over time. Our protocol did not demonstrate an increase in rates of repeat CTAP ($P = 0.563$) at 30 days, nor an increase in patient re-admission within 7 days ($P = 0.295$). **Discussion/Impact:** Successful implementation of an ED and radiology developed protocol significantly reduced the use of oral contrast in patients requiring enhanced CTAP as part of their diagnostic work up and, thereby, reduced overall ED LOS without increasing the need for repeat examinations within 30 days or re-admission within 7 days.

Keywords: computed tomography, oral contrast, quality improvement and patient safety

MP31

Optimizing ketorolac dosing by leveraging computerized order entry

N. Pompa, MD, C. Bond, MD, D. Wang, MSc, S. Dowling, MD, University of Calgary, Calgary, AB

Background: Ketorolac has long been used to manage pain in the Emergency Department and has the advantage of being the only parenteral NSAID formulation. Despite multiple studies demonstrating an analgesic ceiling dose of 10mg for intravenous ketorolac, higher doses (30-60mg) are commonly ordered. Use of optimal doses of ketorolac (10mg) has the advantage of lower side effects and cost. **Aim Statement:** The aim of this project was to increase the usage of the optimal dose parenteral ketorolac (10mg) without increasing the use of additional, concomitant or rescue opioids (balancing measures). **Measures & Design:** This pre-/post-intervention comparison study (May 1, 2016 to April 30, 2018) included all patients ≥ 18 years of age that received parenteral ketorolac at one of 4 EDs in the Calgary zone. All data was captured via administrative data records. Stakeholders (ED leadership, analgesia committee, nursing and pharmacy) provided feedback and support for the project. Our multi-modal intervention included modifying all ED computerized order sets such that the default parenteral ketorolac dose was 10mg (post-intervention) from 30mg (pre-intervention), education (dissemination of evidence to support the changes to clinicians) and our pharmacy securing 10mg vials of ketorolac. At their discretion, physicians' were still able to order other doses of ketorolac. **Evaluation/Results:** During the 2 year study period, 19290 patient records were identified where parenteral ketorolac was administered during the ED visit. Baseline characteristics were similar between the pre/post periods. Prior to the change in default dosing, 10.5% of orders were for ketorolac ≥ 10 mg compared to 87% in the post-intervention period ($p < 0.000$). Statistical process charts support the above results and demonstrate that the changes have been sustained. There were no differences in patients receiving ketorolac as the only analgesic between the pre/post periods (42% vs 42%, $p = 0.396$), nor where there significant changes in concomitant opioid usage (46% vs 46%, $p = 0.817$), or rescue analgesia (11% vs 12%, $p = 0.097$). **Discussion/Impact:** In this large cohort, our multi-modal intervention, resulted in a significant increase in optimal ketorolac parenteral dosing without a significant change in additional opioid use. The results support the utility of

computerized order set changes as the cornerstone of an effective and rapid knowledge translation strategy to align physician practice with best evidence.

Keywords: computerized provider order entry, ketorolac, quality improvement and patient safety

MP32

Using physician practice reports and feedback sessions to reduce low value care in bronchiolitis

S. Dowling, MD, I. Gjata, BSc, N. Solbak, BSc, C. Weaver, BSc, K. Smart, MD, R. Buna, MD, A. Stang, MD, University of Calgary, Calgary, AB

Background: Despite strong evidence recommending supportive care as the mainstay of management for most infants with bronchiolitis, prior studies suggest that many of these patients receive low-value interventions. Providing clinicians with their practice reports and peer comparator data or an achievable benchmark of care (audit and feedback) has been shown to be an effective strategy to improve adherence to guidelines. **Aim Statement:** To decrease low-value care (use of any or all of chest radiographs, viral testing and salbutamol) in infants with bronchiolitis by delivering individual physician reports in addition to Group Facilitated Feedback Sessions (GFFS) to pediatric emergency physicians (PEPs). **Measures & Design:** Our cohort included 3,883 patients ≤ 12 months old that presented to two emergency departments with a diagnosis of bronchiolitis from April 1, 2013 to April 30, 2018. Using administrative data we captured baseline characteristics and interventions. Consenting PEPs received two audit and feedback (A&F) reports which included their individual and peer comparator data. Two multi-disciplinary GFFS (including inpatient pediatricians, nurse, learners and respiratory therapists) presented data and identified barriers and enablers of reducing low-value care. The primary outcome was the proportion of patients who received any low-value intervention, and was analyzed using statistical process control charts. Process measures (consent to obtain report, attendance and evaluations from the feedback session) and balancing measures were also captured. **Evaluation/Results:** 78% of PEPs consented to receive their A&F reports. Patient baseline characteristics were similar in the baseline ($n = 3109$) and intervention period ($n = 774$). Following the baseline physician reports and the GFFS, low-value care decreased from 42.6% to 27.1% (absolute difference: -15.5%; 95% confidence interval (CI): -19.8% to -11.2%) and 78.9% to 64.4% (absolute difference: -14.5%; 95% CI: -21.9% to -7.2%) in patients who were not admitted and admitted, respectively. Balancing measures such as ICU admission (absolute difference: -0.6%; 95% CI: -5.7% to 4.4%) and ED revisit within 72 hours (absolute difference: -0.1%; 95% CI: -3.1% to 3.0% non-admitted patients, 1.0%; 95% CI: -1.2% to 3.2% admitted patients) were unchanged. **Discussion/Impact:** The combination of audit and feedback and a GFFS significantly reduced low-value care for pediatric patients with bronchiolitis by PEP's.

Keywords: bronchiolitis, audit and feedback, quality improvement and patient safety

MP33

Provincial spread of buprenorphine/naloxone initiation in emergency departments for opioid agonist treatment: a quality improvement initiative

P. McLane, BA, PhD, MA, K. Scott, MBA, MA, K. Yee, MPH, MSc, Z. Suleman, MPH, K. Dong, MD, E. Lang, MD, S. Fielding, MBA, J. Deol, MD, J. Fanaeian, MD, A. Olmstead, MD, M. Ross, MD,

K. Low, MHA, H. Hair, MBA, C. Biggs, BSc, M. Ghosh, MD, MSc, R. Tanguay, BSc, MD, B. Holroyd, MBA, MD, Emergency Strategic Clinical Network, Edmonton, AB

Background: Since January 1, 2016 2358 people have died from opioid poisoning in Alberta. Buprenorphine/naloxone (bup/nal) is the recommended first line treatment for opioid use disorder (OUD) and this treatment can be initiated in emergency departments and urgent care centres (EDs). **Aim Statement:** This project aims to spread a quality improvement intervention to all 107 adult EDs in Alberta by March 31, 2020. The intervention supports clinicians to initiate bup/nal for eligible individuals and provide rapid referrals to OUD treatment clinics. **Measures & Design:** Local ED teams were identified (administrators, clinical nurse educators, physicians and, where available, pharmacists and social workers). Local teams were supported by a provincial project team (project manager, consultant, and five physician leads) through a multi-faceted implementation process using provincial order sets, clinician education products, and patient-facing information. We used administrative ED and pharmacy data to track the number of visits where bup/nal was given in ED, and whether discharged patients continued to fill any opioid agonist treatment (OAT) prescription 30 days after their index ED visit. OUD clinics reported the number of referrals received from EDs and the number attending their first appointment. Patient safety event reports were tracked to identify any unintended negative impacts. **Evaluation/Results:** We report data from May 15, 2018 (program start) to September 31, 2019. Forty-nine EDs (46% of 107) implemented the program and 22 (45% of 49) reported evaluation data. There were 5385 opioid-related visits to reporting ED sites after program adoption. Bup/nal was given during 832 ED visits (663 unique patients): 7 visits in the 1st quarter the program operated, 55 in the 2nd, 74 in the 3rd, 143 in the 4th, 294 in the 5th, and 255 in the 6th. Among 505 unique discharged patients with 30 day follow up data available 319 (63%) continued to fill any OAT prescription after receiving bup/nal in ED. 16 (70%) of 23 community clinics provided data. EDs referred patients to these clinics 440 times, and 236 referrals (54%) attended their first follow-up appointment. Available data may under-report program impact. 5 patient safety events have been reported, with no harm or minimal harm to the patient. **Discussion/Impact:** Results demonstrate effective spread and uptake of a standardized provincial ED based early medical intervention program for patients who live with OUD.

Keywords: opioid agonist treatment, opioids

MP34

Block that Hip! Improving rates of ultrasound-guided fascia iliaca compartment blocks for hip fracture analgesia in the emergency department: a quality improvement initiative

M. Crickmer, MD, A. Cameron, MD, D. Smith, MD, S. Ward, MD, A. Wong, MD, K. Wong, MD, A. Cheng, MBA, MD, J. Chu, MD, J. Lockwood, MD, A. Petrosniak, MD, S. Vaillancourt, MD, MPH, University of Toronto, Toronto, ON

Background: In patients with acute hip fracture, a fascia iliaca compartment block (FICB) has been shown to provide effective non-opioid analgesia, reduce the incidence of pneumonia, and potentially decrease the rate of delirium [1]. However, this procedure was infrequently used in the St. Michael's Hospital (SMH) emergency department (ED). **Aim Statement:** Our aim was to increase the proportion of patients with hip fracture receiving FICB in the ED to 50% in six months. **Measures & Design:** We completed two

Plan-Do-Study-Act (PDSA) cycles, measuring rates of FICB before and after each cycle. The first was a departmental rounds presentation with information about the process and benefits of FICB, addressing barriers identified by surveying the group. The second cycle included a bundle of interventions comprising of an "instruction card" with the steps required to do the procedure, access to a video tutorial, and a list of experienced physicians willing to help less experienced providers perform FICB. **Evaluation/Results:** In the three months prior to the project, the rate of FICB in the ED was 12.5% (3/24). For the three months after the first PDSA cycle, the rate increased to 22.2% (8/36). Then, the second cycle was performed. In the following two months the rate further increased to 36.8% (7/19). **Discussion/Impact:** Despite the clear increase in FICB rate, these changes were not statistically significant ($p = 0.063$). Our methodology was shown to be safe and effective, and our model can be applied to other ED groups looking to increase their rates of FICB.

Keywords: acute hip fracture, fascia iliaca compartment block, quality improvement and patient safety

MP35

Targeting the opioid crisis by influencing opioid prescribing in the emergency department

D. Shelton, MD, MSc, V. Teo, BSc, PharmD, K. Ding, MD, D. Heffernan, Sunnybrook Health Sciences Centre, Toronto, ON

Background: Liberal prescribing of opioids is a major contributing factor to the opioid crisis. Patients who take opioids for >5 consecutive days are at greater risk of long-term use. Evidence shows that significantly more opioids are prescribed for emergency department (ED) patients with acute pain compared to amounts consumed. Guidelines recommend prescribing a 3-day supply or 10-15 tablets of opioids for patients with acute pain. **Aim Statement:** By January 2020, >70% of opioid prescriptions from our ED will be for <15 tablets of morphine 5 mg equivalents. **Measures & Design:** Emergency physicians were educated on best practice of prescribing opioids for discharged patients. An electronic prescription writer was built for discharged ED patients with a pop-up reminder for quantities >15 tablets (indicating a recommended quantity of 10-15 tablets) and a pop-up reminder for quantities >30 tablets (indicating a maximum quantity of 30 tablets and recommended quantity). A feature was built to auto-populate a prescription for morphine 5 mg po q4h prn x 10 tablets to facilitate adherence to guidelines. Outcome Measure % opioid prescriptions for <15 tablets of morphine 5 mg equivalents Process Measure Amount of opioids prescribed for discharged ED patients, measured as morphine 5 mg equivalents Number of opioid prescriptions for >30 tablets of morphine 5 mg equivalents Balancing Measure Number of patients that return to ED within 7 days and receive a repeat opioid prescription. **Evaluation/Results:** Prior to implementation of the electronic prescription writer a sample audit revealed that 50% of opioid prescriptions were written for <15 tablets of morphine 5 mg equivalents. For the first three quarters of 2019, 62%, 61% and 69% of opioid prescriptions were written for <15 tablets of morphine 5 mg equivalents. Only two prescriptions during the study period were for >30 tablets of morphine 5 mg equivalents. An average number of 7 patients per quarter were given a repeat opioid prescription during a return ED visit. **Discussion/Impact:** We were successful in influencing emergency physicians to prescribe fewer opioids to discharged patients. This has the potential to avoid converting ED patients with acute pain into long-term opioid users and to avoid the diversion of unused opioid tablets.

Keywords: opioids, prescriptions, quality improvement and patient safety

MP36

Reducing utilization of unnecessary coagulation tests by emergency providers

R. Gupta, BA, MD, MSc, S. Mondoux, MD, MSc, G. Rutledge, MD, McMaster University, Hamilton, ON

Background: Curbing unnecessary laboratory testing represents a significant opportunity for cost reduction in the Canadian health care system. A Choosing Wisely report cited a 31% decline in the number of tests ordered in a Canadian emergency department (ED) after implementation of recommendations. The international normalized ratio (INR) remains frequently ordered in emergency departments without an appropriate indication. **Aim Statement:** We aimed to reduce the number of INR tests completed in the St. Joseph's Healthcare Hamilton Emergency Department by 50% by April 30, 2019. **Measures & Design:** We conducted the study in an urban, academic ED employing the Epic electronic health record (EHR). We tailored interventions according to the Hierarchy of Effectiveness to address root causes revealed by analysis of our baseline ordering behaviour. Interventions included provider education around evidence-based ordering indications and removal of the INR from our "chest pain" bloodwork panel. Our outcome measure was the weekly number of INR tests completed per ED visit. Process measures included the proportion of INR tests ordered for inappropriate indications on monthly audits of 20 charts where an INR was completed. Balancing measures included average ED length of stay for patients receiving INR testing. **Evaluation/Results:** We collected outcome, process, and balancing measures through the EHR and analyzed this data using statistical process control charts. Over the nine-month study period, we decreased weekly INR tests from 248.4 to 115.0, a reduction of 56% which met criteria for special cause variation. This amounts to a cost savings of \$43,008 per year. ED length of stay for patients receiving INR testing did not change significantly. **Discussion/Impact:** Our interventions were successful in realising our 50% target reduction in INR tests without an increase in ED length of stay from repeat venipuncture. This result is in keeping with similar efforts in other Canadian EDs. Our interventions could likely be spread to other settings where an INR is included as part of a "chest pain" panel. This may represent a substantial cost reduction opportunity on a national scale. Further work is needed in order to assess long term sustainability, which can be supported by employing high effectiveness mechanisms such as automation of optimal behaviour.

Keywords: choosing wisely, international normalized ratio, quality improvement and patient safety

MP37

Emergency department boarding of admitted oncology patients receiving chemotherapy

K. Grewal, MD, MSc, S. McLeod, MSc, R. Sutradhar, PhD, M. Krzyzanowska, MD, MPH, B. Borgundvaag, MD, PhD, C. Atzema, MD, MSc, Mount Sinai Hospital, Toronto, ON

Introduction: Emergency department (ED) boarding is associated with worse outcomes for critically ill patients. There have been mixed findings in other patient populations. The primary objective of this study was to examine predictors of prolonged ED boarding among cancer patients receiving chemotherapy who required hospital

admission from the ED. Secondary objectives were to examine the association between prolonged ED boarding and in-hospital mortality, 30-day mortality, and hospital length of stay (LOS). **Methods:** Using administrative databases from Ontario, we identified adult (≥ 18 years) cancer patients who received chemotherapy within 30 days prior to a hospital admission from the ED between 2013 to 2017. ED boarding time was calculated as the time from the decision to admit the patient to when the patient physically left the ED. Prolonged ED boarding was defined as ≥ 8 hours. Multivariable logistic regression was used to examine predictors of prolonged ED boarding and to determine if prolonged boarding was associated with mortality. Multivariable quantile regression was used to determine the association between prolonged boarding and hospital LOS. **Results:** 45,879 patients were included in the study. Median (interquartile range (IQR)) ED LOS of stay was 11.8 (7.0, 21.7) hours and median (IQR) ED boarding time was 4.2 (1.6, 14.2) hours. 17,053 (37.2%) patients had prolonged ED boarding. Severe ED crowding was the strongest predictor of prolonged ED boarding (odds ratio: 17.7, 95% CI: 15.0 to 20.9). Prolonged ED boarding was not associated with in-hospital mortality or 30-day mortality. Median hospital LOS was over 9 hours ($p < 0.0001$) longer among patients with the longest ED boarding times. **Conclusion:** Severe ED crowding was associated with a significant increase in the odds of prolonged ED boarding. While our study demonstrated that prolonged boarding was not associated with increased mortality, further work is required to understand if ED boarding is associated with other adverse outcomes in this immunocompromised population.

Keywords: boarding, emergency medicine, oncology

MP38

The impact of physician handoffs on the outcomes of emergency department patients: a medical administrative database retrospective cohort study

A. Mokhtari, D. Simonyan, MSc, A. Pineault, M. Mallet, MSc, S. Blais, BA, MBA, S. Berthelot, MD, MSc, Laval, QC

Introduction: A physician handoff is the process through which physicians transfer the primary responsibility of a care unit. The emergency department (ED) is a fast-paced and crowded environment where the risk of information loss between shifts is significant. Yet, the impact of handoffs between emergency physicians on patient outcomes remains understudied. We performed a retrospective cohort study in the ED to determine if handed-off patients, when compared to non-handed-off patients, were at higher risk of negative outcomes.

Methods: We included every adult patient first assessed by an emergency physician and subsequently admitted to hospital in one of the five sites of the CHU de Québec-Université Laval during fiscal year 2016-17. Data were extracted from the local hospital discharge database and the ED information system. Primary outcome was mortality. Secondary outcomes were incidence of ICU admission and surgery and hospital length of stay. We conducted multilevel multivariate regression analyses, accounting for patient and hospital clusters and adjusting for demographics, CTAS score, comorbidities, admitting department delay before evaluation by an emergency physician and by another specialty, emergency department crowding, initial ED orientation and handoff timing. We conducted sensitivity analyses excluding patients that had an ED length of stay > 24 hours or events that happened after 72 hours of hospitalization. **Results:** 21,136 ED visits and 17,150 unique individuals were included in the study. Median[Q1-Q3] age, Charlson index score,

door-to-emergency-physician time and ED length of stay were 71 [55-83] years old, 3[1-4], 48 [24,90] minutes, 20.8[9.9,32.7] hours, respectively. In multilevel multivariate analysis (OR handoff/no handoff [CI95%] or GMR[SE]), handoff status was not associated with mortality 0.89[0.77,1.02], surgery 0.95[0.85,1.07] or hospital length of stay (-0.02[0.03]). Non-handed-off patients had an increased risk of ICU admission (0.75[0.64,0.87]). ED occupancy rate was an independent predictor of mortality and ICU admission rate irrespectively of handoff status. Sensitivity and sub-group based analyses yielded no further information. **Conclusion:** Emergency physicians' handoffs do not seem to increase the risk of severe in-hospital adverse events. ED occupancy rate is an independent predictor of mortality. Further studies are needed to explore the impact of ED handoffs on adverse events of low and moderate severity.

Keywords: communication, handoff, retrospective cohort study

MP39

Emergency department triage redesign: can elements designed to improve department flow reduce door-to-ECG times in self-presenting ED patients suspected of myocardial infarction?

M. Hewitt, MD, BMSc, B. Forestell, BSc, S. Mondoux, MD, MSc, McMaster University, Hamilton, ON

Introduction: ST-Elevation Myocardial Infarction (STEMI) represents irreversible necrosis of myocardial tissue. Prompt time-to-reperfusion in these patients is paramount in reducing morbidity and mortality. This concept, time-to-reperfusion, is the principle focus for improving STEMI care. Prioritizing diagnosis in patients with high-risk cardiac features through rapid electrocardiogram (ECG) is essential, with gold standard time-to-ECG benchmarked at 10-minutes. While substantial literature is established for pre-hospital ECG interventions, there is a paucity of intervention data for self-presenting patients. While evaluating these times within our department, we conducted a redesign of the triage process. These included nurses becoming the first contact and the addition of an extra triage nurse. These changes provided the opportunity to evaluate whether the redesign elements of the triage system meant to improve department flow could improve other patient-centered outcomes, namely time-to-ECG. **Methods:** The first fifty self-presenting patients designated as "cardiac chest pain" in the month preceding changes to the triage system were analyzed to create a baseline time-to-ECG value. Following the alteration to our triage system, three samples of the first 50 patient's time-to-ECG were collected at two, four and six months post-intervention and compared to pre-intervention via non-paired t-test. Data was further stratified into percentages of patients receiving an ECG within 10-minute intervals starting with 0-10 minutes. Proportions pre and post intervention were then compared using z-scores. **Results:** A baseline pre-intervention time-to-ECG value of 26.6 minutes was established. Average post-intervention time-to-ECG was significantly reduced at 15.6min with a mean difference of $-11.0\text{min} \pm 3.0$ (95% CI $-16.0 - (-5.0)$). Interestingly, the proportion of ECGs performed under 20 minutes rose significantly from 58% to 81% ($z = -3.2$, $p < 0.001$) while the increase in proportion of ECGs performed under 10 minutes from 26% to 37% was not statistically significant ($z = -1.4$). **Conclusion:** The results of this analysis suggest that the addition of an extra triage nurse coupled with changing first point of ED contact from the business clerks to triage nurses significantly reduced mean time-to-ECG in self-presenting patients with chest pain deemed high risk for cardiac causes. Additionally, these changes significantly

increased the proportion of ECGs performed within 20 minutes of ED arrival in these patients.

Keywords: chest pain, time-to-electrocardiogram, triage

MP40

What are the factors contributing to medico-legal risk of procedural interventions performed by physicians practicing emergency medicine?

K. Lemay, P. Finestone, R. Liu, MCS, R. De Gorter, BSc, L. Calder, MD, MSc, The Canadian Medical Protective Association, Ottawa, ON

Introduction: Physicians who practice emergency medicine (EM) often perform procedural interventions, which can occasionally result in unintended patient harm. Our study's objective was to identify and describe the interventions and contributing factors associated with medico-legal (ML) cases involving emergency physicians performing procedural interventions. **Methods:** The Canadian Medical Protective Association (CMPA) is a not-for-profit, ML organization which represented over 99,000 physicians at the time of this study. We extracted five years (2014-2018) of CMPA data describing closed ML cases involving procedural interventions (e.g. suturing, reducing a dislocated joint) and excluding interventions related to pharmacotherapy (e.g. injection of local anesthetic), diagnosis (electrocardiograms) and physical assessments (e.g. ear exams), performed by physicians practicing EM. We then applied an internal contributing factor framework to identify themes. We analysed the data using descriptive statistics. **Results:** We identified 145 cases describing 145 patients who had 205 procedures performed in the course of their EM care. The three most common interventions were orthopedic injury management (47/145, 32.4%), wound management (43/145, 29.7%), and Advanced Cardiac Life Support (24/145, 16.6%). Out of 145 patients, 93.8% (136/145) experienced a patient safety event, and 55.9% (76/136) suffered an avoidable harmful incident. One quarter of patients suffered mild harm (34/76, 25.0%), 18.4% of patients died, 14.5% suffered severe harm, and 13.2% moderate harm. Peer experts were critical of 86/145 cases (59.3%) where the following provider contributing factors were found: a lack of situational awareness (20/68, 29.4%), and deficient physician clinical decision-making (54/68, 79.7%). Clinical decision-making issues included a lack of thoroughness of assessment (33/54, 61.1%), failure to perform tests or interventions (21/54, 38.9%), and a delay or failure to seek help from another physician (17/54, 31.2%). Peer experts were also critical of 48.8% of cases containing team factors (42/86) due to deficient medical record keeping (26/42, 61.9%), and communication breakdown with patients or other team members (25/42, 59.5%). **Conclusion:** Both provider and team factors contributed to ML cases involving EM physicians performing procedural interventions. Addressing these factors may improve patient safety and reduce ML risk for physicians.

Keywords: emergency physicians, medico-legal, procedural interventions

MP41

Crowdsourcing to save lives: A scoping review of bystander alert technologies for out-of-hospital cardiac arrest

A. Valeriano, BA, BSc, S. Van Heer, BSc, S. Brooks, MD, MHSc, F. de Champlain, MD, B.Eng, Queen's University, Kingston, ON

Introduction: Out-of-hospital cardiac arrest (OHCA) constitutes a significant global health burden, with a survival rate of only

10-12%. Early intervention is vital but limited by ambulance response times, low rates of bystander assistance, and access to AEDs. Smart-phone technologies have been developed that crowdsource willing volunteers to nearby OHCA in order to initiate resuscitation prior to ambulance arrival. We performed a scoping review to map the available literature on these crowdsourcing technologies and compared their key operational features. **Methods:** A search strategy was developed for five online databases: Medline, Cochrane, Embase, and Web of Science, as well as Google Scholar. We searched for primary studies and grey literature describing mobile phone technologies that alerted users of nearby cardiac arrests in the community. Two reviewers independently screened all articles and extracted relevant study information. Subsequently, we performed a search of the Google and Apple app stores, a general internet search, and consulted experts to identify all available technologies that might not be described in literature. We contacted developers for information on technology use and specifications to create a detailed features table.

Results: We included 72 articles examining bystander alerting technologies from 15 countries worldwide, owing to the increasing importance of this topic. We identified 25 unique technologies, of which 18 were described in the included literature. Technologies were either text message-based systems (n = 4) or mobile phone applications (n = 21). Most (23/25) used global positioning systems to direct bystanders to victims and nearby AEDs. Response radii for alerts varied widely from 200m to 10km. Some technologies had advanced features such as video-conferencing with ambulance dispatch and detailed alert settings. Not all systems required volunteers to have first aid training. There were 18 studies examining effects on bystander intervention, all of which showed significant improvements using the technologies. However, only six studies assessed impact on survival outcomes. Key barriers discussed included false positive alerts, legal liability, and potential psychological impact on volunteers.

Conclusion: Our review provides a comprehensive overview of crowdsourcing technologies for bystander intervention in out-of-hospital cardiac arrest. Future work in this growing field should focus on survival outcomes and methods of addressing barriers to implementation.

Keywords: crowdsourcing, out-of-hospital cardiac arrest, resuscitation

MP42

Evaluating clinical and situational factors related to the likelihood of physician authorization for time-sensitive procedures during mandatory paramedic patches

D. Kelton, BSc, MD, S. Doran, BA, BSc, MD, BEd, M. Davis, MD, MSc, K. Van Aarsen, MSc, J. Momic, BSc, Western University, London, ON

Introduction: Delegation of controlled medical acts by physicians to paramedics is an important component of the prehospital care framework. Where directives indicate that physician input is needed before proceeding with certain interventions, online medical control (a "patch") exists to facilitate communication between a paramedic and a Base Hospital Physician (BHP) to request an order to proceed with that intervention. The clinical and logistical setting will contribute to the decision to proceed with or withhold an intervention in the prehospital setting. The aim of this study was to examine the impact of various clinical and situational factors on the likelihood of a patch request being granted. **Methods:** Prehospital paramedic calls that included a mandatory patch point (excluding requests exclusively for

termination of resuscitation and those records which were unavailable) were identified through review of all patch records from January 1, 2014 to December 31, 2017 for Paramedic Services in our region. Written Ambulance Call Reports (ACRs) and audio recordings of paramedic patches were obtained and reviewed. **Results:** 214 patch records were identified and screened for inclusion. 91 ACRs and audio patch records were included in the analysis. 51 of 91 (56%) patch requests were granted by the BHP. Of the 40 paramedic requests that were not granted, the most commonly cited reason was close proximity to hospital (22/40; 55%) followed by low likelihood of the intervention making a clinical impact in the prehospital setting (11/40; 27.5%). Requests for certain interventions were more likely to be granted than other requests. All requests to perform needle thoracostomy for possible tension pneumothorax, administer atropine for symptomatic bradycardia and treat hemodynamically unstable hyperkalemia were granted (2/2, 3/3 and 7/7, respectively), while requests for synchronized cardioversion (7/19; 37%) and transcutaneous pacing (2/6; 33%) were approved less than half of the time. **Conclusion:** This retrospective review suggests that requests to perform certain critical and potentially time sensitive interventions are more likely to be granted which calls into question the requirement for a mandatory patch point for these procedures. Furthermore, the interplay between proximity to hospital and the decision to proceed with an intervention potentially informs future modifications to directives to facilitate timely, safe and efficient care.

Keywords: mobile communication, online medical control, prehospital

MP43

Evaluating factors related to quality of audio transmission during mandatory paramedic patches and technical barriers to efficient communication in the prehospital setting

D. Kelton, BSc, MD, S. Doran, BA, BSc, MD, BEd, M. Davis, MD, MSc, K. Van Aarsen, MSc, J. Momic, BSc, Western University, London, ON

Introduction: Delegation of controlled medical acts by physicians to paramedics is an important component of the prehospital care framework. Where directives indicate that physician input is needed before proceeding with certain interventions, online medical control (a "patch") exists to facilitate communication between a paramedic and a Base Hospital Physician (BHP) to request an order to proceed with that intervention. The quality and clarity of audio transmission is paramount for effective and efficient communication. The aim of this study was to examine the impact of audio transmission quality on the results of paramedic patch calls. **Methods:** Prehospital paramedic calls that included a mandatory patch point (excluding requests exclusively for termination of resuscitation and those records which were unavailable) were identified through review of all patch records from January 1, 2014 to December 31, 2017 for Paramedic Services in our region. Written Ambulance Call Reports (ACRs) and audio recordings of paramedic patches were obtained and reviewed. Pre-specified patch audio quality metrics, markers of transmission quality and comprehension as well as the resulting orders from the BHP were extracted. Differences between groups was compared using chi-square analyses. **Results:** 214 records were identified and screened initially. 91 ACRs and audio records were included in the analysis. At least one explicit reference to poor or inadequate call audio quality was made in 55/91 (60.4%) of calls and on average, 1.4 times per call. Of the 91 audited call records, 48 of 91 (52.7%) patches experienced

an interruption of the call. Each time a call was interrupted, re-initiation of the call was required, introducing a mean [IQR] delay of 81 [33-68] seconds to re-establish verbal communication. Order requests made by paramedics in calls with no interruptions were approved in 30 of 43 patches (70%) while those requests made in calls with one or more interruptions were approved in only 21 of 48 cases (44%) ($\Delta 26.0\%$; 95%CI 5.6-43.5%, $p = 0.01$). **Conclusion:** This retrospective review suggests that audio quality and interruptions of patch calls may impact a physician's ability to approve orders for interventions in the prehospital setting. Focus on infrastructure and technology underlying this important mode of communication may be a fruitful avenue for future improvements in systems where this may be an issue.

Keywords: mobile communication, online medical control, prehospital

MP44

Implementing rural advanced care community paramedics in rural and remote British Columbia: a qualitative research approach

F. Besserer, MD, MSc, D. Banner-Lukaris, PhD, J. Tallon, MD, MSc, D. Kandola, BHSc, MHSc, University of British Columbia, Prince George, BC

Introduction: Community paramedicine is well-established with an increasing evidence base to support its role in improving healthcare delivery in Canada and across the world. In British Columbia (BC), the BC Emergency Health Services (BCEHS) community paramedicine program provides an avenue to expand the Advanced Care Paramedic (ACP) role in underserved rural and remote communities across the province. **Methods:** We undertook stakeholder consultations using purposive sampling to better understand the barriers and facilitators impacting the integration of rural advanced care community paramedics (RACCPs) in 6 BC communities and to evaluate stakeholder perspectives of the implementation and impacts of the RACCP. 18 in-depth interviews were completed with a diverse range of stakeholders. The interviews were analyzed using a qualitative descriptive approach and the Theoretical Domains Framework.

Results: A number of key facilitators and barriers to implementation of the RACCP were identified. Facilitators included the RACCP bridging significant gaps in existing community-based healthcare services including palliative care, harm reduction, and home-based assessment. The RACCP also provides leadership within their communities by actively engaging in the delivery of informal and formal debriefing, mentorship, and education. Identified barriers to RACCP implementation included confusion over the scope of the RACCP role, lack of shared health data, and various regulatory challenges. Several priority areas for ongoing development were also identified including workforce planning, addressing regulatory requirements, developing a strategic and systematic activation and dispatch process, providing continuing mentorship and supports for RACCPs, and the importance for ongoing engagement with end-users to determine the impact of the RACCP role for community health services. **Conclusion:** This research provides a strong foundation for addressing healthcare delivery in rural and remote BC by identifying the unique challenges communities face in healthcare provision and is a leading initiative for the ongoing development of professional paramedic practice across the province.

Keywords: community paramedicine, health service delivery, rural

MP45**What to do with #MeToo: pre and post presenting patterns of intimate partner violence**

A. Sobiesiak, BHSc, K. Muldoon, MPH, PhD, L. Shipeolu, BA, M. Heimerl, BA, MSW, K. Sampsel, MD, University of Ottawa, Ottawa, ON

Introduction: The #MeToo social media movement gained international status in October 2017 as millions disclosed experiences of sexual and intimate partner violence. People who experience violence from a former/current intimate partner may not present for care for many reasons, among them not knowing where to go for care, or not realizing they were experiencing abuse since the behavior was portrayed as 'normal'. Empirical research identified increased police reporting, internet searches, and new workplace regulations on sexual assault/harassment after #MeToo. Less is known about how #MeToo has influenced hospital-based care, particularly among IPV cases. We aimed to investigate if the #MeToo social movement influenced patterns of IPV cases presenting for emergency care. **Methods:** This study took place at the Sexual Assault and Partner Abuse Care Program (SAPACP), within the Emergency Department of The Ottawa Hospital. Patients seen from November 1st, 2016 through to September 30th, 2017 was considered Pre-#MeToo and those seen November 1st, 2017 to September 30th, 2018 was considered Post-#MeToo. All patients seen in October 2017 were excluded. Analyses compare the proportion and characteristics of IPV cases seen Pre- and Post-#MeToo. Log-binomial regression models were used to calculate relative risk and 95% CI. **Results:** 890 cases were seen by the SAPACP during the total study period, of which 564 (63%) were IPV cases. 258 IPV cases were seen Pre-#MeToo and 306 IPV Post-#MeToo. The clinical presentation for IPV cases was similar between both periods where approximately 42% of IPV cases presented for sexual assault, 50% presented for physical assault. An increase in frequency and proportion of IPV cases was observed post-#MeToo. Post-#MeToo there were 48 additional cases of IPV, corresponding to almost a 20% increase in risk compared to the Pre-#MeToo period. (RR: 1.19, 95% CI: 1.07-1.31) Post-#MeToo, there were more presenting cases of IPV among male/trans cases (9 vs 26) and youth cases (82 vs 116). **Conclusion:** #MeToo is a powerful social movement that corresponded with a significant increase in IPV cases presenting for emergency care. While the assault characteristics among IPV cases remained similar, an important contribution of this research is the increase in youth, male/transgender patients who presented for care post-#MeToo. Continued investigations into pre- post-#MeToo trends is needed to understand more about the changing clinical population and to inform resource and service allocation.

Keywords: domestic violence, intimate partner violence, trauma

MP46**Clinically significant traumatic intracranial haemorrhage following minor head trauma in older adults: a retrospective cohort study**

E. Mercier, MD, MSc, T. O'Brien, MBBS, B. Mitra, PhD, MBBS, N. Le Sage, MD, PhD, P. Tardif, MSc, M. Emond, MD, MSc, M. D'Astous, MD, PhD, Hôpital de l'Enfant-Jésus, Québec, QC

Introduction: The primary objective of this study was to determine the incidence of clinically significant traumatic intracranial haemorrhage (T-ICH) following minor head trauma in older adults. Secondary objective was to investigate the impact of anticoagulant and antiplatelet therapies on T-ICH incidence. **Methods:** This

retrospective cohort study extracted data from electronic patient records. The cohort consisted of patients presenting after a fall and/or head injury and presented to one of five ED between 1st March 2010 and 31st July 2017. Inclusion criteria were age ≥ 65 years old and a minor head trauma defined as an impact to the head without fulfilling criteria for traumatic brain injury. **Results:** From the 1,000 electronic medical records evaluated, 311 cases were included. The mean age was 80.1 (SD 7.9) years. One hundred and eighty-nine (189) patients (60.8%) were on an anticoagulant ($n = 69$), antiplatelet ($n = 130$) or both ($n = 16$). Twenty patients (6.4%) developed a clinically significant T-ICH. Anticoagulation and/or antiplatelets therapies were not associated with an increased risk of clinically significant T-ICH in this cohort (Odds ratio (OR) 2.7, 95% CI 0.9-8.3). **Conclusion:** In this cohort of older adults presenting to the ED following minor head trauma, the incidence of clinically significant T-ICH was 6.4%.

Keywords: head injury, intracranial haemorrhage, traumatic brain injury

MP47**Factors associated with preventable trauma death: a narrative review**

G. Genois, I. Vlahovic, L. Moore, PhD, B. Beck, MD, MSc, P. Blanchard, MD, PhD, M. Émond, MD, MSc, B. Mitra, MD, PhD, MBBS, P. Cameron, MD, MBBS, A. Nadeau, PhD, É. Mercier, MD, MSc, Hôpital de l'Enfant-Jésus, Québec, QC

Introduction: Trauma care is highly complex and prone to medical errors. Accordingly, several studies have identified adverse events and conditions leading to potentially preventable or preventable deaths. Depending on the availability of specialized trauma care and the trauma system organization, between 10 and 30% of trauma-related deaths worldwide could be preventable if optimal care was promptly delivered. This narrative review aims to identify the main determinants and areas for improvements associated with potentially preventable trauma mortality. **Methods:** A literature review was performed using Medline, Embase and Cochrane Central Register of Controlled Trials from 1990 to a maximum of 6 months before submission for publication. Experimental or observational studies that have assessed determinants and areas for improvements that are associated with trauma death preventability were considered for inclusion. Two researchers independently selected eligible studies and extracted the relevant data. The main areas for improvements were classified using the Joint Commission on Accreditation of Healthcare Organizations patient event taxonomy. No statistical analyses were performed given the data heterogeneity. **Results:** From the 3647 individual titles obtained by the search strategy, a total of 37 studies were included. Each study included between 72 and 35311 trauma patients who had sustained mostly blunt trauma, frequently following a fall or a motor vehicle accident. Preventability assessment was performed for 17 to 2081 patients using either a single expert assessment ($n = 2$, 5.4%) or an expert panel review ($n = 35$, 94.6%). The definition of preventability and the taxonomy used varied greatly between the studies. The rate of potentially preventable or preventable death ranged from 2.4% to 76.5%. The most frequently reported areas for improvement were treatment delay, diagnosis accuracy to avoid missed or incorrect diagnosis and adverse events associated with the initial procedures performed. The risk of bias of the included studies was high for 32 studies because of the retrospective design and the panel review preventability assessment. **Conclusion:** Deaths occurring after a trauma remain often preventable. Included studies

have used unstandardized definitions of a preventable death and various methodologies to perform the preventability assessment. The proportion of preventable or potentially preventable death reported in each study ranged from 2.4% to 76.5%. Delayed treatment, missed or incorrect initial diagnosis and adverse events following a procedure were commonly associated with preventable trauma deaths and could be targeted to develop quality improvement and monitoring projects.

Keywords: errors, preventable trauma death, systematic review

MP48

Head computerized tomography overuse in adults with mild traumatic brain injury in a single Quebec emergency department

S. Thibault, V. Gélina, MSc, S. Turcotte, MSc, A. Pépin, R. Renald, N. Le Sage, MD, PhD, P. Plante, PhD, H. Witteman, PhD, F. Légaré, MD, PhD, L. Sauvé, PhD, M. Gagnon, PhD, P. Archambault, MD, MSc, Université Laval, Lévis, QC

Introduction: Choosing Wisely Canada has reported rates of unnecessary head computed tomography (CT) scans for low-risk mild traumatic brain injury (mTBI) patients in Ontario and Alberta ranging from 14% to 46%. Local data for Quebec is currently not available. We sought to estimate the overuse of CT scans among adults with mTBI in the emergency department (ED) of a single level II trauma center in Quebec. **Methods:** We performed a retrospective chart review of adults who visited the ED of Hôtel-Dieu de Lévis from 04/01/2016 to 03/31/2017. Using an administrative database (Med-GPS, Montreal), we randomly sampled ED patients aged over 18 that had an initial Glasgow Coma Scale score of 13 to 15 and had suffered from a mTBI in the last 24 hours. We excluded patients with an unclear history of trauma, a bleeding disorder/anticoagulation, a history of seizure, any acute focal neurological deficit, a return visit for reassessment of the same injury, unstable vital signs, or a pregnancy. Data was extracted by two reviewers who analyzed separate charts. They used the Canadian CT Head Rule (CCHR) to determine relevance of CT scans. Overuse was determined if a patient without any high or medium risk CCHR criteria underwent a scan. A third reviewer verified a 10% random sample of the data extraction for each primary reviewer and inter-rater reliability was assessed using the kappa statistic. **Results:** From the 942 eligible mTBI patients, we randomly selected 418 patient charts to review, of which 217 met all inclusion and exclusion criteria (56% were men and the mean age was 48 years old (SD = 21)). Among included patients, 101 were determined as low risk. The overuse proportion was 26% (26/101), 95% CI [18-35]. Two CT scans were assessed as abnormal, but none revealed life-threatening injuries and only one was considered clinically significant with a subdural hematoma of 9 mm. Inter-rater reliability was substantial to perfect (kappa = 0.6 and 1.0) for each primary reviewer. **Conclusion:** We identified head CT scan overuse in this ED. This will support local quality improvement initiatives to reduce unnecessary head CT scans for adults with mTBI.

Keywords: computed tomography scan, emergency department, mild traumatic brain injury

MP49

Does reduced cough capacity in minor thoracic trauma leads to more atelectasis development?

M. Emond, MD, MSc, S. Hegg, PhD, E. Thériault, MD, Laval, Quebec, QC

Introduction: Minor thoracic trauma (MTI) accounts for approximately 15% of all injuries treated in the emergency

department (ED). Many of which are minor and will be handle on an outpatient basis. MTI and rib fractures especially cause non-negligible pain. The pain experienced by patients can lead to reduce pulmonary function, decrease mucous clearance and decrease cough capacity leading in infectious problems and atelectasis. To our knowledge, there is no study of atelectasis development caused by reduced cough capacity in the setting of MTI. **Objective:** Evaluate if a variation in cough capacity leads to atelectasis development. Evaluate if there was a difference in cough capacity perception between the nurse, the physician and the patient himself. **Methods:** A prospective observational cohort study (2006-2012) in 4 ED recruited patients with a chief complaint of MTI, ≥ 16 years old, discharged home from the ED. Exclusion criteria: 1) a confirmed hemothorax, pneumothorax, fail chest, lung contusion or any other important thoracic or abdominal internal injury at the initial visit or unable to attend follow-up visits. Patients were assessed at 7- and 14- days. For each patient, age, sex, mechanism of injury, dyspnea, COPD/asthma and smoking status were collected. Chest x-ray was done at each visit; pulmonary complications were assessed by a blind radiologist. Cough capacity was assessed on a scale of 0 to 10 by a nurse, physician and patient himself at 0, 7- and 14- days. Pain was scored on a scale of 0 to 10. Chi-squared and odds ratio (IC: 95%. $p \leq 0.05$) were assessed to determine if the cough capacity variation leads to atelectasis development. A Pearson correlation test was assessed the correlation in cough capacity among participants. **Results:** 1474 patients were recruited. Initial visit: 9% had atelectasis, 7 days: 7% and 4.6% at 14 days. 1105 patients were retained for analysis after exclusion of missing data. The median initial pain score was 7-8 for all patient categories. At 7 days, the odds ratio of atelectasis development were (score (0-3) 1.18 (0.42-3.34); score (4-7) 1.20 (0.48-3.03); $p \leq 0.05$). The Pearson correlation of cough capacity assessment, in patients without atelectasis were (0.53 nurse vs. patient; 0.37 physician vs. patient; 0.51 nurse vs. physician $p \leq 0.05$). As for the cough capacity perception correlation in patients with atelectasis were (0.62 nurse vs. patient; 0.40 physician vs. patient; 0.51 nurse vs. physician; $p \leq 0.05$). **Conclusion:** There is no statistically significant difference in atelectasis development depending on cough capacity and there is poor correlation regarding the perception of cough capacity except for the nurse. It would be interesting to develop a patient reported outcome measure questionnaire which targets minor thoracic trauma as it is a common emergency department complaint and it could help us improve medical management and patient quality of life

Keywords: atelectasis, cough capacity, minor thoracic trauma

MP50

Vaping, tobacco and cannabis among patients presenting to the emergency department: a cross-sectional study

K. Zhou, BMSc, D. Junqueira, MSc, PhD, PharmD, S. Couperthwaite, BSc, J. Meyer, BSc, B. Rowe, MD, MSc, University of Alberta, Edmonton, AB

Introduction: Inhaled toxins from tobacco smoking, cannabis leaf smoking as well as vaping/e-cigarette products use are known causes of cardio-respiratory injury. While tobacco smoking has decreased among Canadian adults, there are now several other forms of legal inhalant products. While legal, the evidence of benefit and safety of vaping is limited. Of concern, cases of e-cigarette or vaping products use associated lung injury (EVALI) have been accumulating in the U.S. and now in Canada. Despite this, very little is known about the inhalation exposure of emergency department (ED) patients; this

study was designed to explore lung health in the ED. **Methods:** We investigated the prevalence of exposure to vaping, tobacco and cannabis among patients presenting to a Canadian ED from July to November 2019. Ambulatory (CTAS 2 to 5), stable, adult (≥ 17 years) patients were prospectively identified and invited to complete a survey addressing factors related to lung health (previous diagnosis of respiratory conditions and respiratory symptoms at the ED presentation) and information on current exposure to vaping, tobacco and cannabis smoking. Categorical variables are reported as frequencies and percentages; continuous variables are reported as medians with inter-quartile range (IQR). The study was approved by the Health Research Ethics Board. **Results:** Overall, 1024 (71%) of 1433 eligible patients completed the survey. The median age was 43.5 (IQR: 29, 60), and 51% were female. A total of 351 (31%) participants reported having been previously diagnosed with ≥ 1 respiratory conditions, and 177 (17%) were visiting the ED as a result of ≥ 1 respiratory symptoms (e.g., cough, shortness of breath, wheezing). Daily tobacco smoking was reported by 190 (19%), and 83 (8%) reported using vaping/e-cigarette products. Cannabis use within 30 days was described by 80 (15%) respondents. Exposure to tobacco and vaping products was reported by 39 (4%) participants, 63 (6%) reported using tobacco in combination with cannabis smoking, and 3% reported combining vaping and cannabis use. **Conclusion:** Patients seeking care in the ED are exposed to a large quantity of inhaled toxins. Vaping products, considered the cause of the most recent epidemic of severe lung injury, are used in isolation and in combination with other smoking products in Canada. These exposures should be documented and may increase the risk of lung health injuries and exacerbations of chronic respiratory conditions.

Keywords: cannabis, tobacco, vaping

MP51

The relationship between entrustment scores in the simulated and workplace environments among emergency medicine residents

N. Prudhomme, MD, M. O'Brien, MD, MScPT, M. McConnell, PhD, N. Dudek, MD, W. Cheung, MD, MMed, University of Ottawa, Ottawa, ON

Introduction: The Emergency Medicine Specialty Committee of the Royal College of Physicians and Surgeons of Canada (RCPSC) has specified that resuscitation Entrustable Professional Activities (EPAs) can be assessed in either the workplace or simulation environments; however, there is minimal evidence that such clinical performance correlates. We sought to determine the relationship between assessments in the workplace versus simulation environments among junior emergency medicine residents. **Methods:** We conducted a prospective observational study to compare workplace and simulation resuscitation performance among all first-year residents ($n = 9$) enrolled in the RCPSC-Emergency Medicine program at the University of Ottawa. All scores from Foundations EPA #1 (F1) were collected during the 2018-2019 academic year; this EPA focuses on initiating and assisting in the resuscitation of critically ill patients. Workplace performance was assessed by clinical supervisors by direct observation during clinical shifts. Simulation performance was assessed by trained simulation educators during regularly-scheduled sessions. We present descriptive statistics and within-subjects analyses of variance. **Results:** We collected a total of 104 workplace and 36 simulation assessments. Interobserver reliability of simulation assessments was high (ICC = 0.863). We observed no correlation between

mean EPA scores assigned in the workplace and simulation environments (Spearman's $\rho = -0.092$, $p = 0.813$). Scores in both environments improved significantly over time ($F(1,8) = 18.79$, $p < 0.001$, $\eta^2 = 0.70$), from 2.9(SD = 1.2) in months 1-4 to 3.5(0.2) in months 9-12 ($p = 0.002$). Workplace scores (3.4(0.1)) were consistently higher than simulation scores (2.9(0.2)) ($F(1,8) = 7.16$, $p = 0.028$, $\eta^2 = 0.47$).

Conclusion: We observed no correlation between EPA F1 ratings of resuscitation performance between the workplace and simulation environments. Further studies should seek to clarify this relationship to inform our ongoing use of simulation to assess clinical competence.

Keywords: entrustment, resuscitation, simulation

MP52

Effectiveness of an outpatient parenteral antibiotic therapy clinic for adults with non-purulent cellulitis

A. Mattice, BSc, R. Yip, D. Eagles, MD, MSc, H. Rosenberg, MD, K. Suh, MD, I. Stiell, MD, MSc, K. Yadav, MD, MSc, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Emergency department (ED) patients with cellulitis that are treated with intravenous (IV) antibiotics may be eligible for outpatient parenteral antibiotic therapy (OPAT). The primary objective of this study was to determine whether the implementation of an OPAT clinic results in decreased hospitalization and return ED visits for patients treated with IV antibiotics. **Methods:** We conducted a before-after implementation study involving adults (age ≥ 18 years) that presented to two tertiary care EDs with cellulitis and were treated with IV antibiotics. The intervention was referral to an infectious disease physician within one week of the index ED visit at the newly created OPAT clinic. The primary outcomes were hospital admission and return ED visits within 14 days. Secondary outcomes were treatment failure (admission after 48 hours of OPAT) and adverse events (e.g. vomiting, diarrhea). We conducted an interrupted time series analysis from January to December both pre-intervention (2013) and post-intervention (2015), with 24 monthly data points. The year of clinic implementation (2014) was considered a transition period. A segmented non-linear regression autoregressive error model was used to aggregate the monthly data to evaluate the effectiveness of the intervention. **Results:** A total of 1,666 patients met inclusion criteria: 858 pre-intervention (mean age 59 years, 53.1% male) and 808 post-intervention (mean age 62 years, 54.5% male). Hospitalization rates were not significantly higher one year after clinic implementation ($p = 0.53$) although there was a non-statistically significant gradual increase of 0.8% per month (95%CI -0.3% to 1.9%). One year after introduction of the OPAT clinic, return ED visits were significantly lower (change in intercept -24.4%, 95%CI -34.2% to -14.6%; $p < 0.001$), followed by an additional drop of 1.4% per month (95%CI -2.1% to -0.6%; $p = 0.002$). By the end of the study, return visits were 40.7% lower (95%CI 25.6% to 55.9%) than if the intervention had not been introduced. Treatment failure rates were $< 2\%$ and adverse events were $< 5\%$ in both groups. **Conclusion:** Implementation of an OPAT clinic significantly reduced return ED visits for cellulitis, which is critically important given the current ED overcrowding crisis. There was no significant change in hospital admission rates. There were low rates of treatment failures and adverse events. An OPAT clinic should be considered to reduce ED crowding while maintaining safe patient care.

Keywords: cellulitis, infectious disease, outpatient parenteral antibiotic therapy

MP53**A feasibility analysis for successful completion of IVC ultrasound in hypotensive emergency department patients**

R. Dunfield, BSc, MD, P. Ross, MD, C. Keyes, BSc, J. Fraser, BN, D. Lewis, MBChB, P. Boreskie, MD, C. Pham, MD, S. Ali Alrobaian, MD, F. Scheuermeyer, MD, MSc, H. Lamprecht, MBChB, PhD, M. Stander, MBChB, MMed, R. Henneberry, MD, A. Sibley, MD, P. Atkinson, MBChB, Dalhousie University, Saint John, NB

Introduction: Determining fluid status prior to resuscitation provides a more accurate guide for appropriate fluid administration in the setting of undifferentiated hypotension. Emergency Department (ED) point of care ultrasound (PoCUS) has been proposed as a potential non-invasive, rapid, repeatable investigation to ascertain inferior vena cava (IVC) characteristics. Our goal was to determine the feasibility of using PoCUS to measure IVC size and collapsibility. **Methods:** This was a planned secondary analysis of data from a prospective multicentre international study investigating PoCUS in ED patients with undifferentiated hypotension. We prospectively collected data on IVC size and collapsibility using a standard data collection form in 6 centres. The primary outcome was the proportion of patients with a clinically useful (determinate) scan defined as a clearly visible intrahepatic IVC, measurable for size and collapse. Descriptive statistics are provided. **Results:** A total of 138 scans were attempted on 138 patients; 45.7% were women and the median age was 58 years old. Overall, one hundred twenty-nine scans (93.5%; 95% CI 87.9 to 96.7%) were determinate. 131 (94.9%; 89.7 to 97.7%) were determinate for IVC size, and 131 (94.9%; 89.7 to 97.7%) were determinate for collapsibility. **Conclusion:** In this analysis of 138 ED patients with undifferentiated hypotension, the vast majority of PoCUS scans to investigate IVC characteristics were determinate. Future work should include analysis of the value of IVC size and collapsibility in determining fluid status in this group.

Keywords: hypotension, inferior vena cava, point of care ultrasound

MP54**Management algorithm for the treatment of intoxications with calcium channel blockers: a simulation trial (MATRICS)**

V. Gauvin, MD, É. Raymond-Dufresne, MD, M. St-Onge, MD, PhD, Laval University, Quebec, QC

Introduction: Cardiotoxicants poisonings are rare but have the potential to be highly lethal. Given the precarious nature of these poisonings, the Quebec Poison Control Center (CAPQ) has established a management protocol for optimal treatment. This study seeks to evaluate whether CAPQ's Calcium Channel Blocker (CCB) poisoning management protocol improves treatment delivery by physicians using simulation. The primary outcome is whether the management protocol decreases time to delivery of calcium and insulin. The secondary outcome is whether use of the management protocol increases appropriate dosing. **Methods:** For this randomized AB / BA crossover trial, Emergency Medicine and Internal Medicine residents were randomly assigned to one of two groups; one group received the management protocol during the simulation and the other did not. The crossover occurred 3-months later whereby the groups were reversed. Inverse probability weighting was used to compensate for losses at follow-up. Differences in baseline characteristics, as well as carry-over effect, were evaluated. The outcomes were analyzed with a two-level hierarchical model. **Results:** Twenty-three residents were included in the study. No significant differences in baseline characteristics were

noted between the AB / BA groups, and no carry-over effect was identified on statistical analysis for all variables. As for the primary outcomes, time to administration of IV calcium decreased by 87 seconds (CI -266 to 92), time to insulin bolus decreased by 52 seconds (-217 to 114), and time to insulin infusion decreased by 115 seconds (-213 to -18) when the protocol was used. As for the secondary outcomes, there were no statistically significant differences for the percentage of adequate doses of IV calcium (RR: 1.27; 95% CI: 0.80–2.02), insulin bolus (RR: 1.30; 95% CI: 0.80–2.12) and insulin infusion (RR: 1.37; 95% CI: 0.99–1.91). **Conclusion:** This randomized crossover study, which uses simulation to evaluate the performance of CAPQ's CCB poisoning management protocol, does not statistically demonstrate decreased time to administration or increased accuracy of dosing, due to the large confidence intervals. Unfortunately, we were not able to obtain the planned sample size due to limited participation. However, our results trend towards more optimal dosing and rapid dosing of treatments, and from a qualitative standpoint, the protocol appeared to increase the structure of patient care.

Keywords: calcium channel blocker, management protocol, simulation

MP55**Reducing barriers to successful cardiac resuscitation: intervention in elementary schools**

P. Blanchard, BSc, MBA, MD, MSc, PhD, V. Gauvin, MD, L. Marie-Pier, MD, F. Péloquin, MD, I. Bertrand, MD, E. Mercier, MD, MSc, Université Laval, Québec, QC

Introduction: The incidence of out-of-hospital cardiac arrest (OHCA) in school is approximately 2.1 for 100,000 per year. Although rare, it is a devastating event for the local community. Schools with public access to automated external defibrillators (AED) and an emergency response plan have demonstrated increased survival rates of up to 70% for students who suffer cardiac arrest. Previous studies identified numerous barriers to successful cardiac resuscitation in public school systems. The main objectives of this study were to identify those barriers in the Quebec region elementary school system and to assess the impacts of an AED focused training session. **Methods:** A previously validated survey focused on the potential barriers to successful defibrillation in OHCA and on demographic variables was sent to 139 elementary schools. Later, 92 employees within three elementary schools who responded to the survey were evaluated before and after receiving training on the use of AED in a mock cardiac arrest scenario. The primary outcome was the time to first shock and the secondary outcomes included correct AED pad placement and safety of the procedure. **Results:** Survey response rate was 53%, which is comparable to previous studies assaying barriers to cardiac resuscitation in public school systems. 95% of school respondents reported the presence of an AED on the school premises but 46% stated that no formal AED training course was provided to employees. Out of the four schools who reported a previous OHCA, only one had access to an AED at the time of the event. Following focused AED training, 92% of school workers successfully completed a defibrillation sequence in a mock scenario, from 53% before ($p < 0.001$, McNemar test). The time to first shock went from 66 seconds (95% CI 63-70) to 47 seconds (95% CI 45-49; -29%, $p < 0.001$). Proper pad placement was the most problematic step for participants and personnel who reported previous training had better performance (OR 3.15, 95% CI 1.33-7.42, $p = 0.009$). **Conclusion:** Most elementary schools in the Quebec region have

access to AEDs. However, inadequate AED training represents a significant barrier to successful defibrillation in the event of an OHCA. Our results showed that a simple focused AED training could improve the performance of school workers and optimize the chain of survival.

Keywords: Automated external defibrillators, Out-of-hospital cardiac arrest, Resuscitation

MP56

Intraosseous versus intravenous access in pediatric out-of-hospital cardiac arrest: an examination of prehospital vascular access methods and survival rates

F. Besserer, MD, MSc, J. Dirk, BSc, G. Meckler, MD, MSHS, J. Tijssen, MD, MSc, A. DeCaen, MD, T. Kawano, MD, PhD, B. Grunau, MD, MHSc, University of British Columbia, Prince George, BC

Introduction: Intraosseous (IO) and intravenous (IV) access to the vascular system for the delivery of fluid and medication is a component of advanced pediatric resuscitation. Data describing the use of IV or IO vascular access methods and outcomes of pediatric out-of-hospital cardiac arrest (OHCA) are limited. **Methods:** We analyzed prospectively collected data of non-traumatic OHCA of the Resuscitation Outcomes Consortium registry in Canada and the USA (2011-2015). We included patients 17 years of age and younger who were treated by emergency medical services (EMS). We described the vascular access routes utilized, and the success rate of these attempts. We performed a logistic regression model, to evaluate the association of vascular access route and survival, adjusting for age, sex, shockable initial rhythm, witnessed status, public location, EMS arrival interval and time from 911 call to vascular access. In this model, we excluded patients with failed, multiple site or no vascular access attempts during the resuscitation. **Results:** Of 1549 non-traumatic pediatric OHCA, 822/895 (92%) and 345/488 (71%) had successful IO and IV vascular access attempts, respectively. IO access was more common in younger cases. Of 761 cases included in the regression model, 30/601 (5%) of IO-treated cases survived to hospital discharge, in comparison to 40/160 (25%) of IV-treated cases. Intraosseous access was associated with a decreased survival to hospital discharge (adjusted OR 0.46; 95% CI 0.21 to 0.98). **Conclusion:** In pediatric patients with OHCA, intraosseous vascular access was more commonly successful than IV placement and more common among younger cases. However, in cases with successful vascular access, IO use was associated with lower survival to hospital discharge. **Keywords:** intravascular access, out-of-hospital cardiac arrest, pediatrics

MP57

Effect of grip strength measured in the emergency department on the risk of functional decline following a minor trauma in robust elderly: a pan-Canadian study

S. Hegg, PhD, M. Sirois, PhD, P. Carmichael, MSc, J. Perry, MD, MSc, J. Lee, MD, MSc, R. Daoust, MD, MSc, E. Lang, MD, MSc, M. Emond, MD, MSc, Laval, Quebec, QC

Introduction: The elderly (65 yo and more) increase in Canada is well documented along with a disproportionate use of Emergency Departments after a minor injury. These patients requires specific care given a 16% risk of functional decline following a visit to ED. To prevent functional decline, a multidimensional assessment of the elderly is recommended in the emergency department. Objective: To determine if ED grip strength can predict functional decline at

3 or 6 months post-injury. **Methods:** A multicentre prospective study in 5 ED across Canada was realized between 2013 and 2016. Patients 65 years old and over, autonomous in daily living activities and consulting the emergency department for minor trauma were recruited 7 days a week. Clinical-demographic data, functional status, fear of falling, number of falls in the last month, grip strength measurement were collected in the ED. Functional decline (loss of at least points to functional status) was calculated at 3 and 6 months. Descriptive statistics and linear regression model with repeated measurements were used to determine if the grip strength was predictive of functional decline at 3 or 6 months. **Results:** 387 patient were recruited. Mean age was 74 ± 7 years old, 52% were male. XXX experienced a fall in the last month. The initial maximum grip strength was (24 ± 10 intervention vs. 28 ± 13 control; $p \leq 0.05$). grip strength is associated with pre-injury functional status ($p < 0.0001$) and fear of falling ($p = 0.0001$) but does not predict 3 or 6 month functional decline. **Conclusion:** Given the strong association with fear of falling and functional status at initial ED evaluation, we recommend that grip strength measurement could be included in a multidisciplinary geriatric emergency department assessment as needed.

Keywords: elderly, functional decline, grip strength

MP58

Have opioid prescription by emergency physicians changed significantly over five years?

M. Wei, MD, M. Da Silva, MD, J. Perry, MD, MSc, University of Ottawa, Ottawa, ON

Introduction: It is believed by some that emergency physicians prescribe more opioids than required to manage patients' pain, and this may contribute to opioid misuse. The objective of our study was to assess if there has been a change in opioid prescribing practices by emergency physicians over time for undifferentiated abdominal pain. **Methods:** A medical record review for adult patients presenting at two urban academic tertiary care emergency departments was conducted for two distinct time periods; the years of 2012 and 2017. The first 500 patients within each time period with a discharge diagnosis of "abdominal pain" or "abdominal pain not yet diagnosed" were included. Data were collected regarding analgesia received in the emergency department and opioid prescriptions written. Opioids were standardized into morphine equivalent doses to compare quantities of opioids prescribed. Analyses included t-test for continuous and chi-square for categorical data. **Results:** 1,000 patients were included in our study. The mean age was 42.0 years and 69.6% of patients were female. Comparing 2017 to 2012, there was a non-significant decrease in opioid prescriptions written for patients discharged directly by emergency physicians, from 17.8% to 14.4% ($p = 0.14$). Mean opioid quantities per prescription decreased from 130.4 milligrams of morphine equivalents per prescription to 98.9 milligrams per prescription ($p = 0.002$). 13.9% of opioid prescriptions in 2017 were for more than 3 days, which is a decrease from 28.1% in 2012. During the emergency department care, there was an increase in foundational analgesia use prior to initiating opioids from 17.6% to 26.8% ($p = 0.001$). There was also a decrease for within ED opioid analgesia use from 40.0% to 32.8% ($p = 0.018$). **Conclusion:** Opioid prescription rates did not change significantly during our study. However, physicians reduced the quantity of opioids per prescription and used less opioid analgesia in the emergency department for abdominal pain of undetermined etiology.

Keywords: analgesia, opioids

MP59

Exploring adverse events in boarded psychiatric patients in Calgary zone adult emergency departments

D. Major, BSc, S. Vandenberg, MD, MSc, University of Calgary, Calgary, AB

Introduction: Adult Emergency Departments (EDs) in Calgary are facing a crisis of boarded patients admitted to psychiatric in-patient units. In psychiatric emergency care, “boarding” describes the holding of patients in the ED after the decision to admit has been made by a staff psychiatrist and a bed request has been submitted. Literature review suggests psychiatric patients face exorbitantly higher boarding times than any other service in the hospital however little is published on the nature of these adverse events. Examples of adverse patient events from a psychiatric perspective could include: the need to initiate mechanical and/or chemical restraints after admission and while still in the ED, attempts to self-harm, and verbal and physical assault on ED staff. **Methods:** This study quantifies the incidence of adverse events experienced by psychiatric patients while boarded in the ED. It uses a retrospective chart review of all adult psychiatric patients, age 18 - 55yo, who presented to one of four adult EDs and who were admitted to a psychiatric in-patient unit in the Calgary Zone between January 1, 2019 and May 15, 2019. A randomly generated convenience sample identified 200 patients, 50 from each site, for in-depth review. **Results:** During the study time period, 1862 adult patients were admitted from emergency departments to the psychiatry service across all four sites. Of the 200 charts reviewed, patients ranged in age from 26-41 (average 34). 52.5% were male with the majority being admitted to a non-high observation bed. The average boarding time was 23.5 hours with an average total ED length of stay of 31 hours for all comers. Those who experienced an adverse event while boarded in the ED experienced a significantly prolonged average boarding time (35 hours) compared to those who did not experience an adverse event (6.5 hours) ($p = 0.005$). Significant adverse events were associated with the specific hospital site and the type of admission bed needed (high observation versus normal versus short stay) ($p < 0.05$). **Conclusion:** Psychiatric patients boarded in Calgary EDs experience a number of significant adverse events. The importance of understanding the reality of the conditions that psychiatric ED patients face while waiting for in-patient placement cannot be overstated. This study is important to emergency medicine as it will allow for deeper understanding of the patient experience while in the ED and identifies areas that may require further advocacy amongst ED staff and our psychiatry colleagues.

Keywords: adverse event, boarding, psychiatric emergency

MP60

Application of routinely collected administrative data to track demographic and mental health characteristics of people experiencing homelessness

I. Burcul, BSc, J. Dai, BSc, Z. Ma, BHSc, S. Jamani, R. Hossain, MD, S. Strobel, MD, MA, University of Toronto, Toronto, ON

Introduction: People experiencing homelessness have complex psychiatric and medical presentations, and have poor access to primary care. Thus, emergency departments (EDs) often become their main point of healthcare contact. Using routinely collected administrative data from EDs, we examine the ED utilization, health and reasons for presentations of people experiencing homelessness. **Methods:** All routinely collected administrative health data from EDs located within Ontario, Canada from 2010-2017 were analyzed. Individuals

experiencing homelessness were identified by a marker that was adopted in 2009 replacing their recorded postal code with an XX designation. Outcomes include number of unique patients, number of visits and repeat visits, CTAS scores, ambulance utilization, and type of ICD-10 presentation. **Results:** 640,897 visits to the ED over 10 years were made by 39,525 unique individuals experiencing homelessness. A visit to an ED by a homeless patient resulted in repeat presentation on the same day 5% of the time. The median repeat presentation to an ED was 14 days. In people experiencing homelessness, the most prevalent category of presentations were primary mental health diagnoses, accounting for 34.8% of visits ($n = 223,392$). Under mental health conditions, psychoactive substance use presentations made up more than 54% of the presentations ($n = 121,112$). Alcohol was by far the most common cause of substance use/induced disorders ($n = 84,805$). **Conclusion:** Applications of administrative data presents a novel method of measuring health and healthcare outcomes for marginalized populations. We found people experiencing homelessness are presenting to ED more frequently in Ontario, with significant mental health and addiction problems. Our study identifies several important health vulnerabilities within the population, which may serve as potential targets for future interventions.

Keywords: data, health characteristics, homelessness

Poster Presentations

P001

Proof-of-principle in a large animal pilot: cardiac arrest may be associated with acute, transient coagulopathy that may drive post-cardiac arrest syndrome

C. Yeh, MD, PhD, B. Camilotti, MD, H. Hanif, MLT, R. Mohindra, MDCM, MASc, C. Sun, P. Kim, MSc, PhD, S. Lin, MD, MSc, M. Sholzberg, MDCM, MSc, University of Toronto, Toronto, ON

Introduction: Many cardiac arrest survivors die later due to hemorrhage or thromboembolism, thought to be caused by acquired coagulopathy in post-cardiac arrest syndrome (PCAS) from shock and reperfusion injury. Understanding PCAS is a priority identified by the AHA for the prevention of complications in cardiac arrest survivors. Shock dysregulates both coagulation and fibrinolysis. The key effector enzyme thrombin (Th), is responsible for both up- and down-regulating coagulation and fibrinolysis. Measuring early Th activity may allow for predicting PCAS coagulopathy, and early medical intervention in the ED. Therefore, we aimed to characterize the time-course profile of early coagulation using an established pig model of cardiac arrest. **Methods:** Yorkshire pigs were anaesthetized and intubated, had VF-arrest induced by pacing, and were resuscitated per ACLS. Rotational thromboelastometry (ROTEM) was performed on whole blood at four times: baseline, intra-arrest, post-arrest, and death, using the fibrin-based test with tissue factor to initiate clotting in the presence of a platelet inhibitor cytochalasin D (FIBTEM). Clot time (CT), clot formation time (CFT), alpha-angle during clot formation (Alpha), clot amplitude at 10 min (A10), maximum clot firmness (MCF), and maximum lysis as total percentage (ML%) were quantified. The primary outcome is the overall coagulation initiation measured by CFT, while secondary outcomes include ROTEM parameters reflecting Th activity. Parameters are compared over time in SPSS using repeated measures ANOVA and Bonferroni correction. **Results:** Pilot data from one experiment show that cardiac arrest causes immediate early changes to coagulation that subsequently normalized with ROSC (Figure 1). CFT was impaired immediately

upon cardiac arrest (2.3-fold increase), normalized with ROSC, and impaired again at death when compared with baseline. Consistent with clotting impairment, A10, Alpha, and MCF were all reduced with cardiac arrest, normalized with ROSC, and impaired again at death. **Conclusion:** Higher initial indices of coagulopathy in patients with cardiac arrest appear to correlate with death and thromboembolism. In this pilot, CFT is acutely modified by cardiac arrest. Since CFT is affected by overall Th activity, early Th dysregulation may be a critical driver of coagulopathy. Th may therefore be a lead target that is modifiable in the emergency post-arrest setting to decrease morbidity and mortality from PCAS in cardiac arrest survivors.

Keywords: cardiac arrest, coagulopathy, thrombin

P002

Minimum archiving requirements for emergency medicine point-of-care ultrasound: a modified Delphi-derived national consensus

M. Wong, MD, M. Woo, MD, W. Cheung, MD, MMed, P. Pageau, MD, P. Olszynski, MD, MEd, D. Lewis, MBBS, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Point-of-care ultrasound (POCUS) has become standard practice in emergency departments ranging from remote rural hospitals to well-resourced academic centres. To facilitate quality assurance, the Canadian Association of Emergency Physicians (CAEP) recommends image archiving. Due in part to poor infrastructure and lack of a national standard, however, archiving remains uncommon. Our objective was to establish a minimum standard archiving protocol for the core emergency department POCUS indications. **Methods:** Itemization of potential archiving standards was created through an extensive literature review. An online, three-round, modified Delphi survey was conducted with the thirteen POCUS experts on the national CAEP Emergency Ultrasound Committee tasked with representing diverse practice locations and experiences. Participants were surveyed to determine the images or clips, measurements, mode, and number of views that should comprise the minimum standard for archiving. Consensus was pre-defined as 80%. **Results:** All thirteen experts participated fully in the three rounds. In establishing minimum image archiving standards for emergency department POCUS, complete consensus was achieved for first trimester pregnancy, hydronephrosis, cardiac activity versus standstill, lower extremity deep venous thrombosis, and ultrasound-guided central line placement. Consensus was achieved for the majority of statements regarding abdominal aortic aneurysm, extended focused assessment with sonography in trauma, pericardial effusion, left and right ventricular function, thoracic B-line assessment, cholelithiasis and cholecystitis scans. In total, consensus was reached for 58 of 69 statements (84.1%). This included agreement on 41 of 43 statements (95.3%) describing mandatory images for archiving in the above indications. **Conclusion:** Our modified Delphi-derived consensus represents the first national standard archiving requirements for emergency department POCUS. Depending on the clinical context, additional images may be required beyond this minimum standard to support a diagnosis. **Keywords:** archiving, delphi, point-of-care ultrasound

P003

Productivity patterns in early-career physicians: a multi-center analysis of administrative emergency department operations data

C. Wong, MD, S. Lu, D. Wang, MSc, S. Dowling, MD, E. Lang, MD, University of Calgary, Calgary, AB

Introduction: Physician metrics extracted from an electronic medical records (EMR) system can be utilized for practice improvement. One key metric analyzed at many emergency departments (EDs) is 'patients per hour' (pts/hr), a proxy for physician productivity. It is often believed that early-career physicians experience rapid growth in efficiency as they acclimatize to a hospital system and develop clinical confidence. This is the first study to evaluate the following question: Do early-career ED physicians increase their productivity when beginning practice? **Methods:** We performed a retrospective review of EMR data of early-career ED physicians working at one or more urban, academic centers. Early-career physicians must have started practice within three months of residency completion, and were identified by privileging records and provincial medical college registration. Physicians were excluded if they did not have at least 36 months of continuous data. Monthly productivity data (pts/hr) was extracted for each physician for their first 36-months of practice. A 'performance curve' or graph with a trendline of productivity as a moving average was created for each physician. Each performance curve was visually evaluated by two independent reviewers to qualitatively identify the general trend as upward, downward, or stable, with disagreements resolved by conference. Each physician's first and third year average productivity was compared quantitatively as well, with a significant upward or downward trend defined as a difference of at least 0.2 pts/hr. **Results:** A total of 41 physicians met the inclusion and exclusion criteria. Overall monthly pts/hr averages ranged from 1.08 to 7.65. Upon visual inspection, six (14.6%) physicians had upward trends, five (12.2%) had downward trends, and 30 (73.2%) had no discernable pattern. The quantitative analysis comparing first year to third year productivity matched the qualitative inspection exactly, with the same six physicians showing increased productivity, five with decreased, and 30 without significant change. Notably, the majority (30/41) of physicians demonstrated radical productivity variations over short periods with no discernable long-term trends. **Conclusion:** The majority of early career physicians do not demonstrate sustained early-career productivity changes. Of those that do, an approximately equal number will become faster and slower.

Keywords: efficiency, metrics, productivity

P004

The impact of transfusion guideline on emergency physician transfusion orders

C. Williams, BSc, S. Campbell, MBChB, MD, I. Sadek, MD, C. Cheng, MD, PhD, C. LeBlanc, MD, MEd, Dalhousie University, Halifax, NS

Introduction: Blood transfusions continue to be a critical intervention in patients presenting to emergency departments (ED). Improved understanding of the adverse events associated with transfusions has led to new research to inform and delineate transfusion guidelines. The Nova Scotia Guideline for Blood Component Utilization in Adults and Pediatrics was implemented in June 2017 to reflect current best practice in transfusion medicine. The guideline includes a lowering of the hemoglobin threshold from 80 g/L to 70 g/L for transfusion initiation, to be used in conjunction with the patient's hemodynamic assessment before and after transfusions. Our study aims to augment understanding of transfusion guideline adherence and ED physician transfusing practices at the Halifax Infirmary Emergency Department in Nova Scotia. **Methods:** A retrospective chart review was conducted on one third of all ED visits involving red-cell transfusions for one year prior to and one year following the guideline implementation.

A total of 350 charts were reviewed. The primary data abstracted for the initial transfusion, and subsequent transfusion if applicable, from each reviewed chart included clinical and laboratory data reflective of the transfusion guideline. Based on these data, the transfusion event was classified one of three ways: indicated based on hemoglobin level, indicated based on patient's symptomatic presentation, or unable to determine if transfusion indicated based on charting.

Results: The year before guideline implementation, the total number of transfusions initiated at a hemoglobin of between 71-80 was 31 of 146 total transfusions. This number dropped by 23.6% to 22 of 136 in the year following guideline implementation. The number of single-unit transfusions increased by 28.0% from 47 of 146 in the year prior to 56 of 136 in the year after guideline implementation. The initial indication for transfusion being unable to be determined based on charting provided increased by 120%. The indication for subsequent transfusions being unable to be determined based on charting increased by 1500% ($P < 0.05$). **Conclusion:** These data suggest that implementing transfusion guidelines effectively reduced the number of transfusions given in the ED setting and increased the number of single-unit transfusions administered. However, the data also suggest the need for better education around transfusion indications and proper documentation clearly outlining the rationale behind the decision to transfuse.

Keywords: transfusions, value-added care

P005

Regional anesthesia in Canadian emergency departments: Emergency physician practices and impressions

D. Wiercigroch, BSc, MPA, S. Friedman, MD, MPH, D. Porplycia, MSc, M. Ben-Yakov, MDCM, University of Toronto, Toronto, ON

Introduction: The use of regional anesthesia (RA) by emergency physicians (EPs) is expanding in frequency and range of application as expertise in point-of-care ultrasound (POCUS) grows, but widespread use remains limited. We sought to characterize the use of RA by Canadian EPs, including practices, perspectives and barriers to use in the ED. **Methods:** A cross-sectional survey of Canadian EPs was administered to members of the Canadian Association of Emergency Physicians (CAEP), consisting of sixteen multiple choice and numerical responses. Responses were summarized descriptively as percentages and as the median and inter quartile range (IQR) for quantitative variables. **Results:** The survey was completed by 149/1144 staff EPs, with a response rate of 13%. EPs used RA a median of 2 (IQR 0-4) times in the past ten shifts. The most broadly used applications were soft tissue repair (84.5% of EPs, $n = 126$), fracture pain management (79.2%, $n = 118$) and orthopedic reduction (72.5%, $n = 108$). EPs agreed that RA is safe to use in the ED (98.7%) and were interested in using it more frequently (78.5%). Almost all (98.0%) respondents had POCUS available, however less than half (49.0%) felt comfortable using it for RA. EPs indicated that they required more training (76.5%), a departmental protocol (47.0%), and nursing assistance (30.2%) to increase their use. **Conclusion:** Canadian EPs engage in limited use of RA but express an interest in expanding their use. While equipment is available, additional training, protocols, and increased support from nursing staff are modifiable factors that could facilitate uptake of RA in the ED.

Keywords: nerve block, pocus, regional anesthesia

P006

Time for a national conversation: Practices and perspectives on HIV testing in Canadian emergency departments

D. Wiercigroch, BSc, MPA, E. Xie, MD, MSc, J. Hulme, MDCM, MPH, M. Landes, MD, MSc, University of Toronto, Toronto, ON

Introduction: Improved access to HIV testing would benefit the one in six Canadians living with undiagnosed HIV, and potentially reduce transmission. Emergency departments may be the first or only point of contact with the healthcare system for people exposed to HIV; however, HIV testing remains inaccessible in many EDs in Canada.

Methods: We used a grounded theory approach to characterize the experiences and context of HIV testing in Canadian EDs. We conducted semi-structured phone interviews with ED and public health practitioners from a purposive sample of urban, rural, academic, and community ED catchment areas. Thematic analysis was performed through iterative readings by two authors. Results were triangulated through consultation with public health and HIV experts. **Results:** Data were obtained from 16 ED physicians and 8 public health practitioners. HIV tests were infrequently performed in the EDs of our sample. Informants from higher incidence regions believed that greater availability of HIV tests in the ED would benefit the populations they serve. In half of the sample, rapid HIV tests were available. However, indications for testing were most often occupational or known high-risk exposure. Notably, two urban EDs in British Columbia screened all patients who otherwise needed blood tests (opt-out), but had shifted to opt-in testing at the time of this study. Consent practices and perceived requirements varied widely between sites; this confused or frustrated physicians. Most EDs were unable to offer a test result to patients during their visit as results were not available until days to weeks later. Commonly, the ordering physician was responsible for communicating results. Some EDs had an assigned physician managing all results on a given day while others relied on public health units for follow-up. All EDs reported access to public health clinics for ongoing care. Barriers to offering a test in the ED included time required for consent, discomfort with pre-test counseling, delay in results availability and unclear processes for follow-up. **Conclusion:** We describe substantial regional and within-site variation in HIV testing practices across a diverse sample of EDs across Canada. These findings highlight disparities in access to HIV testing and warrant a national discussion on best practices for testing in EDs with an emphasis on reducing barriers for high-risk populations and addressing unmet needs.

Keywords: health services accessibility, human immunodeficiency virus, marginalized populations

P007

Cunningham reduction of anterior shoulder dislocation facilitated by inhaled low-dose methoxyflurane – a pilot study

H. Wiemer, BSc, MD, S. Campbell, MBChB, R. Fitzpatrick, C. Carriere, S. Teed, BAppBus:ES, P. Hico, A. Snook, J. Gallant, J. Belliveau, BSc, MHA, C. DeMone, Dalhousie University, Halifax, NS

Introduction: The Cunningham reduction method for anterior shoulder dislocation offers an atraumatic alternative to traditional reduction techniques without the inconvenience and risk of procedural sedation and analgesia (PSA). Unfortunately, success rates as

low as 27% have limited widespread use of this method. Inhaled methoxyflurane (I-MEOF) offers a rapidly administered, minimally invasive option for short-term analgesia. We conducted a pilot study to evaluate the feasibility of studying whether I-MEOF increased success rates for atraumatic reduction of anterior shoulder dislocation. **Methods:** A convenience sample of 20 patients with uncomplicated anterior shoulder dislocations were offered the Cunningham reduction method supported by methoxyflurane analgesia under the guidance of an advanced care paramedic. Operators were instructed to limit their attempt to the Cunningham method. Outcomes included success rate without the requirement for PSA, time to discharge, and operator and patient satisfaction with the procedure. **Results:** 20 patients received I-MEOF and an attempt at Cunningham reduction. 80% of patients were male, median age was 38.6 (range 18-71), and 55% were first dislocations of that joint. 35% (8/20 patients) had reduction successfully achieved by the Cunningham method under I-MEOF analgesia. The remainder proceeded to closed reduction under PSA. All patients had eventual successful reduction in the ED. 60% of operators reported good to excellent satisfaction with the process, with inadequate muscle relaxation being identified as the primary cause of failed initial attempts. 80% of patients reported good to excellent satisfaction. **Conclusion:** Success with the Cunningham technique was marginally increased with the use of I-MEOF, although 65% of patients still required PSA to facilitate reduction. The process was generally met with satisfaction by both providers and patients, suggesting that early administration of analgesia is appreciated. Moreover, one-third of patients had reduction achieved atraumatically without need for further intervention. A larger, randomized study may identify patient characteristics which make this reduction method more likely to be successful.

Keywords: methoxyflurane, procedural sedation and analgesia, shoulder dislocation

P008

Care of palliative patients by paramedics in the 911 system

C. Wallner, BSc, MD, MCR, M. Welsford, BSc, MD, K. Lutz-Graul, BSc, K. Winter, BSc, MBA, McMaster University, Hamilton, ON

Introduction: Palliative Care aims to relieve suffering and improve the quality of living and dying in patients with life-limiting, progressive conditions. Many patients and families prefer to stay at home at end of life. Despite this, many access 911 in times of apparent crisis. It has been noted in the literature that a well functioning palliative care system includes considering Emergency Medical Services as part of the patients' circle of care. Training in palliative care is traditionally limited or absent for prehospital clinicians, including Paramedics and Emergency Medical Services Physicians. Furthermore, in our region, there are currently no medical directives available to Paramedics within the 911 system specifically addressing the needs of palliative care patients. **Methods:** A feasibility study (Expanding Care by Paramedics for Palliative Patients – EC3P) was designed to evaluate implementation of a new palliative care medical directive with trained teams of Paramedics available to respond to 911 calls. As part of this study, a pre-implementation retrospective chart review was performed. Patient care records were screened for "palliative" within the past medical history and text fields. Information about dispatch and scene times, patient demographics, details of patient encounter, and disposition of the patient were recorded. Descriptive statistics were used. **Results:** Data was reviewed for all calls in 2018. Call data was reviewed to exclude those that were pediatric (<18yo)

and those whose palliative status was unknown or unclear. There was a total of 318 calls. The majority of the calls (83%) were between 7am and 8pm, with peaks at 10 am and 6pm. The majority were transported to hospital (74%), 16% were transferred to hospital initiated by their palliative care physician, 20% "refused" transport, and 6% were declared dead and not transported. The most common reasons for calling 911 were new symptoms or a sudden worsening of chronic symptoms, followed by needs exceeding caregiver capacity; the third most common was lift assist without apparent injury. **Conclusion:** Much is unknown about the palliative patient population as it intersects with prehospital emergency care. This study will help provide information needed to guide further research and implementation.

Keywords: emergency medical services, palliative care

P009

Quality improvement and implementation of urine culture follow up process

N. Walji, MBChB, MSc, A. Greer, BSc, MD, M. Hewitt, BSc, MD, M. BinKharfi, MBBS, McMaster University, Hamilton, ON

Background: The diagnosis of urinary tract infection (UTI) is made based on symptoms, urinalysis and urine culture. While simple urinary tract infections do not require routine culture, the Infectious Disease Society of America (IDSA) Guidelines state that complicated urinary tract infections should have urine cultures performed to determine which antibiotics are effective, as there is a higher risk of infection with resistant organisms. We hypothesized that the rate of urine cultures sent for complicated UTI is less than is recommended by the literature. **Aim Statement:** We aimed to implement a follow-up reporting system for Urinary Culture in patients diagnosed with complicated UTIs and raise our Urinary Culture rates in this population to 80% by June 2019. **Measures & Design:** We performed a single-center chart review using Emergency Department (ED) charts of non-admitted patients. They were audited daily for two weeks to obtain a sample of patients who had a discharge diagnosis of urinary tract infection, pyelonephritis or cystitis. Charts capturing these diagnoses were assessed to see if a culture was clinically indicated and if it was ordered. Charts were screened for the presence of any of the following criteria indicating complicated UTI: known structural or functional abnormality of the urinary tract, genitourinary obstruction, pregnancy, immunosuppression, diabetes, indwelling or intermittent catheter use, fever, male patient, clinical pyelonephritis, antimicrobial failure, or transfer from a nursing home. Data was then compiled to determine culture rates in complicated and uncomplicated UTIs. This prevalence rate established the baseline performance in the ED which was used to inform the quality improvement project. **Evaluation/Results:** Over a two week period, 26 patients were discharged from the ED with a diagnosis of UTI, with 17 of these patients meeting criteria for complicated UTI. Only 6 of 17 complicated UTIs were sent for urine culture, therefore our pre-implementation culture rate was 35%. After initial data collection, a follow-up system was designed ensuring that urine culture and sensitivities results would be compiled and reviewed daily at Hamilton Health Sciences. This system was created with input from key stakeholders including department chiefs, core lab services, ED physicians and business clerks. A discrepancy form was created for documentation of culture result recognition and any required patient follow up ie. antibiotic change. In October 2019, the system had been implemented for a month, after which another chart review was completed. 27 cases were captured, 18 of which were complicated. The

complicated culture rate had increased significantly from 35% to 72%. **Discussion/Impact:** In the ED, ordering of cultures for patients being discharged, regardless of type, is commonly associated with concern of result follow up, which may take up to 72 hours. This discrepancy system was implemented to ensure that all urine cultures ordered had appropriate follow up, thus supporting physicians in ordering cultures when indicated. The significant improvement in culture rate from 35% to 72% is balanced by one single culture of all 9 simple UTIs (11%). In PDSA cycle 2, we hope to increase rates to 90% by improving current challenges with the system.

Keywords: complicated urinary tract infection, quality improvement and patient safety, urine culture

P010

An examination of sample size selection in medical record reviews in emergency medicine journals

J. Vinken, BKL, MA, M. Bilic, BSc, R. Jones, BSc, S. Upadhye, BSc, MD, MSc, McMaster University, St. Catharines, ON

Introduction: Medical record review (MRR) studies are commonly used in Emergency Medicine (EM) research. It is not always clear how sample size calculations are reported, or the methods by which they were derived. This scoping review sought to examine reporting and justification of MRR sample sizes from the EM literature. **Methods:** Using Web of Science, we identified the top ten journals, based on impact factor rating in 2018, within the field of Emergency Medicine. Journals were excluded if they were not in English or did not include sufficient articles for analysis. Within each of these ten selected journals, we searched for chart reviews and related terms: "medical record", "outpatient record", "inpatient record", "clinical record", and "nursing note". From this search subset, five articles were randomly selected from each journal. Data about sample size and sample size selection were extracted and analyzed by two reviewers independently for each article. **Results:** Of the 50 articles randomly selected, 48 articles were retrospective MRRs and two articles were prospective MRRs. 78% (39 articles) chose sample size based on availability, 14% (seven articles) chose sample size based on power calculations, 4% (two articles) chose sample size based on a previous study's methodology, and 4% (two articles) did not give details on sample size selection. **Conclusion:** While some emergency medicine MRRs based sample size selection on power or previous studies, the vast majority are based on availability with study-specific exclusion/inclusion criteria. This may indicate they are using a smaller sample size than necessary to be sufficiently powered to assess their end goal. More work is required to determine the effect of this on outcomes and interpretability of results, as well as which method is most accurate and efficient.

Keywords: medical record review, sample size calculation, sample size decision making

P011

A learning module for better medical record review research.

J. Vinken, BKL, MA, S. Upadhye, BSc, MD, MSc, McMaster University, St. Catharines, ON

Innovation Concept: The objective of this research study was to create a flipped classroom, interactive, experiential learning module on how to do a medical record review study. It is designed for medical students, residents, physicians, and researchers to have a remote, online, but interactive experience that expands on textbook concepts. The "flipped classroom" means that learners will guide their own

education. This learning module will include a pre-test, interactive video module, and a post-test. These components will ensure each learner reaches previously set learning goals and not only solidify the learning of learners but validate the educational method, proving its value. **Methods:** A review of the literature indicates that medical record review is a valuable method of research in emergency medicine however researchers may encounter methodological difficulties, and sometimes medical record reviews are performed in a suboptimal manner due to these difficulties. We are creating a learning module that builds off of the chapter in the Royal College Research Guide and elaborates on various elements, including sample size calculation. Previous work indicates that a flipped classroom approach in medicine to learning has been well developed and is backed by evidence as well as learner preference to guide their own learning. **Curriculum, Tool, or Material:** The learning module was initiated from the Royal College Research Guide chapter on how to conduct medical record review research. The module is a white board drawing style video that combines elements of explanation and elaboration of the chapter information and a step by step, learner-interactive example of a medical record research project creation. **Conclusion:** Medical record review research is accessible to many researchers due to the availability of data. This innovation would help ensure that with this availability, good research is being conducted. Future steps will involve testing and validating this learning module using the pre and post-tests, and expanding to create other, similar modules for other Royal College Research Guide chapters.

Keywords: flipped classroom, innovations in EM education, medical record review

P012

Does physician burnout differ between urban and rural emergency medicine physicians? A comparison using the Maslach Burnout Inventory tool

R. Leigh, MD, K. Van Aarsen, MSc, L. Foxcroft, MD, R. Lim, MD, London Health Science Centre, London, ON

Introduction: Previous literature suggests that emergency medicine physicians experience high levels of work-related burnout. However, these results are drawn primarily from physicians working in large urban emergency departments. The aim of this study was to compare physician wellness between emergency medicine physicians working in urban versus rural settings. **Methods:** Emergency medicine physicians were recruited to complete a wellness survey from both urban and rural emergency medicine departments in Southwestern Ontario. The primary outcome measure of interest was physician burnout as measured by the Maslach Burnout Inventory-Human Services Survey (MBI-HSS). This survey tool measures physician burnout in the three domains of emotional exhaustion, depersonalization, and personal accomplishment. Descriptive statistics, paired t-tests and Mann-Whitney U tests were used to analyze parametric and non-parametric burnout domain data respectively. **Results:** Surveys were completed by 67/99 (68%) and 22/66 (33%) of urban and rural emergency medicine physicians, respectively. An emotional exhaustion score ≥ 27 OR a depersonalization sub-score ≥ 10 was considered the threshold for burnout and was found in 71.4% (40/56) of urban physicians surveyed and 85.7% (18/21) ($P = 0.20$) of rural physicians. No statistically significant difference in mean emotional exhaustion, depersonalization, or personal accomplishment was noted between groups. **Conclusion:** High levels of burnout were noted amongst both urban and rural emergency medicine physicians. No statistically

significant differences were noted between groups when compared on the Maslach Burnout Inventory survey tool. Despite many factors differentiating urban from rural practice, rural emergency doctors suffer similar rates of burnout. Thematic qualitative interviews exploring specific burnout factors may offer further insight into the drivers of physician burnout.

Keywords: burnout

P013

Emergency medicine in dental practice: shaping an educational curriculum

C. Vadeanu, BSc, MD, K. Lobay, BSc, MBA, MD, DMD, University of Alberta, Edmonton, AB

Introduction: There is increasing public demand for dentists and their professional regulators to mitigate medical risk to patients in private dental clinics – especially those that offer procedural sedation. Recent high-profile adverse events reported in the media suggest an urgent need to address this issue. However, there is a paucity of knowledge in the literature regarding how best to do so. We aim to explore opportunities for multidisciplinary emergency medical training of dentists, and to offer an informed perspective to assist with the preliminary development of a structured educational program. **Methods:** We employ Gioia Methodology, an established standard for inductive qualitative research and thematic analysis. Interviewees were recruited via email and selected to ensure a broad and knowledgeable perspective. We conducted individual semi-structured 1-hour interviews of 6 dentists, 4 medical anesthesiologists, 3 emergency physicians, and 1 oral and maxillofacial surgeon. Several interviewees had leadership roles in Canadian dental regulatory agencies and educational institutions. Data from these interviews was contemporaneously analyzed and organized into “first-order concepts”, “second-order themes” and “aggregate dimensions.” **Results:** Our findings demonstrated 12 first-order concepts. Dentists require “leadership from professional regulators”, and “accreditation by recognized training institutions” to “ensure competence in initial emergency medical care of patients”. “Customized training programs” led by “multidisciplinary instructors” – including emergency physicians – should ensure “pre-operative medical risk assessment”, “appropriate intra-operative patient monitoring”, and “the ability to recognize common medical emergencies”. Emergency medical skills training should focus upon “teamwork within the office”, “early activation of EMS”, “ABC skills”, and the administration of “emergency medications”. **Conclusion:** Dentists require a very broad skillset to safely manage patients in their practice, especially when procedural sedation is required. Our aggregate dimensions provide an overview of our recommendations: we suggest that dentists must work with their regulators and educators to “build upon an existing culture of patient safety” by fostering “competence in the prevention, recognition and initial management of medical emergencies” in the dental practice setting.

Keywords: dental practice, education, emergency care

P014

Incidental findings in trauma whole-body CT scans: a systematic review

V. Tsang, K. Bao, J. Taylor, MD, MPH, University of British Columbia, Vancouver, BC

Introduction: Whole-body computed tomography scans (WBCT) are a mainstay in the work-up of polytrauma or multiple trauma patients in the emergency department. While incredibly useful for

identifying traumatic injuries, WBCTs also reveal incidental findings in patients, some of which require further diagnostic testing and subsequent treatment. Although the presence of incidental findings in WBCTs have been well documented, there has been no systematic review conducted to organize and interpret findings, determine IF prevalence, and document strategies for best management. **Methods:** A systematic review was conducted using MEDLINE, PUBMED, and EMBASE. Specific journals and reference lists were hand-mined, and Google Scholar was used to find any additional papers. Data synthesis was performed to gather information on patient demographics, prevalence and type of incidental findings (IFs), and follow-up management was collected. All documents were independently assessed by the two reviewers for inclusion and any disagreements were resolved by consensus. **Results:** 1231 study results were identified, 59 abstracts, and 12 included in final review. A mean of 53.9% of patients had at least one IF identified, 31.5% had major findings, and 68.5% had minor findings. A mean of 2.7 IFs per patient was reported for articles that included number of total IFs. The mean age of patients included in the studies were 44 years old with IFs more common in older patients and men with more IFs than women. IFs were most commonly found in the abdominal/pelvic region followed by kidneys. Frequency of follow-up documentation was poor. The most common reported mechanisms of injury for patients included in the study were MVA and road traffic accidents (60.0%) followed by falls from >3m (23.2%). **Conclusion:** Although there is good documentation on the mechanism of injury, patient demographics, and type of IF, follow-up for IFs following acute trauma admission lacks documentation and follow-up and is an identified issue in patient management. There is great need for systematic protocols to address management of IFs in polytrauma patients.

Keywords: incidental findings, polytrauma, whole-body computed tomography

P015

Efficacy of the Brain Injury Guidelines for complicated mild traumatic brain injuries

J. Tourigny, C. Malo, MD, MSc, V. Boucher, MSc, P. Blanchard, MBA, MD, PhD, J. Chauny, MD, MSc, G. Clark, MD, MSc, V. Paquet, MD, E. Fortier, MD, M. Émond, MD, MSc, Université Laval, Quebec, QC

Introduction: The Brain Injury Guidelines (BIG) stratifies complicated mild traumatic brain injury (mTBI) patients into 3 groups to guide hospitalization, neurosurgical consultation and repeat head-CT. BIG-1 patients could be managed safely without neurosurgical consultation or transfer. Systematic transfer to neurotrauma centers provide few benefits to this subgroup leading to overtriage. Similarly, unnecessary clinical and radiological follow-ups utilize significant health-care resources. Objective: to validate the safety and efficacy of the BIG for complicated mTBIs. **Methods:** We performed a multicenter historical cohort study in 3 level-1 trauma centers in Quebec. Patients ≥ 16 years old assessed in the Emergency Department (ED) with complicated mTBI between 2014 and 2017 were included. Patients with penetrating trauma, cerebral aneurysm or tumor were excluded. Clinical, demographic and radiological data, BIG variables, TBI-related death and neurosurgical intervention were collected using a standardized form. A second reviewer assessed all ambiguous files. Descriptive statistics, over- and under-triage were calculated. **Results:** A total of 342 patients' records were assessed. Mean age was 63 ± 20.7 and 236 (69 %) were male. Thirty-five

patients were classified under BIG-1 (10.2%), 110 under BIG-2 (32.2%) and 197 under BIG-3 (57.6%). Twenty-six patients (7%) required neurosurgical intervention, all were BIG-3. 90% of TBI-related deaths occurred in BIG-3 and none were classified BIG-1. Among the 192 transfers (51%), 14 were classified under BIG-1 (7.3%) and should not have been transferred according to the guidelines and 50 under BIG-2 (26%). In addition, 40% of BIG-1 received a repeat head computed tomography, although not indicated. Similarly, 7 % of all patients had a neurosurgical consult even if not required. Projected implementation of BIG would lead to 47% of overtriage and 0.3% of undertriage. **Conclusion:** Our results suggest that the Brain Injury Guidelines could safely identify patients with negative outcomes and could lead to a safe and effective management of complicated mTBI. Applying these guidelines to our cohort could have resulted in significantly fewer repeat head CTs, neurosurgical consults and transfers to level 1 neurotrauma centers. **Keywords:** complicated mild traumatic brain injury, guidelines

P016

Feasibility of a nurse-led smoking cessation intervention in the emergency department

A. Tolmie, BSc, R. Erker, BN, MN, A. Donauer, MD, E. Sullivan, MD, MPH, T. Graham, BA, MSc, PhD, T. Oyedokun, MBChB, MMed, J. Stempien, BSc, MD, University of Saskatchewan, Saskatoon, SK

Introduction: Cigarette smoking is a leading global cause of morbidity and mortality. Multiple studies internationally have established that cigarette smoking prevalence is higher in emergency department (ED) patients than their respective communities. Previously, we demonstrated the smoking prevalence among Saskatoon ED patients (19.6%) is significantly higher than the provincial average (15.1%), and over 50% of smoking patients would be receptive to ED-specific cessation support. The purpose of this project was to identify nurses' beliefs regarding smoking cessation in the ED, and barriers to implementing it in the department. **Methods:** A questionnaire was administered to all nurses employed at St. Paul's Hospital ED in Saskatoon assessing attitudes towards ED cessations, as well as the benefit and feasibility of three potential interventions: brief cessation counselling, referral to community support programs, and distributing educational resources. The questionnaire included Likert scale numerical ratings, and written responses for thematic analysis. Thematic analysis was performed by creating definitions of identified themes, followed by independent review of the data by researchers. **Results:** 83% of eligible nurses completed the survey (n=63). Based on Likert scores, ED nurses rarely attempt to provide cessation support, and would be minimally comfortable with personally providing this service. Barriers identified through thematic analysis included time constraints (68.3%), lack of patient readiness (19%), and lack of resources/follow-up (15.9%). Referral to community support programs was deemed most feasible and likely to be beneficial, while counselling within the ED was believed to be least feasible and beneficial. Overall, 93.3% of nurses indicated time and workload as barriers to providing ED cessation support during the survey. **Conclusion:** Although the ED is a critical location for providing cessation support, the proposed interventions were viewed as a low priority task outside the scope of the ED. Previous literature has demonstrated that multifaceted ED interventions using counselling, handouts, and referrals are more efficacious than a singular approach. While introduction of a referral program has some merit, having

professionals dedicated to ED cessation support would be most effective. At minimum, staff education regarding importance of providing smoking cessation therapy, and simple ways to incorporate smoking cessation counselling into routine nursing care could be beneficial.

Keywords: emergency nursing, primary prevention, smoking cessation

P017

Chart audit of patients with no fixed address presenting to the emergency department to identify areas to improve care

S. Todorovich, MD, MPH, D. Giffin, BSc, MD, M. Columbus, PhD, Western University, London, ON

Background: Homelessness is a growing Canada-wide concern. Those with no fixed address have increased rates of emergency department (ED) utilization and increased healthcare spending compared to the general population, with higher rates of acute and chronic illnesses, as well as all-cause mortality. EDs are uniquely situated to act as an access point to the network of available community services, however referral rates from the ED is uncertain. To date, there has been no data collected on London, Ontario's homeless population, their health burden, and their utilization patterns of the ED. **Aim Statement:** The primary objective of this study is to describe ED visits for adult patients with no fixed address in London, Ontario to assess for potential areas to improve care. **Measures & Design:** This is a retrospective chart review, of patients with no fixed address visiting London, Ontario Emergency Departments in 2018. ED visits were identified and pulled using either a diagnosis of "homeless", a lack of postal code, or a postal code for a known shelter. Cases included based on postal code were manually reviewed to determine whether the patient had a resident address with the same postal code. **Evaluation/Results:** From this search, 4,294 visits were identified for 1237 unique patients. The median visits per person was 1 (IQR 1-2), with 388 patients having 3 or more visits, and the max being 138 visits. The median age was 38 (IQR 28-52), with 73% male. Ground ambulance was used for 46% of visits. 28% of visits were CTAS 1&2 and 5% were CTAS 5. Police facilitated visits in 401 cases. Top 3 discharge diagnosis categories were mental health (19%), infection (18%), drug misuse (17%). **Discussion/Impact:** Several errors were identified with our search strategy suggesting the current system of capturing homelessness in the EPR is not accurate, leading to an underestimation of the problem and limiting our ability to describe this population. The Ministry of Health mandates homelessness be applied as a tertiary discharge diagnosis during coding of the patient visit if possible. However, use of this code is inconsistent leading to large-scale omission of visits and an underrepresentation of pediatric cases. Systemic steps should be taken to improve identification of these patients moving forward.

Keywords: homelessness, quality improvement and patient safety, resource utilization

P018

Journal club functions as a community of practice that safeguards quality assurance in the era of free open access medical education: a qualitative study

D. Ting, MD, B. Bailey, MD, MPH, F. Scheuermeyer, MD, MHSc, T. Chan, MD, MHPE, D. Harris, MD, MHSc, University of British Columbia, Vancouver, BC

Introduction: The ways in which Emergency Medicine (EM) physicians interact with the medical literature has been transformed with

the rise of Free Open Access Medical Education (FOAM). Although nearly all residents use FOAM resources, some criticize the lack of universal quality assurance. This problem is a particular risk for trainees who have many time constraints and incompletely developed critical appraisal skills. One potential safeguard is journal club, which is used by virtually all EM residency programs in North America to review new literature. However, EM resident perspectives have not been studied. Our research objective was to describe how residents perceive journal club to influence how they translate the medical literature into their clinical practice. Our research question was whether FOAM has influenced residents' goals and perceived value of journal club. **Methods:** We developed a semi-structured interview script in conjunction with a methods expert and refined it via pilot testing. Following constructivist grounded theory, and using both purposive and theoretical sampling, we conducted a focus group (n = 7) and 18 individual interviews with EM residents at the 4 training sites of the University of British Columbia. In total, we analyzed 920 minutes of recorded audio. Two authors independently coded each transcript, with discrepancies reconciled by discussion and consensus. Constant comparative analysis was performed. We conducted return of findings through public presentations. **Results:** We found evidence that journal club works as a community of practice with a progression of roles from junior to senior residents. Participants described journal club as a safe venue to compare practice patterns and to gain insight into the practical wisdom of their peers and mentors. The social and academic activities present at journal club interacted positively to foster this environment. In asking residents about ways that journal club accelerates knowledge translation, we actually found that residents cite journal club as a quality check to prevent premature adoption of new research findings. Residents are hesitant to adopt new literature into their practice without positive validation, which can occur during journal club. **Conclusion:** Journal club functions as a community of practice that is valued by residents. Journal club is a primary way that new evidence can be validated before being put into practice, and may act as quality assurance in the era of FOAM.

Keywords: free open access medical education, graduate medical education, qualitative research

P019

What happens to John Doe? Unidentified patients in the emergency department: a retrospective chart review

K. Tastad, BSc, J. Koh, MD, D. Goodridge, PhD, J. Stempien, BSc, MD, T. Oyedokun, MBChB, MMed, University of Saskatchewan, Saskatoon, SK

Introduction: Patients who are not identified upon presentation to the emergency department (ED), commonly referred to as John or Jane Does (JDs), are a vulnerable population due to the sequelae associated with this lack of patient information. To date, there has been minimal research describing JDs. We aimed to characterize the JD population and determine if it differs significantly from the general ED population. **Methods:** We conducted a retrospective chart review of 114 JDs admitted to Saskatoon EDs from May 2018 to April 2019. Patients met inclusion criteria if they were provided a unique JD identification number at ED admission because their identities were unknown or unverifiable. Data regarding demographics, clinical presentation, ED course, mode of identification, and major clinical outcomes (i.e. admission rates, mortality rates) were gathered from electronic records. A second reviewer abstracted a random 21.0%

sample of charts to ensure validity of the data. The JD population was then compared to the general population of ED patients that presented during the same time period. **Results:** Male JDs most commonly presented as trauma activations (85.7%) in contrast to female JDs who most commonly presented with issues related to substance abuse (51.4%). Compared to the general ED population, a greater percentage of JDs were categorized as CTAS 1 or 2 (85.8% vs 18.9%, $p < 0.0001$), more likely to be 44 years of age or younger (82.4% vs 58.5%, $p < 0.0001$), and more likely to be male (64.9% vs 49.1%, $p < 0.0001$). Descriptive statistics on the JD population demonstrated that most JDs received consults to inpatient services (58.8%). Of JDs who presented to the ED, 34.2% were admitted to hospital. The mortality of the JD population was 13.2% at 3 months. The ED average (SD) length of stay for JDs was 8.7 (9.0) hours. How JDs were ultimately identified was recorded only 70.2% of the time. Most frequently, JDs identified themselves (26.3%), other identification methods included police services (14.9%), family members (7.9%), registered nurses (6.1%), government-issued identification (5.3%), social work (4.4%) or other measures (5.4%). **Conclusion:** JDs represent a unique population in the ED. Both their presentations and clinical outcomes differ significantly from the generalized ED population. More research is needed to better identify strategies to improve the management and identification methods of these unique patients.

Keywords: emergency department, John Doe, unidentified patient

P020

Development and early experience with the Foothills Medical Center Pulmonary Embolism Response Team (PERT)

M. Szava-Kovats, MD, J. Andruchow, MD, P. Boiteau, MD, E. Herget, MD, K. Solverson, MD, University of Calgary, Calgary, AB

Background: Pulmonary embolism (PE) is a common illness with significant mortality without appropriate treatment. Its disease severity is variable, difficult to prognosticate and triage of severe PE remains a patient safety concern. Some PE may benefit from invasive and advanced medical therapy, but these decisions require complex multi-disciplinary coordinated care. We have launched a multi-disciplinary rapid response team at the Foothills Medical Center Hospital (FMC) to assist prognostication, treatment, disposition planning, and followup for high-risk PE: The Pulmonary Embolism Response Team (PERT). **Aim Statement:** PERT has been implemented to improve patient-oriented outcomes however, as severe PE is infrequent, we initially target process measures. In the first year of PERT rollout, we aim for: 1) 100% of high risk PE be detected by emergency for PERT consult 2) PERT response be within 45 minutes of activation 3) PERT treatment and disposition be made within 1 hour of consult. 4) > 80% of patient dispositions match those informed by evidence-based risk stratification tools. **Measures & Design:** Through collaboration between emergency medicine, radiology, cardiac sciences, medical specialties and critical care, a collective evidence-based PE risk stratification/treatment pathway was developed. This has been disseminated to providers and embedding into electronic medical records (EMR) for computer assisted decision-making support. EMR data has been harmonized with standardized radiographic reporting for PE to cue reporting of high risk imaging findings. Standardized imaging and EMR prognostic factors flag high risk PE suggesting PERT activation. PERT standard operating

procedures have been developed, including evidenced-based pathways for further therapy, advanced imaging, and subspecialized disposition planning. Clinical services meet quarterly, and review dashboard summary data on clinical adverse events, resource utilization, and time data of patient flow to revise PE care pathways. **Evaluation/Results:** PERT activations occur approximately 2 times weekly. Adherence to operating procedures is high. Feedback post implementation cites improved adherence to evidence-based practice, clearer communication, and faster patient disposition. Quantitative analysis of performance is limited by infrequency of cases. **Discussion/Impact:** Our project shows feasibility of a PERT service. Pre-implementation data is collected, and we are currently measuring these post. We suspect signal of improved patient-oriented outcomes will be detected with more cases.

Keywords: pulmonary embolism, quality improvement and patient safety, thrombosis

P021

A novel way of hiding beds: manipulating wait time predictions to alter future patient flows into the ED

S. Strobel, BA, MD, Cornell University, Ithaca, New York, USA

Introduction: Wait time predictions have become more common in emergency departments in Canada. These estimate the wait times a patient faces to see providers and they are usually provided in an accessible way such as through an online interface. One purpose of these trackers is to improve ED system efficiency. Patients can self-triage to alternative care such as their primary care physician, defer care until a later time or could move from oversubscribed to undersubscribed EDs. However, these mechanisms could also be abused. If providers can artificially influence the wait time this may provide a possible lever to change patients flows to an ED. I investigate whether there is evidence suggestive of manipulation of online wait time trackers at an ED system in Ontario. **Methods:** Inputs into the wait time prediction algorithm, like patient volumes are taken from the ED EMR. This is the most likely place where staff can manipulate the wait time tracker by retaining patients in the EMR system even after they are discharged. I examine two sets of data to assess whether the online tracker displays differences in patient volumes from “true” data. The first is scraped data of patient volumes from the wait times website. The second are the accurate patient volumes from administrative data which includes when a physician discharged patients from the ED. I compare values of the true patient volumes to the online values and plot distributions of these differences. I also employ measures of accuracy such as mean square error and root mean square error to provide a value of how accurate the online data is compared to the true data. I examine these by ED and over time. **Results:** There are differences between the number of patients that are posted online and those in the administrative data. The distributions of these differences are skewed towards positive values suggesting that the online data more often overcounts rather than undercounts patients. Measures of accuracy increase during times when EDs are congested but do not decrease when EDs become less congested. This inaccuracy persists for a period after EDs cease to be busy. **Conclusion:** ED wait time trackers have the potential to be manipulated. When staff have incentive to reduce patient volumes, online data becomes more inaccurate relative to true data. This suggests that wait time trackers may have unintended consequences and that the information that they provide may not be entirely accurate.

Keywords: machine learning, predictions, wait times

P022

Use of police and SAR records to identify cases and reduce survivorship bias in prehospital care research

D. Stephanian, BA, MSc, J. Brubacher, BSc, MD, MSc, University of British Columbia, Vancouver, BC

Introduction: Evidence based medical practices are limited in pre-hospital care. A 2006 National Academies report on the state of pre-hospital care indicates that as little as 4% of prehospital care is evidence based. Retrospective case reviews are inexpensive studies that can effectively evaluate current practices and identify opportunities for improvement. Commonly, retrospective reviews in prehospital care rely on electronic health records from hospitals and emergency health services. These data sources suffer from three limitations; survivorship and inclusion biases, a lack of control cases, and difficulty identifying unusual etiologies in databases. Police and search and rescue records are uncommon but promising data sources for certain topics. **Methods:** To test our methodology, we investigated outcomes of suicide attempts by jumping from bridges in Vancouver. We identified patients who threatened, attempted, or jumped from bridges >12m between 2006 and 2017. We describe the population, mortality and adverse outcomes, and identify factors differentiating survivors from fatalities. Police and Coast Guard (CG) records were searched to identify cases. Corresponding records from ambulance, hospitals, and the coroner were identified using date, time, and patient age and sex. Linked records were reviewed and key data extracted. **Results:** 1208 cases were identified, outcomes were positively identified for 90.3%. 273 were confirmed jumps. 78.2% of ambulance, 90.0% of hospital, and 93.6% of coroner records were identified and linked to corresponding police and CG records. By contrast, an independent search of ambulance records yielded a 99.42% false positive rate, and independent searches of hospital records were not possible due to technological limitations in patient data collection and storage tools. Further, of 197 cases where patients jumped into water, 94 were attended to by EHS, and 52 were transported to hospital. **Conclusion:** Police and CG records effectively identified patients. Without these data sources, identifying most cases would not have been possible. Since a majority of patients were not transported to EHS or hospital, linking data from these agencies to the hospital and EHS records limited survivorship bias. This methodology may be valuable in future prehospital and ED research, especially for topics with high likelihood of police or SAR contact like suicide attempts or avalanche burials.

Keywords: bias, data, prehospital

P023

Development of a Canadian Global Health Emergency Medicine (GHEM) Certificate Program based on established best practices

R. Stefan, MD, MSc, J. Maskalyk, MD, L. Puchalski Ritchie, MD, PhD, M. Salmon, MD, MPH, M. Landes, MD, MSc, University of Toronto, Toronto, ON

Innovation Concept: Global health fieldwork is valuable for Canadian residents, but is often trainee-organized, short-term, unsupervised, and lacking in preparation and debriefing. In contrast, we have developed a Certificate Program which will be offered to University of Toronto (UofT) emergency medicine (EM) trainees in their final year of residency. This 6-month Program will complement the Transition to Practice stage for residents interested in becoming leaders in GHEM. **Methods:** We completed a multi-phase needs

assessment to inform the structure and content of a GHEM Certificate Program. Phase 1 consisted of 9 interviews with Program Directors (PDs), Assistant PDs, and past fellows from existing GH fellowships in Canada and USA to understand program structure, curriculum, fieldwork and funding. In Phase 2 we interviewed 4 PDs and fellows from UofT fellowship programs to understand local administrative structures. In Phase 3 we collected feedback from 5 UofT residents and 7 faculty with experience in global health to assess interest in a local GHEM Program. All interview data was reviewed and best practices and lessons learned from key stakeholders were summarized into a proposed outline for a 6-month GHEM Certificate Program.

Curriculum, Tool, or Material: The Program will comprise of 1) 3 months of preparatory work in Toronto followed by 2) 3 months of fieldwork in Addis Ababa, Ethiopia. Fieldwork will coincide with activities under the Toronto-Addis Ababa Academic Collaboration in Emergency Medicine (TAAAC-EM). The GHEM trainee's work will support TAAAC-EM activities. Preparatory months will include training in specific competencies (POCUS, teaching, tropical medicine, QI) and meetings between the trainee and a UofT mentor to design an academic project. During fieldwork, the trainee will do EM teaching (75% of time) and complete their academic project (25% of time). A UofT supervisor will accompany, orient and supervise the trainee for their first 2 weeks in Addis. Throughout fieldwork, the trainee will be required to debrief with their UofT mentor weekly for academic and clinical mentoring. One AAU faculty member will be identified as a local supervisor and will participate in all evaluations of the trainee during fieldwork. **Conclusion:** This Program will launch with a call for applications in July 2021, expecting the first trainee to complete the Program in 2022-23. We anticipate that this Program will increase the number of Canadian EM trainees committed to global health projects and partnerships throughout their career. **Keywords:** global health, innovations in EM education, postgraduate education

P024

A retrospective chart review of the length of stay of patients presenting to the emergency department with a drug overdose

R. Soegtrop, BSc, MD, K. Van Aarsen, MSc, M. Columbus, PhD, A. Dong, MD, Western University, London, ON

Introduction: Patients who present to the Emergency Department (ED) with a drug overdose often require long periods of monitoring. After their initial assessment and stabilization, they spend a significant amount of time in a high cost acute care bed in the ED for monitoring until they are medically cleared for psychiatric care or to be discharged. The shift length at this ED is a maximum of 8 hours; meaning any patients staying over 8 hours must be handed over between physicians, increasing the chance of medical errors. The objective of this study is to examine the total ED length of stay (LOS) of this patient group after physician initial assessment (PIA) to determine if there is justification for the creation of a toxicology observation or short-stay unit for these patients. **Methods:** A single-centre, blinded retrospective chart review was conducted examining all adult patients presenting to the ED at an urban academic tertiary care centre with a drug overdose in 2018. Variables examined include: Disposition (home, admitted to acute care setting, admitted to non-acute care setting), time from PIA to disposition and total length of stay from PIA to discharge home or admission to hospital. The primary outcome is total length of stay in the ED after PIA. **Results:** A total of 1006 patients presenting with an overdose were included. A

total of 388 patients were admitted with 44% (172) having an ED LOS greater than 8 hours and 36% (138) staying 8 hours after PIA. The median [IQR] LOS in the ED for all patients was 343 minutes [191-565] while the median [IQR] time to PIA was 37 minutes [15-97]. The majority of these patients (54%) were discharged with no consulting services involved, 23% received a consult to psychiatry, 22% were consulted to internal medicine and 5% of patients were consulted to Critical Care Medicine. **Conclusion:** This demonstrates patients presenting to the ED with an overdose are seen in the ED by a physician quickly, however many stay in the department over 5 hours from their initial assessment in a monitored setting. While a majority of these patients are able to go home, 44% of admitted patients wait greater than 8 hours in the ED on monitors. The creation of a toxicology observation unit would be helpful for this population to increase patient safety and ease ED bed congestion.

Keywords: length of stay, overdose, toxicology

P025

Checking the pulse in the 21st century: inter-observer reliability of carotid pulse detection by point-of-care ultrasound

D. Smith, MD, J. Chenkin, MD, MEd, R. Simard, MD, University of Toronto, Toronto, ON

Introduction: Detection of a pulse is crucial to decision-making in the care of patients who are in cardiac arrest, however, the current standard of manual pulse palpation is unreliable. An emerging alternative is the use of point-of-care ultrasound (POCUS) for direct assessment of the carotid pulse. The primary objective of this study is to determine the inter-observer reliability for healthcare provider interpretation of the carotid pulse by POCUS in patients who are peri-arrest or in cardiac arrest. **Methods:** We conducted a web-based survey of healthcare providers. Participants were shown a tutorial demonstrating POCUS detection of the carotid pulse and then asked to interpret 15 carotid pulse ultrasound clips from patients who were peri-arrest or in cardiac arrest. The primary outcome was inter-observer reliability for carotid pulse assessment. Secondary outcomes included inter-observer reliability stratified by healthcare provider role and POCUS experience, mean tutorial duration, mean pulse assessment duration, rate of pulse assessments < 10 seconds, and change in participant confidence before and after the study. Inter-observer reliability was determined by Krippendorff's α . Change in participant confidence was determined by Wilcoxon signed-rank test. **Results:** 68 participants completed our study, with a response rate of 75% (68/91). There was near perfect inter-observer reliability for pulse assessment amongst all study participants ($\alpha=0.874$, 95% CI 0.869, 0.879). Senior residents ($n=24$) and POCUS experts ($n=6$) demonstrated the highest rates of inter-observer reliability, $\alpha=0.902$ (95% CI 0.888, 0.914) and $\alpha=0.925$ (95% CI 0.869, 0.972), respectively. All sub-groups had α greater than 0.8. Mean tutorial duration was 31 seconds (SD = 17.5) with maximum duration of 55 seconds. Mean pulse assessment duration was 7.7 seconds (SD = 5.2) with 76% of assessments completed within 10 seconds. Participant confidence before and after the study significantly increased from a median of 2 to a median of 4 on a 5-point Likert-type scale ($z=6.3$, $p<.001$). **Conclusion:** Interpretation of the carotid pulse by POCUS showed near perfect inter-observer reliability for patients who were peri-arrest or in cardiac arrest. Participants required minimal training and indicated improved POCUS pulse assessment confidence after the study. Further work must be done to determine the impact of POCUS pulse assessment on the resuscitation of patients in cardiac arrest.

Keywords: cardiac arrest, pulse check, ultrasound

P027

Development of a physician assistant lead stroke protocol to provide timely and equitable access to hyperacute stroke care in a telestroke community hospital

L. Shoots, BHSc, MD, V. Bailey, BN, Brant Community Healthcare System, Brantford, ON

Background: The Brant Community Healthcare System (BCHS) has consistently been well above the recommended 30 minute benchmark for door-to-needle (DTN) for eligible acute stroke patients. As a large community hospital with no neurologists, and like many other hospitals internationally, we rely on telestroke support for every stroke case. This is a time-consuming process that requires a multitude of phone calls, and pulls physicians from other acutely ill patients. We sought to develop a system that would streamline our approach and care for hyperacute stroke patients by targeting improvements in DTN. **Aim Statement:** We will decrease the door-to-needle (DTN) time for stroke patients arriving at the BCHS Emergency Department (ED) who are eligible for tissue plasminogen activator (tPA) by 25% from a median of 87 minutes to 50 minutes by March 31, 2018 and maintain that standard. **Measures & Design:** Outcome Measures: Door-to-needle time for acute stroke patients receiving tPA Process Measures: Door-to-triage time, Door-to-CT time, Door-to-CTA time; INR collection-to-verification time, telestroke callback time Balancing Measures: Number of stroke protocol patients per month Model Design: We simultaneously designed and implemented a robust program to train physician assistants in hyperacute stroke care. **Evaluation/Results:** Through vast stakeholder engagement and implementing a multitude of change ideas, by March of 2018 we had achieved an average DTN of 53 minutes. Our door-to-triage time went from an average of 7 minutes to 3 minutes. Our door-to-CT time decreased from 17 minutes to 7 minutes and our time between CT and CTA from an average of 13 minutes to 3 minutes. One and a half years later, our average DTN is maintained at 55 minutes and physician assistants continue to effectively lead and liaise with telestroke neurologists and stroke patients. **Discussion/Impact:** Prior to this program, acute stroke care was a very contentious topic at our local community hospital. Creating a program that streamlined the care and standardized the work has proven successful, and not only allowed for improved DTN times but also freed up physicians to better simultaneously care for other acutely ill patients.

Keywords: door-to-needle time, quality improvement and patient safety, stroke

P028

Antibiotic prescribing and use of corticosteroids for the emergency department management of acute pharyngitis

C. Sheridan, BHSc, MSc, K. Grewal, MD, MSc, B. Borgundvaag, MD, PhD, S. McLeod, MSc, PhD, Schwartz/Reisman Emergency Medicine Institute, Sinai Health, University of Toronto, Toronto, ON

Introduction: Acute pharyngitis is a common emergency department (ED) presentation. The Centor (Modified/McIsaac) score uses five criteria (age, tonsillar exudates, swollen tender anterior cervical nodes, absence of a cough, and history of fever) to predict Group A Streptococcus (GAS) infection. The recommendation is patients with a Centor score of 0-1 should not undergo testing and should

not be given antibiotics, patients with a score of 2-3 may warrant throat cultures, and for patients with a score ≥ 4 , empiric antibiotics may be appropriate. Associated pain is often first managed with acetaminophen or non-steroidal anti-inflammatory drugs, however recent evidence suggests a short course of low-to-moderate dose corticosteroids as adjunctive therapy may reduce inflammation and provide pain relief. The objective of this study was to describe the ED management of acute pharyngitis for adult patients presenting to an academic ED over a two-year study period. **Methods:** This was a retrospective chart review of all adult (> 17 years) patients presenting to Mount Sinai Hospital ED with a discharge diagnosis of acute pharyngitis (ICD-10 code J02.9) from January 1st 2016 to December 31st 2018. Trained research personnel reviewed medical records and extracted data using a computerized, data abstraction form. **Results:** Of the 638 patients included in the study, 286 (44.8%) had a Centor score of 0-1, 328 (51.4%) had a score of 2-3, and 24 (3.8%) had a score of ≥ 4 . Of those with a Centor score of 0-1, 83 (29.0%) had a throat culture, 88 (30.8%) were prescribed antibiotics, 15 (5.2%) were positive for GAS and 74 (25.9%) were given corticosteroids in the ED or at discharge. Of those with a Centor score of 2-3, 156 (47.6%) had a throat culture, 220 (67.1%) were prescribed antibiotics, 44 (13.4%) were positive for GAS, and 145 (44.2%) were given corticosteroids. Of those with a Centor score ≥ 4 , 14 (58.3%) had a throat culture, 18 (75.0%) were prescribed antibiotics, 7 (29.2%) were positive for GAS and 12 (50.0%) were given corticosteroids. **Conclusion:** As predicted, a higher Centor score was associated with higher risk of GAS infection, increased antibiotic prescribing and use of corticosteroids. Many patients with low Centor scores were prescribed antibiotics and also had throat cultures. Further work is required to understand clinical decision making for the management of acute pharyngitis.

Keywords: antibiotic, corticosteroids, pharyngitis

P029

Requesting prescriptions in the emergency department: the patient, the request and the response

L. Shepherd, BSc, MD, MHPE, M. Mucciaccio, MD, K. VanAarsen, MSc, Western University, London, ON

Introduction: Patients presenting to the Emergency Department (ED) for the sole purpose of requesting prescriptions are problematic. Problematic for the patient, who may have a long wait to be seen and may leave dissatisfied. Problematic for the ED physician, who is in the business of episodic not comprehensive care and is diligently trying to avoid the misappropriation of medications. The primary objective of this study was to determine the characteristics of patients who present to the ED or Urgent Care Centre (UCC) requesting a prescription, the nature of these requests and the resulting action by the attending physician. The secondary objective was to determine the proportion of medication requests and responses that have potential street value. With this knowledge we may be better positioned to serve these patients and support physician decision-making. **Methods:** This was a single-centre, retrospective electronic chart review looking at all adult patients with a presenting complaint of medication request who attended a two-site tertiary ED or an Urgent Care Centre (UCC) in London, Ontario between April 1, 2014 and June 30, 2017. Data was tested for normality and analyzed using descriptive statistics. **Results:** A total of 1923 cases met the inclusion criteria. Cases were removed ($n = 421$) if it was unclear which prescription was requested or if a non-medication prescription or injection was requested. The patient median (IQR) age was 44 (32-54) with 58% being male and

55% having a family doctor. There were a total of 2261 prescriptions requested by 1502 patients. The top 3 most commonly requested classes of medications were opioids 433/1502 (28.8%), antidepressants/antipsychotics 371/1502 (24.7%) and benzodiazepines 252/1502 (16.8%). The median (IQR) wait time was 73 minutes (35-128). 298/1502 (19.8%) of patients received their requested prescription (opioids 12.7%; antidepressant/antipsychotic 55.3% and benzodiazepines 16.3%). 740/1502 (49.3%) of patients requested a medication that had street value. Of those, 118/740 (15.9%) received the requested medication. **Conclusion:** There is no "one size fits all" solution for the patient who presents to the ED requesting a prescription. The large number of requests for psychiatric medications suggests a service gap for mental health patients in the community. This data supports the need for comprehensive electronic medication records to guide physicians' decisions.

Keywords: prescription requests

P030

Assessment of lab results on emergency department patients that leave without seeing a physician

D. Shelton, MD, MSc, W. Thomas-Boaz, BN, MN, Sunnybrook Health Sciences Centre, Toronto, ON

Background: Most emergency departments (ED) utilize medical directives to initiate lab investigations for patients prior to physician assessment. This practice facilitates expedited patient care in the ED, resulting in safer and efficient care. However, some patients choose to leave the ED prior to seeing a physician due to prolonged waiting. Previously, at our hospital there was no defined process for identifying and following up on abnormal test results on patients that leave without being seen (LWBS), resulting in lab results often not being reviewed by a nurse or physician. **Aim Statement:** By April 2020, we aim to have 90% of ED LWBS patients with abnormal results identified and followed up. **Measures & Design:** A series of consultations and information gathering occurred that included an environmental scan of other EDs and discussions with emergency nurses, emergency physicians, Risk Management, Legal Department, College of Nurses of Ontario and Canadian Medical Protective Association. A process map was developed collaboratively to standardize the process to identify and follow up on abnormal investigations of LWBS patients and a new hospital policy was developed to officially outline this process. The following are the family of measures: Outcome measure – % LWBS patients with abnormal tests that had follow-up documented in chart Process measure – Number LWBS patients with investigations initiated by medical directive, Number LWBS patients, % LWBS patients Balancing measure – Satisfaction of nurses with new process for LWBS patients **Evaluation/Results:** At baseline, 29% of LWBS patients with abnormal lab results had follow up documented in the chart. After implementation of the new standardized process and policy, the follow up rate of LWBS patients with abnormal results in August, September and October 2019 was 47%, 28% and 29% respectively. **Discussion/Impact:** These results indicate that standardization and new policy implementation is insufficient to change practice, even one that aims to provide safer patient care. Nevertheless, these interventions are important first steps to improving the safety for ED LWBS patients. We plan to implement an audit and feedback approach to encourage nursing staff to routinely check lab results on LWBS patients.

Keywords: follow up, left without being seen, quality improvement and patient safety

P031

Multidisciplinary healthcare and first aid provider training for in-flight medical emergencies: a crowdsourcing session followed by an airplane simulation

A. Seto, BHSc, MD, J. Kariath, BSc, University of Calgary, Calgary, AB

Innovation Concept: Is there a healthcare provider on board? Healthcare providers may be less confident for in-flight medical emergencies (IFME), as these situations are not part of usual curriculum or practice contexts (e.g. hospitals). For example, the literature reveals that medical students and physicians lack IFME basic knowledge and preparedness. The goal is to pilot a training session for healthcare providers to improve their confidence in navigating IFME. **Methods:** This training innovation involved: i) a session to crowdsourcing insights from multidisciplinary healthcare and first aid providers, followed by reviewing considerations of a CMAJ 2018 article on airplane emergencies, and ii) 2 airplane simulations (syncope and cardiac arrest). During crowdsourcing, 7 IFME learning objectives were explored: i) challenges, ii) solutions, iii) equipment, iv) taking vitals, v) general approach, vi) cardiac arrest approach, and vii) human resources / role-delegation. Knowledge and approaches extracted were then applied in simulations. Participants provided scores out of 7.00 for: i) satisfaction of crowdsourcing session and simulation and ii) self-rated confidence on learning objectives at baseline, post-crowdsourcing session, and post-simulation. Results were analyzed with repeated measures ANOVA with post-hoc Tukey. **Curriculum, Tool, or Material:** The workshop curriculum was a crowdsourcing session and simulation to mentally rehearse and practice clinical skills in airplane settings to improve IFME preparedness. **Conclusion:** Participants rated the crowdsourcing activity (6.70/7.00, n = 11) and simulation (6.50/7.00, n = 11) positively. Confidence in the 7 topics improved from baseline (2.49/7.00) to post-crowdsourcing (5.23/7.00) to post-simulation (5.94/7.00). Significant differences ($p < 0.01$) between baseline and post-crowdsourcing, and between baseline and post-simulation were observed. There was no significant difference between post-crowdsourcing and post-simulation. One simulation limitation was not all could be rescuers; therefore, debriefing is important to meet learning objectives. Second, the simulation was not within an airplane; housing simulations inside an airplane with flight attendants is a potential next step. Overall, self-confidence in topics of IFME may improve after just one crowdsourcing session, facilitated through group discussions and mental rehearsal. Added simulations may maintain self-confidence on these topics, by promoting memory retention through active learning and repetition.

Keywords: in-flight medical emergencies, innovations in EM education, simulation

P032

Perceived versus actual cricothyroid membrane landmarking accuracy by emergency medicine residents and staff physicians

N. Schouela, MBBCh, M. Woo, MD, A. Pan, MD, W. Cheung, MD, J. Perry, MD, MSc, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Cricothyrotomy is an intervention performed to salvage "can't intubate, can't ventilate" situations. Studies have shown poor accuracy landmarking the cricothyroid membrane, particularly in female patients by surgeons and anesthesiologists. There is less data available about emergency physician performance. This study

examines the perceived versus actual success rate of landmarking the cricothyroid membrane by resident and staff emergency physicians using obese and non-obese models. **Methods:** Five male and female volunteers were selected as models. Each model was placed supine, and a point-of-care ultrasound expert landmarked the borders of each cricothyroid membrane. 20 residents and 15 staff emergency physicians were given one attempt to landmark five models. Data was gathered on each participant's perceived likelihood of success and attempt difficulty. Overall accuracy and accuracy stratified by sex and obesity status were calculated. **Results:** Overall landmarking accuracy amongst all participants was 58% (SD 18%). A difference in accuracy was found for obese males (88%) versus obese females (40%) (difference = 48%, 95% CI = 30-65%, $p < 0.0001$); and non-obese males (77%) versus non-obese females (46%) (difference = 31%, 95% CI = 12-51%, $p = 0.004$). There was no association between perceived difficulty and success (correlation = 0.07, 95% CI = -0.081-0.214, $p = 0.37$). Confidence levels overall were higher amongst staff physicians (3.0) than residents (2.7) (difference = 0.3, 95% CI = 0.1-0.6, $p = 0.02$), but there was no correlation between confidence in an attempt and its success ($p = 0.33$). **Conclusion:** We found that physicians demonstrate significantly lower accuracy when landmarking cricothyroid membranes of females. Emergency physicians were unable to predict their own accuracy while landmarking, which can potentially lead to increased failed attempts and longer time to secure the airway. Improved training techniques and a modified approach to cricothyrotomy may reduce failed attempts and improve the time to secure the airway.

Keywords: cricothyroid, cricothyrotomy, landmarking

P033

Procedural skills training in emergency medicine physicians within the Edmonton zone: a needs assessment

R. Schonnop, BSc, MD, B. Stauffer, MD, MHSE, A. Gauri, MSPH, D. Ha, BSc, MD, University of Alberta, Edmonton, AB

Introduction: Procedural skills are a key component of an emergency physician's practice. The Edmonton Zone is a health region that comprises twelve tertiary, urban community and rural community emergency departments (EDs) and represents over three hundred emergency physicians. This study describes the current attitudes toward procedural skill competency, current procedural skill practices, and the role for educational skills training sessions among emergency medicine physicians within a geographical health region. **Methods:** Multicenter descriptive cross-sectional survey of all emergency medicine physicians working at 12 emergency departments within the Edmonton Zone in 2019 ($n = 274$). The survey underwent several phases of systematic review; including item generation and reduction, pilot testing, and clinical sensibility testing. Survey items addressed current procedural skill performance frequency, perceived importance and confidence, current methods to maintain competence, barriers and facilitating factors to participation in a curriculum, preferred teaching methods, and desired frequency of practice for each procedural skill. **Results:** Survey response rate was 53.6%. Variability in frequency of performed procedures was apparent across the type of hospital sites. For majority of skills, there was a significantly positive correlation between the frequency at which a skill was performed and the perceived confidence performing said skill. There was inconsistency and no significant correlation with perceived importance, perceived confidence, or frequency performing a given skill and the desired frequency of training for that skill. Course

availability (76.2%) and time (72.8%) are the most common identified barriers to participation in procedural skills training. **Conclusion:** This study summarized the current emergency department procedural skill practices and attitudes toward procedural skill competency and an educational curriculum among emergency medicine physicians in Edmonton. This represents a step towards targeted continuing professional development in the growing realm of competency-based medical education.

Keywords: clinical competence, emergency medicine, medical education

P034

Computed tomography rates for emergency department super-users

D. Savage, MD, PhD, R. North, MD, G. McKay, MD, C. McMillan, MD, R. Stonebridge, MD, B. Piper, MD, A. Jeffery, HBK, R. Ohle, MBChB, MA, D. Vanderburgh, MD, Thunder Bay Regional Health Sciences Centre, Thunder Bay, ON

Introduction: Most emergency departments (ED) in Canada have a population of high frequency users that present to the ED on a regular basis. These patients are well described in the literature and typically defined by a frequency of 8-10 visits/year. In Thunder Bay, Ontario we have a significant population of patients that present more often than we have termed "super-users". These patients often are typically from a vulnerable population with multiple co-morbidities and a high mortality rate. Although their risk for poor health outcomes is well recognized, both the chronicity and complexity of their symptoms often contributes to diagnostic dilemmas. The decision to order a computed tomography (CT) scan can be a difficult balance between ruling out life threatening diagnoses and exposing the patient to excessive radiation. Our objective was to describe how often these super-users of the ED received a CT scan and what types of imaging were completed. **Methods:** The Thunder Bay Regional Health Sciences Centre is a geographically isolated hospital in Northwestern Ontario with the next closest hospital based CT scanner greater than 300 km away. Based on previous literature and our preliminary scoping of the super-user group, we have identified a minimum of 25 visits as the threshold. A retrospective chart review was conducted for the year 2017 using our electronic medical record. Patient demographic data was collected along with the type and number of CT scans into a standardized collection tool. **Results:** Our preliminary results showed that our total population of super-users was 75 patients with an average of 32 visits to the ED per year. A total of 76% of the patients had a CT scan completed at least once. On average these patients have a CT during 10% of their visits with head CT comprising 50% of the imaging and abdominal/pelvis imaging comprising another 45%. For 20% of these super-users, they had CTs on 20% of their visits. From this population, only 10% of the patients had surgery in 2017 while 7% of visits required admission to hospital. The most common diagnoses for these patient visits relate to mental health/addictions, gastrointestinal complaints and infection. **Conclusion:** This study has shown that a significant number of our super-user population are receiving multiple CTs. Our next step is collect data on individual radiation doses and calculate exposure risks. We hope to inform policy and decision-makers who are developing programs to treat the underlying cause of their high resource use.

Keywords: computed tomography, emergency department, super-user

P035**Improving emergency department outcomes for Alberta seniors**

G. Sandhar, M. Kruhlak, BSc, L. Krebs, MSc, MPP, L. Gaudet, MSc, S. Couperthwaite, BSc, B. Rowe, MD, MSc, University of Alberta, Edmonton, AB

Introduction: In 2010, Alberta Health Services (AHS) introduced Transition Coordinators (TC), a unique nursing role focused on assessment of elderly patients to support safe discharge home. The objective of this study is to describe patient characteristics to predict safe discharge for seniors (≥ 65 years of age) and identify barriers that can be used to improve ED outcomes for these patients. **Methods:** Two trained research assistants conducted a chart review of the TC referral form and the ED Information System (EDIS) for patients seen by TCs between April and June 2017. Information on patient characteristics, existing home care and community services, the index ED visit and subsequent revisits were extracted. Data were entered into a purpose-built database in REDCap. A descriptive analysis was conducted; results are reported as mean $\pm$ standard deviation (SD), median (interquartile range [IQR]), or proportions, as appropriate. **Results:** A total of 1411 patients with TC referral forms were included (779 [55%] female). The majority of these patients were ≥ 65 (1350 [96%]) with a mean age of 82 ± 9.6 . The majority of patients were triaged as a CTAS of 3 (835 [59%]) with the most common reasons for presentation including: shortness of breath (128 [9%]), abdominal pain (94 [6.7%]), and general weakness (81 [5.7%]). Nearly one third of patients (391 [30%]) were already receiving home care services; (96 [7%]) received a new home care referral as a result of their ED visit. Of all the patients, 1111 (79%) had comorbidities (median: 3 [IQR: 1 to 5]). Overall, 38% ($n=536$) patients had visited the ED in the 12 months prior to the index with a median of 2 [IQR: 1 to 4] visits. On average, patient's length of stay for their index visits was 12 ± 0.35 hours. Admissions occurred for 599 [42%] patients with delays being common; the mean time between the decision to admit and the patient leaving the ED was 6 hrs $\pm$ 0.23. **Conclusion:** Seniors in the ED are complex patients who experience long lengths of stay and frequent delays in decision-making. Upon discharge, few patients receive referrals to community supports, potentially increasing the likelihood of revisits and readmissions. Future studies should assess whether the presence of TCs is associated with better outcomes in the community. **Keywords:** transitions in care

P036**Sensitivity and false negatives in the use of a prehospital sepsis alert**

S. Sample, BSc, MD, D. Quinlan, MD, MSc, K. Willis, BN, D. Casement, BAppB:ES, K. Lutz-Graul, BScCP, M. Welsford, BSc, MD, McMaster University, Hamilton, ON

Introduction: Prehospital sepsis alerts assist paramedics in identifying patients with sepsis and in communicating this diagnosis to receiving facilities. Following the prospective implementation study of our regional systemic inflammatory response syndrome-based alert criteria (Alert), the purpose of this sub-study was to determine the cause of Alert false negatives (patients without an Alert that subsequently met sepsis criteria in the Emergency Department (ED)). Additionally, the sensitivity of the Alert for detecting sepsis was compared to the Quick Sequential Organ Failure Assessment (qSOFA) and Hamilton Early Warning Score (HEWS). **Methods:** This study was an additional analysis of the prospective Alert implementation study. Included patients were ≥ 18 years old, transported by a regional

Emergency Medical Service and met severe sepsis or septic shock criteria (SS/SS, 2012 Surviving Sepsis Guidelines) in regional EDs in 2013. False negative patients were identified prospectively and reviewed by comparing paramedic determined Alert status to the retrospective application of the Alert criteria to Paramedic Call Report (PCR) data. The Alert sensitivity was first calculated from prospective data, then retrospective sensitivities of the Alert, qSOFA and HEWS were calculated by retrospectively applying these tools to PCRs, using ED diagnosis of SS/SS as reference standard. **Results:** In 2013, 229 patients met SS/SS criteria in the ED and had PCRs available; 115 (50.2%) were male and median age [interquartile range] was 76.0 [63.0-84.0]. Of 229, 149 (65.0%) arrived in the ED without an Alert (false negatives) and 46 (30.9%) of these met Alert criteria retrospectively and were therefore missed by paramedics. Sensitivity of the Alert was 34.9% when applied by paramedics and 41.5% when applied retrospectively to PCRs. The retrospective sensitivities of the qSOFA and HEWS were 37.6% and 67.7%, respectively. **Conclusion:** In ED patients diagnosed with SS/SS who arrived with no Alert, the majority (69.1%) were missed by the Alert criteria, rather than by paramedic application of the tool. The Alert had a sensitivity of 34.9%. When applied retrospectively and compared to the Alert, qSOFA had similar sensitivity and HEWS had increased sensitivity. Future research should focus on deriving improved alerts or implementing those with higher accuracy, such as HEWS.

Keywords: emergency medical services, pre-alert, sepsis

P037**Adherence to the Canadian CT Head Rule in a Nova Scotian emergency and trauma centre**

C. LeBlanc, MD, MEd, A. Sampalli, BHSc, S. Campbell, MBChB, University of Toronto, Toronto, ON

Introduction: Choosing Wisely Nova Scotia (CWNS), an affiliate of Choosing Wisely Canada™ (CWC), aims to address unnecessary care and testing through literature-informed lists developed by various disciplines. CWC has identified unnecessary head CTs among the top five interventions to question in the Emergency Department (ED). Zyluk (2015) determined the Canadian CT Head Rule (CCHR) as the most effective clinical decision rule in adults with minor head injuries. To better understand the current status of CCHR use in Nova Scotia, we conducted a retrospective audit of patient charts at the Charles V. Keating Emergency and Trauma Center, in Halifax, Nova Scotia. **Methods:** Our mixed methods design included a literature review, retrospective chart audit, and a qualitative audit-feedback component with participating physicians. The chart audit applied the guidelines for adherence to the CCHR and reported on the level of compliance within the ED. Analysis of qualitative data is included here, in parallel with in-depth to contextualize findings from the audit. **Results:** 302 charts of patients having presented to the surveyed site were retrospectively reviewed. Of the 37 cases where a CT head was indicated as per the CCHR, a CT was ordered 32 (86.5%) times. Of the 176 cases where a CT head was not indicated, a CT was not ordered 155 (88.1%) times. Therefore, the CCHR was followed in 187 (87.8%) of the total 213 cases where the CCHR should be applied. **Conclusion:** Our study reveals adherence to the CCHR in 87.8% of cases at this ED. Identifying contextual factors that facilitate or hinder the application of CCHR in practice is critical for reducing unnecessary CTs. This work has been presented to the physician group to gain physician engagement and to elucidate enablers and barriers to guideline adherence. In light of the frequency of CT heads ordered EDs, even a small reduction would be impactful.

Keywords: clinical decision rule, computed tomography, minor head injury

P038

Comparison of diagnostic imaging rates between workplace and non-workplace injuries in the emergency department: a ten-year review

A. Sampalli, BSc, C. LeBlanc, MD, MEd, S. Campbell, MBChB, M. Vohra, MBA, MD, University of Toronto, Toronto, ON

Background: In Canada, injuries represent 21% of Emergency Department (ED) visits. Faced with occupational injuries, physicians may feel pressured to provide urgent imaging to facilitate expedited return to work. There is not a body of literature to support this practice. Twenty percent of adult ED injuries involve workers compensation. **Aim Statement:** Tacit pressures were felt to impact imaging rates for patients with workplace injuries, and our aim was to determine if this hypothesis was accurate. We conducted a quality review to assess imaging rates among injuries suffered at work and outside work. A secondary aim was to reduce the harm resulting from non-value-added testing. **Measures & Design:** Information was collected from the Emergency Department Information System on patients with acute injuries over the age of 16-years including upper limb, lower limb, neck, back and head injuries. Data included both workplace and non-work-related presentations, Canadian Triage and Acuity Scale (CTAS) levels and age at presentation. Imaging included any of X-ray, CT, MRI, or Ultrasound ordered in EDs across the central zone of Nova Scotia from July 1, 2009 to June 30, 2019. A total of 282,860 patient-encounters were included for analysis. Comparison was made between patients presenting under the Workers' Compensation Board of Nova Scotia (WCB) and those covered by the Department of Health and Wellness (DOHW). Imaging rates for all injuries were also trended over this ten-year period. **Evaluation/Results:** In patients between 16 and 65-years, the WCB group underwent more imaging (55.3% of visits) than did the DOHW group (43.1% of visits). In the same cohort, there was an overall decrease of over 10% in mean imaging rates for both WCB and DOHW between the first five-year period (2009-2013) and the second five-year study period (2013-2018). Imaging rates for WCB and DOHW converged with each decade beyond 35 years of age. No comparison was possible beyond 85-years, due to the absence of WCB presentations. **Discussion/Impact:** Patients presenting to the ED with workplace injuries are imaged at a higher rate than those covered by the DOHW. Campaigns promoting value-added care may have impacted imaging rates during the ten-year study period, explaining the decline in ED imaging for all injuries. While this 10% decrease in overall imaging is encouraging, these preliminary data indicate the need for further education on resource stewardship, especially for patients presenting to the ED with workplace injuries.

Keywords: quality improvement and patient safety, value-added care, workplace injuries

P039

Utilization of serum D-dimer assays and computed tomography pulmonary angiography (CTPA) scans in the diagnosis of pulmonary embolism among emergency department (ED) physicians

L. Salehi, MD, MPH, MHA, P. Phalpher, MD, H. Yu, MD, M. Ossip, MD, R. Valani, MBA, MD, M. Mercuri, PhD, William Osler Health System, Brampton, ON

Introduction: As the availability of Computed Tomography Pulmonary Angiography (CTPA) to rule out pulmonary embolism (PE) increases, so too does its utilization, and consequent overutilization. A variety of evidence-based algorithms and decision rules using clinical criteria and D-Dimer testing have been proposed as instruments to allow physicians to safely rule out a PE in low-risk patients. However, studies have shown mixed results with respect to both physician uptake of these decision rules and their impact on improving ordering practices among physicians. The objective of this study is to describe the prevalence of D-Dimer utilization among ED physicians and its impact on positive yield rates of CTPAs in a community setting.

Methods: Data was collected on all CTPA studies ordered by ED physicians at two very high-volume community hospitals and an affiliated urgent care centre during the 2-year period between January 1, 2016 and December 31, 2017. For each CTPA, we determined if 1) a D-Dimer had been ordered prior to CTPA, if 2) the D-Dimer was positive, and if 3) the CTPA was positive for a PE. Using a chi-square test, we compared the diagnostic yield for those patients who had a D-Dimer prior to their CTPA and those who did not. **Results:** A total of 2,811 CTPAs were included in the analysis. Of these, 964 CTPAs (34.3%) were ordered without a D-Dimer. Of those 1,847 patients who underwent D-Dimer testing prior to the CTPA, 343 (18.7%) underwent a CTPA despite a negative D-Dimer. When compared as a group, those CTPAs preceded by a D-Dimer showed no significant difference in positive yields when compared to those CTPAs ordered without a prior D-Dimer (9.9% versus 11.3%, $p = 0.26$). **Conclusion:** The findings of this study present a complicated picture of the impact of D-Dimer utilization on CTPA ordering patterns. There is evidence of suboptimal uptake of routine D-Dimer ordering, and adherence to guidelines in terms of forgoing CTPAs in low-risk patients with negative D-Dimers. While this study design leaves unanswered the question of how many CTPAs were avoided as a result of a negative D-Dimer, the finding of a similar positive yield among those patients who had a D-Dimer ordered versus those who did not is interesting, and illustrative of the issues arising from the high false-positive rates associated with D-Dimer screening.

Keywords: computed tomography, overutilization, pulmonary embolism

P040

Retrospective assessment of discrepancies in preliminary radiological reports in the emergency department

N. Saha, BSc, S. Chakraborty, MBBS, University of Ottawa, Ottawa, ON

Background: Preliminary reports and subsequent immediate management decisions of radiological scans are often performed by emergency physicians and on-call radiology residents. Many academic hospitals have resident-only coverage for after-hour shifts. Generally, these preliminary reports are eventually reviewed by a staff radiologist, during which discrepancies may be identified. Depending on the severity of the discrepancy and the time taken to notify the treating physician, there is potential for significant impact on the patient's care. **Aim Statement:** In an attempt to identify and minimize errors in radiological readings, and to improve the communication of discrepancies, our project aims to retrospectively audit all radiological discrepancies that have occurred at The Ottawa Hospital's emergency departments from April 2018 to May 2019. **Measures & Designs:** A systematic review of all cases with noted radiological discrepancies was obtained from the Picture Archive and Communication System

software and EPIC platform. Analysis of these cases will allow us to define when errors occur, what is the type and severity of the error, how long it took to relay the discrepancy to a treating physician, and what was the subsequent management impact. **Evaluation/Results:** We discovered 712 cases with radiological reading discrepancies, 168 major, 527 minor, and 17 incidentals. Interestingly, a significant portion of major (severely affecting care/life-threatening) discrepancies were reported from radiology residents, especially on CT images, although emergency physicians had the most discrepancies (mostly minor). Radiology residents were seen to have more discrepant reports during after-hour services while emergency physicians did not show any specific pattern of discrepant reporting. The average time to report a major discrepancy to a treating physician is 8.8 hours, where the maximum time taken was 104 hours and the minimum was 0.2 hours. 56% of reports with major discrepancies made no mention of who was notified. **Discussion/Impact:** By identifying weak points in radiological reporting, our results will allow us to provide suggestions at an administration and teaching level to minimize discrepancies. It is critical to create a workflow where mistakes are mitigated, and communication is efficient and standardized to prevent patient harm from delayed or incorrect diagnosis.

Keywords: emergency department, quality improvement and patient safety, radiology discrepancy

P041

Point-of-care ultrasound utilization and monetary outcomes (POCUMON) study

D. Rusiecki, BSc, S. Douglas, MD, MSc, C. Bell, BSc, MD, Queen's University, Kingston, ON

Introduction: Point-of-care ultrasound (POCUS) is an integral tool in the modern emergency physician's toolkit. Evidence suggests many imaging and lab investigations are ordered without true medical indications; it is unknown how POCUS utilization impacts health care costs at a patient level. The purpose of this study was to assess whether POCUS use in the emergency department (ED) was associated with cost savings via decreased laboratory and radiographic testing. **Methods:** POCUMON is a single-center, prospective pilot study. The participants were a convenience sample of ED staff physicians and PGY-5 Emergency Medicine (EM) residents working in the ED from July-October 2019. Physicians who used POCUS as part of their assessment had the cost of their patient investigation plans compared with those proposed by a control group of ED physicians simultaneously on-shift. The control group was blinded to the POCUS findings but had access to the patient and medical record. The lab investigations and imaging studies ordered by both groups were recorded with respective costs. Data were analyzed using a paired T-test, with sub-group analyses. Ethics approval was obtained from the Queen's University HSREB (No.6026732). **Results:** 50 patient assessments using POCUS were captured in the study period. 76% of patient assessments were performed by EM staff physicians; 94% of control assessments were provided by EM staff physicians. Patient chief complaints included abdominal pain (7), chest pain/dyspnea (10), flank pain (3), pregnancy concerns (4), trauma (7), extremity complaints (4), back pain (3), and other (12). The POCUS group had a trend for lower number of laboratory tests (4.7 ± 0.44 vs 5.22 ± 0.39 ; $p = 0.28$) and imaging studies (0.94 ± 0.14 vs 1.1 ± 0.11 ; $p = 0.33$). Overall health care costs were similar in both groups, with a

trend to cost savings in the POCUS group ($\$142.00 \pm 15.44$ vs $\$174.60 \pm 17.00$; $p = 0.12$). Subgrouping identified significant cost savings in the POCUS group for patients with a chief complaint of flank pain ($\$43.64$ vs $\$248.82$, $p = 0.01$). **Conclusion:** POCUS use was not associated with significant health care cost savings. ED POCUS usage did see a trend towards decreased laboratory and imaging investigations. Patients presenting with flank pain had significantly lower expenditures associated with their visit when POCUS was incorporated into their assessment. Large scale prospective studies are needed to investigate if POCUS is associated with cost-savings in ED patients.

Keywords: cost analysis, point-of-care ultrasound

P042

Workplace-based assessment in emergency medicine: how do physicians use entrustment anchors?

T. Robinson, MSc, BPHE, N. Wagner, PhD, A. Szulewski, MD, MHPE, PhD, N. Dudek, MD, MEd, W. Cheung, MD, MMed, A. Hall, MD, MMed, Queen's University, Kingston, ON

Introduction: Competency based medical education (CBME) has triggered widespread utilization of workplace-based assessment (WBA) tools in postgraduate training programs. These WBAs predominately use rating scales with entrustment anchors, such as the Ottawa Surgical Competency Operating Room Evaluation (O-SCORE). However, little is known about the factors that influence a supervising physician's decision to assign a particular rating on scales using entrustment anchors. This study aimed to identify the factors that influence supervisors' ratings of trainees using WBA tools with entrustment anchors at the time of assessment and to explore the experiences with and challenges of using entrustment anchors in the emergency department (ED). **Methods:** A convenience sample of full-time emergency medicine (EM) faculty were recruited from two sites within a single academic Canadian EM hospital system. Fifty semi-structured interviews were conducted with EM physicians within two hours of completing a WBA for an EM trainee. Interviews were audio-recorded, transcribed verbatim, and independently analyzed by two members of the research team. Themes were stratified by trainee level, rating and task. **Results:** Interviews involved 73% (27/37) of all EM staff and captured assessments completed on 83% (37/50) of EM trainees. The mean WBA rating of studied samples was 4.34 ± 0.77 (2 to 5), which was similar to the mean rating of all WBAs completed during the study period. Overall, six major factors were identified that influenced staff WBA ratings: amount of guidance required, perceived competence through discussion and questioning, trainee experience, clinical context, past experience working with the trainee, and perceived confidence. The majority of staff denied struggling to assign ratings. However, when they did struggle, it involved the interpretation of WBA anchors and their application to the clinical context in the ED. **Conclusion:** Several factors appear to be taken into account by clinical supervisors when they make decisions regarding the particular rating that they will assign a trainee on a WBA that uses entrustment anchors. Not all of these factors are specific to that particular clinical encounter. The results from this study further our understanding on the use of entrustment anchors within the ED and may facilitate faculty development regarding WBA completion as we move forward in CBME.

Keywords: assessment, education, entrustment

P044

Outcomes of direct observation of trauma resuscitation

A. Quirion, MBA, MD, A. Nikouline, MD, B. Nolan, MD, MSc, J. Jung, MD, PhD, University of Toronto, Toronto, ON

Introduction: Trauma resuscitations are sporadic high acuity situations that can be difficult to assess for areas of quality improvement. We aim to analyse the type of observation that occurs during trauma resuscitations and outcomes that develop as a result. **Methods:** Medline was searched from 1946 to May 2019 for studies involving direct observation of trauma resuscitation. English studies of both adult and pediatric populations from 2000 onwards were included for study. They were compared for type of observation (in-person vs video) as well as primary outcomes of their observation and any quality improvement as a result. **Results:** A total of 413 publications were identified with 10 meeting eligibility for inclusion. All 10 studies underwent video review with no in-person review being performed. The most common primary outcome was analysis of a critical procedure (6 studies), with tracheal intubation being studied in 4 studies and thoracotomy and vascular access each being studied once. The remaining studies measured communication styles and team effectiveness. Overall 5 of the 10 studies resulted in new policies being put in place for trauma resuscitations, including; use of interosseous lines as first lines in trauma patients in extremis, tracheal intubation check list, and continuing with medical student participation in cardiopulmonary resuscitation. **Conclusion:** This study highlights some of the common focuses of trauma resuscitation observation; critical procedures, team dynamics and communication. A majority of studies focused on critical procedures during resuscitations and quality improvement in the form of checklists to improve them. Remaining studies focused on equally important aspects of team functioning and communication which can be more difficult to objectively measure and derive quality improvement measures for. These studies led an emphasis on use of a horizontal assessment style and closed loop communication in all their trauma resuscitation.

Keywords: observation, resuscitation, trauma

P045

Doing our work better, together: a relationship-based approach to defining the quality improvement agenda in trauma care

E. Purdy, BHSc, MD, MSc, D. Mclean, BN, C. Alexander, MD, M. Scott, BN, A. Donahue, MD, D. Campbell, MD, M. Wulschleger, MD, G. Berkowitz, BSc, D. Henry, PhD, V. Brazil, MBA, MD, Queen's University, Kingston, ON

Background: Trauma care represents a complex patient journey, requiring multi-disciplinary coordinated care. Team members are human, and as such, how they feel about their colleagues and their work affects performance. The challenge for health service leaders is enabling culture that supports high levels of collaboration, cooperation and coordination across diverse groups. **Aim Statement:** We aimed to define and set the agenda for improvement of the relational aspects of trauma care at a large tertiary care hospital. **Measures & Design:** We conducted a mixed-methods collaborative ethnography using the Relational Coordination survey – an established tool to analyze the relational dimensions of multidisciplinary teamwork – participant observation, interviews, and narrative surveys. Findings were presented to clinicians in working groups for further interpretation and to facilitate co-creation of targeted interventions designed to improve team relationships and performance. **Evaluation/Results:** We engaged a complex multidisciplinary network of ~500 care

providers dispersed across seven core interdependent clinical disciplines. Initial findings highlighted the importance of relationships in trauma care and opportunities to improve. Narrative survey and ethnographic findings further highlighted the centrality of a translational simulation program in contributing positively to team culture and relational ties. A range of 16 interventions – focusing on structural, process and relational dimensions – were co-created with participants and are now being implemented and evaluated by various trauma care providers. **Discussion/Impact:** Through engagement of clinicians spanning organizational boundaries, relational aspects of care can be measured and directly targeted in a collaborative quality improvement process. We encourage health care leaders to consider relationship-based quality improvement strategies, including translational simulation and relational coordination processes, in their efforts to improve care for patients with complex, interdependent journeys. **Keywords:** ethnography, quality improvement and patient safety, trauma

P046

Physicians experience with the Epic electronic health record system: findings from an academic emergency department implementation

C. Price, BHSc, MHI, S. Calder-Sprackman, MD, MSc, W. Cheung, MD, MMed, G. Clapham, BA, E. Kwok, MD, MSc, MHA, University of Ottawa, Ottawa, ON

Introduction: In June 2019, The Ottawa Hospital launched the Epic EHR system, which transitioned all departments from a primarily paper-based system to an exclusively electronic system using a one-day “big bang” approach. All Emergency Physicians (EP) received online module training, personalization sessions, and at-the-elbow support during the transition. We sought to evaluate EP satisfaction with the implementation process and the system’s impact on clinical practice in a tertiary care academic emergency medicine setting. **Methods:** Email surveys were distributed during the pre-implementation and go-live phases. Questions were developed by the research team and piloted for face validity and clarity. Surveys were sent to staff EPs, residents and fellows. Likert scales were used to evaluate agreement with statements and the modified Maslach Burnout Inventory was used to assess burnout. Pre-post groups were compared using chi-squared tests to assess for significant differences. Future surveys will be distributed in 2020 for continued implementation evaluation. **Results:** Response rates were 49% (78/160) in the pre and 48% (76/160) in the post period. The majority of respondents were staff (66% pre; 75% post) working 8-15 shifts/month. Prior to launch, 52% of EPs felt the pre-training modules provided sufficient preparation, however only 32% felt this way after go-live ($p = 0.02$). Providers did not feel there were enough personalization (21% pre vs. 24% post, $p = 0.66$) or hands-on sessions offered (51% pre vs. 39% post, $p = 0.15$) and this opinion did not change after go-live. Before Epic, EPs were most concerned with productivity/efficiency, documentation time, and lack of support/training. Although documentation was reported to be easier after go-live by 69% of EPs, reviewing documents, using standardized workups/protocols, patient monitoring/follow-up, efficiency and billing were reported by >50% of EPs to be more difficult. Overall, there was a 22% increase in feeling confident to use Epic (28% pre vs. 50% post, $p < 0.01$); however, only 38% of providers were satisfied with the system. Notably, 82% of EPs reported experiencing moderate or high burnout in the post implementation period. **Conclusion:** Despite receiving standard

EHR training and support, the majority of clinicians did not feel adequately trained or confident using Epic and reported moderate to high burnout. These findings will inform optimization efforts and they represent key considerations for other EDs planning future implementations.

Keywords: burnout, electronic health records, health informatics

P047

Emergency department practice patterns of UTI investigation among the delirious elderly: a retrospective chart review

R. Pinnell, BSc, P. Joo, MDCM, BEng, University of Ottawa, Ottawa, ON

Introduction: Delirium is a common emergency department (ED) presentation in elderly patients. Urinary tract infection (UTI) investigation and treatment are often initiated in delirious patients in the absence of specific urinary symptoms, despite a paucity of evidence to support this practice. The purpose of this study is to describe the prevalence of UTI investigation, diagnosis and treatment in delirious elderly patients in the ED. **Methods:** We performed a retrospective chart review of elderly patients presenting to the ED at The Ottawa Hospital between January 15-July 30, 2018 with a chief complaint of confusion or similar. Exclusion criteria were pre-existing and current UTI diagnosis, Glasgow Coma Scale <13, current indwelling catheter or nephrostomy tube, transfers between hospitals, and leaving without being seen. The primary outcome was the proportion of patients for whom urine tests (urinalysis or culture) or antibiotic treatment were ordered. Secondary outcomes were associations between patient characteristics, rates of UTI investigation, and patient outcomes. Descriptive values were reported as proportions with exact binomial confidence intervals for categorical variables and means with standard deviations for continuous variables. Comparisons were conducted with Fischer's exact test for categorical variables and t-tests for continuous variables. **Results:** After analysis of 1039 encounters with 961 distinct patients, 499 encounters were included. Urine tests were conducted in 324 patients (64.9% [60.6-69.1]) and antibiotics were prescribed to 176 (35.2% [31.1-39.6]). Overall 57 patients (11.4% [8.8-14.5]) were diagnosed with UTI, of which only 12 (21.1% [11.4-33.9]) had any specific urinary symptom. For those patients who had no urinary symptoms or other obvious indication for antibiotics (n = 342), 199 (58.2% [52.8-63.5]) received urine tests and 62 (18.1% [14.2-22.6]) received antibiotics. Patients who received urine tests were older (82.4 ± 8.8 vs. 78.3 ± 8.4 years, p < 0.001) but did not differ in sex distribution from those than those who did not. Additionally, patients who received antibiotics were more likely to be admitted (OR = 2.6 [1.48-4.73]) and had higher mortality at 30 days (OR = 4.2 [1.35-12.91]) and 6 months (OR = 3.2 [1.33-7.84]) than those who did not. **Conclusion:** Delirious patient without urinary symptoms in the ED were frequently investigated and treated for UTI despite a lack of evidence regarding whether this practice is beneficial.

Keywords: delirium, practice patterns, urinary tract infection

P048

Brief online educational intervention improves emergency physicians' and general surgeon's ability to interpret focused gallbladder ultrasound

S. Peng, MD CM, M. Woo, MD, P. Glen, MD, MSc, B. Ritcey, MD, W. Cheung, MD, MMed, E. Kwok, MD, MSc, MHA, A. Sheikh, MD, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Introduction: Biliary colic is a frequent cause for emergency department visits. Ultrasound is the initial test of choice for gallstone disease. We evaluated the effectiveness of a brief online educational module aimed to improve Emergency Physicians' (EP) and General Surgeons' (GS) accuracy in interpreting gallbladder ultrasound. **Methods:** EPs and GSs (resident/fellow and attending) from a single academic tertiary care hospital were invited to participate in a pre- and post- assessment of the interpretation of gallbladder ultrasound. Demographic information was obtained in a standardized survey. All questions developed for the pre- and post- assessment were reviewed for content and clarity by 3 EP and GS experts. Participants were asked 22 multiple-choice questions and then directed to a 7-minute video-tutorial on gallbladder ultrasound interpretation. After a 3-week period, participants then completed a post-intervention assessment. Following pre- and post- assessment, participants were surveyed on their confidence in gallbladder ultrasound interpretation. Data was analyzed using descriptive statistics and paired t-test. **Results:** The overall response rate of the pre-intervention was 50.9% (116/228) and 40.8% (93/228) for the post-intervention. In pre-intervention assessment, 27.7% of participants reported they were "not at all confident" in interpreting gallbladder ultrasound. This contrasted with post-intervention confidence level, where only minority (7.8%) reported "not at all confident". There was a significant increase from the pre- to post- intervention (75.7% to 85.4%; p < 0.01) in correct interpretations. The greatest improvement was seen in those with previous experience interpreting gallbladder ultrasound (from 79.6% to 91.1%; p < 0.01). EPs scored significantly higher than GSs in the pre-intervention (EPs 78.2% compared to GSs 71.0%; p < 0.01). This trend was also observed in post-intervention, although the difference was no longer significant (EPs 88.9% compared to GSs 82.8%; p = 0.05). There was no significant difference in performance between residents/fellows compared to attendings. **Conclusion:** This brief, online intervention improved the accuracy of EPs' and GSs' interpretation of gallbladder ultrasound. This is an easily accessible tutorial that can be used as part of a comprehensive ultrasound educational program. Further studies are required to determine if EPs' and GSs' interpretations of gallbladder ultrasound impacts patient-oriented outcomes.

Keywords: cholecystitis, gallstone complication, point-of-care ultrasound

P049

Goals of care discussion in the emergency department: is it possible

F. Péloquin, MD, É. Marmen, LLB, V. Gélinas, MSc, A. Plaisance, MSc, P. Archambault, MD, MSc, Department of Family Medicine and Emergency Medicine, Université Laval, Québec, QC

Introduction: The Institut national d'excellence en santé et en services sociaux in Quebec published guidelines suggesting that emergency physicians should establish emergency department (ED) patients' goals of care when appropriate. The objective of this study was to explore emergency physicians' opinions about leading goals of care discussion (GCD) in their daily practice. **Methods:** This study used a qualitative design based on the Normalisation Process Theory (NPT); a middle-range theory used to explain the sustainability of implementing complex healthcare interventions. It was conducted in a single academic ED in Lévis, Québec. We planned to recruit a minimal convenience sample of 10 participants. Between April and May 2018, we conducted semi-structured interviews and

transcribed the audio records verbatim. Deductive thematic analysis based on the NPT was conducted using Nvivo 12.0. Two authors codified the content of each interview under the four NPT macro-level constructs: coherence, cognitive participation, collective action and reflexive monitoring. A kappa score was calculated to measure the coding inter-rater reliability. **Results:** We interviewed 10 ED physicians (50 % women; 60% certified by the College of Family Physicians of Canada (Emergency Medicine)). No new ideas emerged after the 9th interview. Our thematic analysis identified 13 themes. Inter-rater reliability of coding was substantial ($\kappa = 0.72$). The coherence construct contained the following themes: common concept of interpersonal communication, efficiency of care and anxiety generated by the discussion, the identification of an acute deterioration leading to the GCD, coming together of clinician, patient and family, and the importance of knowing patients' goals of care before medical handover. The cognitive participation construct involved the following themes: lack of training on the new goals of care form and availability of reminders to promote the recommendation. One theme characterized the collective action construct: heterogeneous prioritization for leading GCD. The reflexive monitoring construct contained 4 themes: need to take action before patients consult in the ED, need to develop education programs, need for legislation and the impossibility of systematic GCD for all patients. **Conclusion:** Goals of care discussion is possible and essential with selected patients in the ED. Nevertheless, policy-making efforts remain necessary to ensure the systematization of the recommendation.

Keywords: advanced care planning, emergency medicine, goals of care discussion

P050

The Northern Amazing and Awesome Model: Using positive deviance to impact patient care

R. Ohle, MBChB, MSc, MA, S. McIsaac, MBChB, MEd, Health Science North, Sudbury, ON

Introduction: Positive deviance recognizes that there are individuals and teams within our community of practice that succeed in spite of system constraints. Amazing and awesome rounds has been proposed as a forum to identify behaviours and processes that lead to exceptional results. The objective of this study was to determine the feasibility and acceptability of a structured amazing and awesome rounds model through an innovative educational intervention. **Methods:** The authors engaged a broad range of professional designations (physicians, surgeons, nurses, respiratory therapists, administrative staff) at a tertiary care institution. A&A rounds were open to all allied health professionals and administrative staff. The Northern A&A rounds model was developed, implemented, and then evaluated as a four-part intervention. This consisted of: 1) Allied health professional training on case selection and analysis, 2) Engaging inter professional members, 3) disseminating lessons learned, and 4) creating an administrative pathway for acting on issues identified through the A&A rounds. The measures of intervention feasibility included the proportion of sessions adherent to the new model and A&A rounds attendance. Post intervention surveys of presenters and attendees were used to determine intervention acceptability. A&A presentation content was reviewed to determine the most frequently adopted components of the model. **Results:** Nine out of 9(100%) of presented cases were adherent to the three components of the Northern A&A Model. A&A rounds were highest attended of all hospital wide grand

rounds ($N = 75$ SD 2.4 $P < 0.001$). Nine case presentations were analyzed and 7 action items were identified for amplification across the hospital. Including 3 case reports published of a novel approach to a patient case, a rapid referral for trauma patients at risk for PTSD, AED placement in all community clinics and routine debrief after resuscitations. Presenters included a broad representation of hospital staff including surgeons, emergency physicians, radiologists, nurses, and administrators. **Conclusion:** The Northern A&A Model was a feasible intervention that was perceived to be effective by both presenters and attendees. The authors believe that this could be readily applied to any hospital seeking to enhance quality of care and patient safety.

Keywords: quality improvement

P051

A chart review of emergency department visits following implementation of the Cannabis Act in Canada

M. O'Brien, BSc, P. Rogers, BSc, MD, E. Smith, MD, Memorial University of Newfoundland, St. John's, NL

Introduction: The legalization of cannabis for recreational use in 2018 remains a controversial topic. There are multiple perceived benefits of cannabis including pain relief, treatment of epilepsy syndromes, and improving body weight of cancer patients. However, there are also many potential risks. The short-term health consequences include cannabinoid hyperemesis syndrome and cannabis induced psychosis. These conditions directly impact the influx of patients presenting to Emergency Departments (ED). There is currently limited research in the area of cannabis legalization burden. However, the studies performed have shown a significant impact in those states which cannabis is legal. A study completed in Colorado found that hospitalization rates with marijuana related billing codes increased from 274 to 593 per 100 000 hospitalizations after the state legalization of recreational cannabis. This study aims to examine if Canada's hospitals are experiencing the same burden as other jurisdictions. **Methods:** A descriptive study was performed via a retrospective chart review of cannabis related visits in tertiary EDs in St. John's, NL, from six months prior to the date of legalization of cannabis for recreational use, to six months after. Hospital ED visit records from both the Health Science Centre and St. Clare's Mercy Hospital were searched using keywords to identify patients who presented with symptoms related to cannabis use. We manually reviewed all visit records that included one or more of these terms to distinguish true positives from false positive cases, unrelated to cannabis use. **Results:** A total of 287 charts were included in the study; 123 visits were related to cannabis use six months prior to legalization, and 164 six months after legalization. A significant increase in ED visits following the legalization of recreational cannabis was seen ($p < .001$). There was no significant difference in the age of users between the two groups. Additionally, the number one presenting complaint due to cannabis use was vomiting (47.7%), followed by anxiety (12.2%). **Conclusion:** Following the implementation of the Cannabis Act in Canada, EDs in St. John's, NL had a statistically significant increase in the number of visits related to cannabis use. It is important to determine such consequences to ensure hospitals and public health agencies are prepared to treat the influx of visits and are better equipped to manage the associated symptoms.

Keywords: cannabis, emergency department, legalization

P052**Who are the super-users of the emergency department?**

R. North, MD, D. Savage, MD, PhD, D. VanderBurgh, MD, G. McKay, MD, C. McMillan, MD, A. Jefferies, BHSc, B. Piper, MD, R. Stonebridge, MD, Northern Ontario School of Medicine, Thunder Bay, ON

Introduction: All emergency departments (EDs) across Canada can identify a group of high frequency users, which are typically defined in the literature as eight to ten visits per year. Although frequent users of the ED are well-studied in the literature, there is little published in terms of identifying the “super-user” group who present to the ED much more often than 10 visits per year. Faced with multiple co-morbidities and a high mortality rate, the ED is often the most appropriate environment to manage this population. In order to inform future initiatives to improve health outcomes, we aimed to identify the specific characteristics of this super-user group. **Methods:** A retrospective chart review was conducted using the electronic medical record from the Thunder Bay Regional Health Sciences Centre to identify patients who had at least 25 visits in the year 2017. A total of 75 patients presented to the ED greater than 25 times in 2017. The following data was then collected on each individual patient: demographic characteristics including age, gender, address, access to a primary care provider. In addition, we collected date, time, diagnoses at each visit, admission rate and surgical interventions. **Results:** Our preliminary results reveal this population presents to the ED on average 32 times per year. The population is 53% male. Most have a private address and half have a primary care provider for all 2017 with one quarter having a primary care provider for part of the year. The percentage of visits for infections was 30%, mental health and addictions presentations comprised 28% of the visits, with gastrointestinal and cardiac visits comprising a total 22% of the visits. Approximately 7% of visits required admission to hospital, and the average length of stay was 5 days. **Conclusion:** Super-users of the ED are a unique population that are typically well connected with primary care and have a very low admission and surgical rate. The most common reasons for visit are infections and mental health and addictions. The next steps include collecting mortality data. This data should be used to inform ED and community initiatives aimed at improved health outcomes for this population.

Keywords: frequent visitors, high volume, super-users

P053**Adverse events and errors in trauma resuscitation: a systematic review**

A. Nikouline, MD, BMSc, A. Quirion, BSc, MBA, MD, B. Nolan, BSc, MD, University of Toronto, Toronto, ON

Introduction: Trauma resuscitations are plagued with high stress and require time sensitive and intensive interventions. It is a landscape that is a perfect hot bed for clinical errors and adverse events for patients. We sought to describe the adverse events and errors that occur during trauma resuscitation and any associated outcomes. **Methods:** Medline was searched for a combination of key terms involving trauma resuscitation, adverse events and errors from January 2000 to May 2019. Studies that described adverse events or errors in initial adult trauma resuscitations were included. Two reviewers analyzed papers for inclusion and exclusion criteria with a third reviewer for any discrepancies. Descriptions of errors, adverse events and associated outcomes

were collated and presented. **Results:** A total of 3,462 papers were identified by our search strategy. 18 papers met our inclusion and exclusion criteria and were selected for full review. Adverse events and errors reported in trauma resuscitation included missed injuries, aspiration, failed airway, and deviation from protocol. Rates of adverse events and errors were reported where applicable. Mortality outcomes or length of stay were not directly correlated to adverse events or errors experienced in the trauma resuscitation. **Conclusion:** Our study highlights the predominance of adverse events and errors experienced during initial trauma resuscitation. We described a multitude of adverse events and errors and their rates but further study is needed to determine outcome differences for patients and possibility for quality improvement.

Keywords: adverse events, errors, trauma

P054**Delay in decision to transfer time for critically ill patients transported by air ambulance in Ontario**

V. Myers, BSc, MD, B. Nolan, BSc, MD, University of Toronto, Toronto, ON

Introduction: Delays in definitive management of critically ill patients are known to drive poor clinical outcomes. A scarcely studied time period in interfacility transfer is the time between initial patient presentation and the decision to transfer. This study seeks to identify patient, environmental and institutional characteristics associated with delays in decision to transfer critically ill patients by air ambulance to a tertiary care centre. **Methods:** Patients >18 years old who underwent emergent air ambulance interfacility transport to a tertiary care centre were included. Patient records were located in a provincial air ambulance database. The primary exposure variable was time from patient presentation to initial call to facilitate transfer. Patient, environmental and institutional characteristics were identified using stepwise variable selection at a significance of 0.1. These characteristics were then explored using quantile regression to identify significant factors associated with delay in transport initiation. **Results:** A total of 11231 patients were included in the analysis. There were 5009 females (44.60%) and 6222 males (55.4%). The median age of patients was 57. The median time to initiate the transfer was 3.05 hours. The variables identified with stepwise selection were gender, category of illness, heart rate, systolic blood pressure, Glasgow coma scale, vasopressor usage, blood product usage, time of day, and type of sending site. The following factors were significantly ($p < 0.05$) associated with an increase in time to initiate transfer compared to the reference category at the 90th centile of time: cardiac illness (+1.45h), gastrointestinal illness (+3.27h), respiratory illness (+4.90h), sepsis (+3.03h), vasopressors (+2.31h), and an evening hour of transport (+3.67h). The following factors were significantly ($p < 0.05$) associated with a decrease in time to initiate transfer compared to the reference category at the 90th centile of time: neurologic illness (-1.45h), obstetrical illness (-1.56h), trauma (-3.14h), GCS <8 (-0.98h), blood transfusion (-1.47h), and sending site being a community hospital >100 beds (-2.26h), <100 beds (-4.71h), or nursing station (-10.02h). **Conclusion:** Time to initiate transfer represents a significant window in a patient's transport journey. In looking at the predictors of early or late initiation of transfers, these findings provide education and quality improvement opportunities in decreasing time to definitive care in critically ill populations.

Keywords: delay, transport

P055

Canadian emergency physician attitudes toward endotracheal intubation for aspiration prophylaxis

M. Munn, MD, MPhil, J. Laraya, MD, G. Boivin-Arcouette, MD, E. van der Linde, MD, A. Lund, MD, MEd, S. Turris, PhD, University of British Columbia, Mont-Tremblant, QC

Introduction: Emergency patients with decreased level of consciousness often undergo intubation purely for airway protection from aspiration. However, the true risk of aspiration is unclear and intubation poses risks. Anecdotal, experienced emergency physicians often defer intubation in these patients while others intubate to decrease the perceived clinical and medico-legal consequences. No literature exists on the intubation practices of emergency physicians in these cases. **Methods:** An online questionnaire was circulated to members of the Canadian Association of Emergency Physicians. Participants were asked questions regarding two common clinical cases with decreased level of consciousness: (1) acute, uncomplicated alcohol intoxication and (2) acute, uncomplicated seizure. For each case, providers' perceptions of aspiration risk, the standard of care, and the need for intubation were assessed. **Results:** 128 of the 1546 Canadian physicians contacted (8.3%) provided responses. Respondents had a median of 15 years of experience, 88% had CCFP-EM or FRCPC certification, and most worked in urban centers. When intubating, 98% agreed they were competent and 90% agreed they were well supported. A minority (17.4%) considered GCS < 8 an independent indication for intubation. For the alcohol intoxication case, 88% agreed that aspiration risk was present but only 11% agreed they commonly intubate. Only 17% agreed intubation was standard care, and only 0.8% felt their colleagues always intubate such patients. For the seizure case, 65% agreed aspiration risk existed but only 3% agreed they commonly intubate, 1% felt colleagues always intubated, and 5% agreed intubation was standard of care. Additional factors felt to compel intubation (394 total) and support non-intubation (366 total) were compiled and categorized; the most common themes emerging were objective evidence of emesis or aspiration, other standard indications for intubation, head trauma, co-ingestions, co-morbidities and clinical instability. **Conclusion:** It is acceptable and standard practice to avoid intubating a select subset of intoxicated and post-seizure emergency department patients despite aspiration risk. Most physicians do not view the dogma of "GCS 8, intubate" as an absolute indication for intubation in these patients. Future research is aimed at identifying key factors and evidence supporting intubation for the prevention of aspiration, as well as the development of a validated clinical decision rule for common emergency presentations.

Keywords: aspiration, endotracheal intubation, intoxication

P056

Gastric ultrasound in stable patients with decreased level of consciousness and recreational substance use -- are presumed full stomachs full?

M. Munn, MD, MPhil, C. Phillips, MD, J. Laraya, MD, G. Boivin-Arcouette, MD, University of British Columbia, Mont-Tremblant, QC

Introduction: Intoxicated patients with decreased Glasgow Coma Scale (GCS) are common presentations to emergency departments. These patients are often intubated due to presumed full stomachs and perceived aspiration risk. Gastric ultrasound (GUS) -- a simple, non-invasive and objective option -- could be applied to this problem. This pilot study uses GUS alongside usual care at a music festival; a

bounded, intoxication-dense environment where airways are often managed using non-invasive airway strategies. We aim to (1) clarify the gastric contents of any intubated patients, and (2) assess if patients managed without intubation go on to have a lack of aspiration sequelae because of empty stomachs or in spite of full stomachs. **Methods:** A prospective cohort study was conducted at a multi-day music festival. Patients presenting to on-site medical services with GCS $\leq$ 13 and known or suspected substance use were included. Patients with trauma, instability, metabolic derangements or additional aspiration risk factors (eg morbid obesity, pregnancy) were excluded. Standard GUS was performed by a trained provider and results were categorized according to convention as FS (full stomach, ie solids or liquids >1.5mL/kg) or ES (empty stomach, ie empty or liquids <1.5mL/kg). Additional patient data were extracted from linked medical records post event. **Results:** 33 patients met inclusion criteria and 27 remained after exclusions were applied and consent obtained. 25 patients reported substance use and 19 polysubstance use. The FS group had 15 patients (7 solid & 8 liquid > 1.5), and the ES group had 12 patients (5 empty & 7 liquid < 1.5). The median low GCS documented for FS and ES was 7 and 11 respectively, and 10 patients total had a GCS of 8 or less (6 FS & 4 ES). No patients were intubated and all were managed conservatively according to usual care. 3 patients (2 FS, 1 ES) were transferred to hospital. No patients re-registered at medical for clinically significant aspiration. **Conclusion:** This pilot study demonstrates the potential utility of GUS in stratifying aspiration risk in intoxicated patients with decreased GCS. "Empty" stomachs might avoid intubation, while the implications and true risks of "full" stomachs for aspiration sequelae in the absence of intubation remain unclear. Due to the small numbers in this pilot study and the quoted GUS sensitivity (only 95%), further research is needed to evaluate the safe application of this modality to clinical decision-making in intoxicated patients.

Keywords: aspiration, endotracheal intubation, gastric ultrasound

P057

Impact of a clinical pathway for the treatment of acute asthma in the emergency department

F. Messier, J. Deshaies, MD, G. Breault, University of Sherbrooke, Sherbrooke, QC

Introduction: In Canada, acute asthma is a common cause of emergency department (ED) attendance and its treatment is affected by ED overcrowding and increasing wait times. Literature suggests that a clinical pathway (CP) for the treatment of acute asthma can increase the use of medical therapy, reduce hospital admission rates and decrease associated costs. However, only few have looked at the effect on ED length of stay (ED LOS) when such a CP is initiated by triage nurse/respiratory therapist among adults. In this optic, an asthma CP was launched on Feb. 2016 at Centre Hospitalier Universitaire de Sherbrooke (QC) and included medical directives allowing triage nurse and respiratory therapist initiation of treatment. **Methods:** The objectives are to determine the effect of an ED nurse/respiratory therapist-initiated asthma CP on (1) ED LOS, (2) time-to-treatment (beta-agonist, corticosteroids), time-to-MD and other secondary outcomes. This was a retrospective before-after study. Adults presenting to the ED before and after CP implementation with a final diagnosis of asthma or asthma exacerbation were eligible. The groups A (before implementation) and B (after implementation) were compared for ED LOS. Three subgroups of 50 patients were generated and compared for outcomes: A1 (before implementation), B1 (after implementation)

without CP) and B2 (after implementation with CP). All five groups were controlled for triage level and sex. **Results:** In total, 1086 patients were included; 543 before implementation (Mar. 2011 – Feb. 2016) and 543 after (Feb. 2016 – Jun. 2019), of whom 14% (N = 77) were treated by CP. The average ED LOS was similar (10.36h vs 10.65h; ($p = 0.31$)) in group A and in group B. In groups A1, B1 and B2, the median ED LOS were respectively 6.00, 6.84, 4.80; these differences were not statistically significant. The average time-to-treatment for beta-agonist in A1, B1 and B2 was respectively 148, 180 and 50 mins; the differences between B2 and A1 and between B2 and B1 were both statistically significant ($p < 0.05$). **Conclusion:** Although this study indicates a low compliance to the CP, it shows that time-to-treatment can be reduced. It didn't demonstrate any statistically significant decrease in ED LOS, most likely due to low number of patients and non-normal distribution, but the 1.2h shorter could be a major advantage if it proves true. Further studies are essential to understand facilitators and alleviate the barriers in anticipation of a multi-centric implementation.

Keywords: asthma, clinical pathway, emergency department

P058

Accuracy of the trauma triage protocol Échelle québécoise de triage préhospitalier en traumatologie (EQTPT) in selecting patients requiring specialized trauma care

E. Mercier, MD, MSc, R. Beaumont-Beaulieu, C. Malo, MD, MSc, P. Tardif, MSc, L. Moore, PhD, D. Eramian, MD, MSc, A. Nadeau, PhD, Hôpital de l'Enfant-Jésus, Québec, QC

Introduction: This study aims to evaluate the accuracy of the Échelle québécoise de triage préhospitalier en traumatologie (EQTPT) to identify patients who will need urgent and specialized trauma care in the La Capitale-Nationale region, province of Quebec. **Methods:** A detailed review of prehospital and in-hospital medical charts was conducted for a sample of patients transported following a trauma by ambulance to one of the five CHU de Quebec's emergency departments (ED) between November 2016 and March 2017. Data related to the trauma mechanism, population, injuries sustained, diagnosis, intervention and patient outcomes were extracted. The study primary outcome was the use of at least one urgent and specialized trauma care defined as: admission to the intensive care unit (ICU), urgent surgery within less than 24 hours after arrival (excluding orthopedic surgery for one limb only), intubation in ED, angioembolization within 24 hours after ED arrival, activation of a massive transfusion protocol in the ED. Also, patients who died secondary to their trauma were also considered as requiring urgent care. **Results:** 902 patients were included. The mean age (SD) was 59 (28.5) years old, 494 (54.8%) were female. The main trauma mechanisms were falls (592 (65.6%)) followed by motor vehicle accident (201 (22%)). 367 (40.7%) patients were transported directly to the tertiary trauma centre from the field. 231 (25.6%) patients had at least one criteria included in the steps 1, 2 or 3 of the EQTPT. Subsequently, most patients (649 (71.9%)) were discharged home from the ED while 177 (19.6%) patients were admitted to the hospital. 82 (9.1%) patients required urgent and specialized trauma care. Of these 82 patients, 27 patients (32%) were identified in step 1 of the protocol, 12 patients (14.6%) in step 2, 5 patients (6.1%) in step 3, 13 patients (15.9%) in step 4 and 2 patients (2.4%) in step 5 while 23 (28.0%) patients were not identified by any steps of the EQTPT protocol. Therefore, 44 (53.6%) of the patients requiring urgent and specialized trauma care were identified by the criteria proposed in the steps 1, 2 or 3. **Conclusion:** In this

retrospective cohort study, the EQTPT was insensitive to identify trauma patients who will need prompt and complex trauma management. Studies are required to determine the factors that could help improve its accuracy.

Keywords: trauma care, triage

P059

Characteristics of older adults attending the emergency department for suicidal thoughts or voluntary intoxication: a multicenter retrospective cohort study

E. Mercier, MD, MSc, S. Boulet, A. Gagnon, BA, A. Nadeau, PhD, F. Mowbray, Hôpital de l'Enfant-Jésus, Québec, QC

Introduction: Suicidal thoughts and self-harm are disproportionately prevalent among older adults but are frequently overlooked by emergency physicians. **Objective:** This study aims to explore the characteristics of older adults visiting the ED for suicidal thoughts or voluntary intoxications. **Methods:** All older adults (≥ 65 years old) who visited one of the five CHU de Quebec' EDs in 2016 were eligible. The medical charts of patients who reported suicidal thoughts or intoxication in triage or received a relevant discharge diagnosis were reviewed. Involuntary intoxications were excluded. Descriptive statistics were used to present the results. **Results:** Results: A total of 478 ED visits were identified, of which 332 ED visits ($n = 279$ patients) were included. The mean age of the ED cohort was 72.6 (standard deviation 6.8) years old and 41.6% were female. Mood disorders (41.2%) and alcoholism (40.5%) were common. Most included patients had a diagnosis of voluntary intoxication (73.2%), including two suicides (0.6%). Following 109 ED visits (30.0%), patients were referred for a mental health assessment. Half of all ED visits resulted in a discharge by the emergency physician (50.0%), while 27.4% were admitted for in-patient care. In the subsequent year (2017), 38.4% returned to the ED for suicidal ideations or self-harm of which 7.9% attended the ED ≥ 5 times. **Conclusion:** ED visits for suicidal thoughts and voluntary intoxication in older adults are more common among men with known mood disorders or alcoholism. Referral for a mental health assessment is inconsistent. ED-initiated interventions designed for this population are needed.

Keywords: intoxication, older adults, suicidal thoughts

P060

Bridging the gap: Using a tele-resuscitation network to improve pediatric outcomes in a community hospital setting

L. Mateus, M. Bilic, BSc, M. Roy, MD, R. Setrak, MBChB, MD, C. Sulowski, MD, P. Stefanowska, MSc, M. Law, PhD, Brock University, St. Catharines, ON

Background: Telemedicine has been defined as the use of technology to provide healthcare when the provider and patient are geographically separated. Use of telemedicine to meet the needs of specific populations has become increasingly common across Canada. The current study employs the Ontario Telemedicine Network (OTN) to connect the emergency departments of a community hospital system and a pediatric tertiary care hospital. OTN functions through a two-way video conferencing system, allowing physicians at the tertiary site to see and hear the patient being treated in the community hospitals. **Aim Statement:** The aim of this project is to ensure essential care is provided to CTAS 1 and 2 pediatric patients who present to Niagara Health emergency departments, to increase the number of appropriate patient transfers. **Measures & Design:** Data for this project include a) description of common diagnoses, b) time of call, c)

occurrence of transfers, and d) professional perceptions of the technology. A descriptive design was used together with the implementation of quality improvement cycles as the intervention occurred. Quality improvement methodologies including plan-do-study-act (PDSA) cycles ensured continuous improvement to the process of OTN use and therefore patient safety throughout the study. **Evaluation/Results:** Since the intervention was employed on December 17, 2018 there have been a total of 19 cases for which 4 transfers were requested. Changes to the process were made including the addition of weekly technology tests and feedback to health professionals involved to garner further support for the use. Results have indicated that seizure was the most common diagnosis, accounting for 37% of cases. The majority of calls were placed after 19:00 hours with no calls being placed between 24:00 and 10:00. **Discussion/Impact:** Healthcare providers had positive perceptions of the technology agreeing that decision making between on-site and remote teams was timely and collaborative, as well as that patient care and outcomes were improved with its use. The results of this study will be used to determine the benefits of employing telemedicine in the emergency departments of other hospital systems.

Keywords: pediatrics, quality improvement and patient safety, tele-resuscitation

P061

Barriers to distributing discharge materials in the emergency department

A. Maneshi, BSc, MD CM, MSc, H. Gangatharan, BSc, M. Cormier, S. Gosselin, MD, McGill Faculty of Medicine Emergency Medicine Residency Program, Montreal, QC

Introduction: An efficient discharging process provides an opportunity for the patient to receive information about their diagnosis, prognosis, treatments, follow-up plan and reasons to return. Even when given complete discharge instructions, studies demonstrate that patients have poor retention of the information due to misunderstandings, language barriers, or poor health literacy. This study sought to identify barriers encountered by healthcare workers in providing discharge handouts to emergency department patients. **Methods:** A bilingual online survey of fifteen questions was shared with Quebec ED staff physicians and residents at the annual conference, and by email correspondence through the Quebec Emergency Medicine Association (AMUQ - L'Association des médecins d'urgence du Québec). **Results:** There was a total of 126 responses (96 physicians and 30 residents), with a response rate of 22.7% (126/556) and a completion rate of 84.1%. 85.8% (n = 120) responded that they were aware of discharge instructions available in their ED. Most common discharge handouts were concussion/traumatic brain injury and laceration repair. 58.3% of respondents (n = 120) reported having handed out discharge instructions in the last week, 22.5% in the last month, 10.8% within the last 6 months and 5.8% had not given out discharge instructions in the last 6 months. Respondents indicated that the most common barriers to giving out discharge instructions were their difficulty to access and the time required. 58% of respondents (n = 65) reported handing out discharge handouts less than 50% of the time for conditions that had a discharge handout available at their hospital. Participants reported they would be more likely to give out discharge instructions if they were easier to print and if there was an automatic prompt from the EMR associated with the diagnosis. When asked to rank based on importance (1 = not important to 10 = very important),

the majority of respondents thought discharge instructions were very important for patient comprehension, return to ED instructions and managing expectations of the illness (Median 8, Likert scale 1-10, DI 0.29, n = 119). **Conclusion:** Despite physicians and residents working in the ED believing discharge instructions are important for patient care, handouts are seldom given to patients. The lack of easy availability such as documents automatically available with the prompt of an electronic medical record would likely increase their distribution.

Keywords: communication, discharge planning, patient safety

P062

Characterizing pediatric emergency department discharge communication using PEDICSv2

K. MacCuspie, BScN, S. Breneol, BScN, J. Curran, PhD, Cape Breton University, Sydney, NS

Introduction: Discharge communication in the pediatric emergency department (ED) is an important aspect of successful transition home for patients and families. The content, process, and pattern of discharge communication in a pediatric ED encounter has yet to be comprehensively explored. The objective of this study was to identify and characterize elements and patterns of discharge communication occurring during pediatric ED visits between health care providers (HCPs) and families. **Methods:** We analyzed real time video observations (N = 53) of children (0-18) presenting to two Canadian pediatric EDs with fever or minor head injury. We used a revised version of an existing coding scheme, PEDICSv2, to code all encounters. PEDICSv2 includes 32 elements capturing discharge communication. Inter-rater reliability was established with a second coder. Descriptive statistics reflecting the rates of delivery of each communication content element was reported to assess repetition at four stages of the visit (introduction/planning, actions/interventions, diagnosis/home management plan and summary/conclusion). Communication content was analyzed to depict behaviors of individual HCPs and the total communication delivered to the patient and caregiver by the healthcare team. **Results:** Results show 55.6% of families were asked to repeat their main concern by multiple HCPs during their ED visit. However, only 14.8% of families had comprehension of delivered discharge information assessed by more than one HCP. When involved in care, physicians were the most likely HCP to perform a comprehension assessment. Most of the communication delivered by nursing staff were elements involved in the introduction/planning and action/intervention stages of the visit. **Conclusion:** Findings indicate that most repetition occurs while eliciting a main concern during the introduction and planning stage of a pediatric ED encounter. In contrast, communication elements focusing on understanding the home management plan are less likely to be repeated by multiple HCPs. Future work focusing on structuring team workflow to minimize repetition during the introduction and planning stage may allow for clearer discharge teaching and more frequent comprehension assessment.

Keywords: discharge communication, emergency medicine, pediatric

P063

CCFP(EM) mentorship improvement study: highlighting the successes and challenges at one academic centre

L. Luo, BHSc, MD, M. Bhimani, BSc, MD, MSc, London Health Sciences Centre, London, ON

Introduction: The Canadian College of Family Medicine Emergency Medicine Program (CCFP-EM) program is a 1-year enhanced skills program available to family medicine graduates interested in emergency medicine. Strong mentorship relationships were thought to assist residents with navigating the challenges of this program. Over the past 4 years, the CCFP-EM program at one academic centre initiated a novel mentorship program that matches residents with staff physicians in three areas of mentorship: clinical, research, and personal. This study aimed to determine the program success and areas for improvement. **Methods:** We conducted a cross-sectional study through an online survey distributed to all CCFP-EM residents and staff mentors from July 2015 to June 2019. Surveys included questions on the degree of satisfaction with the mentorship program, perceptions on the mentor/mentee experience, and areas for improvement. We asked staff and residents to rate their level of satisfaction with each mentorship component. Descriptive statistics were used to analyze satisfaction levels. Open-ended responses were analyzed for common themes. **Results:** 51.3% (19/37) of residents and 63.6% (35/55) of staff participated. For clinical mentorship, 68.5% of residents and 96.0% of staff rated the program as satisfactory/outstanding. For research mentorship, 73.7% of residents and 76.5% of staff rated the program as satisfactory/outstanding. The personal mentorship program was rated satisfactory/outstanding by 72.2% of residents and 95.3% of staff. Analysis for common themes revealed that continuity of support, development of autonomy, and opportunity for direct teaching were the main areas valued by residents. However, scheduling, teaching time, and mentor-mentee compatibility were the main challenges for residents. For mentors, scheduling was a main barrier to clinical mentorship, time constraint and resident commitment were the barriers to research mentorship, and resident engagement was the main barrier to personal mentorship. When asked which component(s) of mentorship should be continued for future residents, "personal mentorship only" was the most popular choice for staff (37.1%), while "mentorship in all three areas" was the most popular choice for residents (47.4%). **Conclusion:** Mentorship is an important aspect of the CCFP-EM program valued by staff and residents alike. Utilizing resident and staff feedback will allow for continuous improvement to the mentorship program. **Keywords:** feedback, mentorship, resident education

P064

Hot days make for long stays: the impact of extreme heat events on emergency department lengths of stay and volumes in two Canadian community hospitals

F. Kegel, BHSc, O. Luo, BHSc, S. Richer, MDCM, McGill University, Montreal, QC

Introduction: The average temperature in Canada has risen 1.7°C between 1948-2016, increasing the frequency, severity and duration of extreme heat events. These events can exacerbate underlying health conditions, bringing patients to emergency departments (EDs). There is limited data associating sustained heat events to Canadian ED volumes and performance. This retrospective analysis assessed the impact of humidex and temperature on ED volume and length of stay (LOS). **Methods:** LOS is an indicator of ED overcrowding and system performance. The authors compared median and maximum LOS (hours) and patient volumes in both ambulatory and stretcher ED sections of two community hospitals (NDH, VH) in Montreal, QC to humidex and temperature during the summers of 2016-2018. Data were analyzed with one-way ANOVA and post hoc

means analysis with Fisher LSD tests of a priori determined thresholds of mean three-day maximum humidex and temperature preceding ED presentation. **Results:** The mean maximum humidex and temperature values for the 2016-2018 summers in Montreal, QC were 30.4 and 26.1°C, respectively (n = 276 days). Elevated mean three-day maximum humidex was associated with increased ED volumes (F[3,88] = 4.2, p = 0.008) and median LOS (F[3,88] = 7.7, p = 0.0001) in the NDH. Mean three-day maximum humidex was associated with ED volumes (F[3,272] = 2.9, p = 0.03) but not with median and maximum LOS (p > 0.05) in the VH. Parallel comparisons with mean three-day maximum temperature similarly showed an association with increased ED volumes (F[3,88] = 5.0, p = 0.003) and increased duration of median LOS (F[3,88] = 3.5, p = 0.02) in the NDH. Mean three-day maximum temperature was associated with increased ED volumes (F[3,272] = 3.3, p = 0.02) but not with median and maximum LOS (p > 0.05) in the VH. **Conclusion:** Warming climates are associated with an increased number of ED presentations and longer median ED LOS. As heat events disproportionately impacted NDH, future investigations need to determine why these two hospitals were affected differently. This study provides local evidence that climate change can disrupt emergency services by increasing the demand for and delaying timely care. This is the first study that the authors are aware of that demonstrates these findings. Hospitals need to be climate ready. Heat waves often happen during times when summer bed closures and vacations already impact system capacity. EDs should dynamically adapt to meet community needs during periods of extreme heat.

Keywords: climate change, emergency department system capacity, extreme heat event

P065

Out-of-hospital cardiac arrest patients eligible for extracorporeal cardiopulmonary resuscitation in Regina emergency departments

B. Lee, BSc, E. Sy, MD, MPH, A. Clay, BSc, MSc, University of Saskatchewan, Regina, SK

Introduction: Extracorporeal cardiopulmonary resuscitation (ECPR) is a rapidly evolving technology for clinical use in patients with refractory cardiogenic arrest. Out-of-hospital cardiac arrest (OHCA) is a common cause of unexpected death and has a low survival rate. There is increasing evidence that suggests better outcomes for (OHCA) patients, including improved neurological outcomes and survival rates, who are started on extracorporeal corporeal membrane oxygenation (ECMO) versus traditional resuscitation methods. **Methods:** We conducted a retrospective chart review of 200 out-of-hospital cardiac arrest patients presenting to Regina emergency departments from January 1, 2017 to March 31, 2019. Eligibility for ECPR was assessed using different clinical criteria from different ECPR programs (University of British Columbia, University of Michigan, and a hypothetical "Regina" criteria created for this study). Outcomes of the eligible patients were compared using descriptive statistics with SPSS version 22. **Results:** Between four different criteria, 15%, 9.5%, 7.5%, and 3.5% of patients were respectively eligible to receive ECPR. Of patients who met eligibility for all four criteria, 80% were male, the average age was 61 years old, the average Cerebral Performance score was 4.46, and 83% died in hospital. There was a low survival rate of eligible patients, with rates of 16%, 17%, 20%, and 28% in each group. The survival rate for all patients was 21% and the average CPC score was 4.35. **Conclusion:**

The significant percentage of patients were eligible for ECPR upon presentation to Regina Emergency Departments. Patients who were eligible had low survival rates and poor neurological outcomes, suggesting that ECPR could prove to be a valuable clinical tool that could improve patient outcomes in Saskatchewan. There were considerable differences in patient eligibility percentages based on different criterion. Differences in inclusion/exclusion criteria, modifying the expected annual number of ECPR eligible OHCA patients, could provide valuable information on required resources and planning for implementation of an ECPR program in a smaller centre, such as Regina.

Keywords: extracorporeal cardiopulmonary resuscitation, extracorporeal membrane oxygenation, out of hospital cardiac arrest

P066

A quality improvement project to improve access to automated external defibrillators in the Niagara region community

R. Chadwick, MD, K. Elliott, MD, R. Haworth, MD, H. Kearney, MSc, A. Laviolette, BSc, McMaster University, St. Catharines, ON

Background: Over 35,000 Canadians lose their lives to cardiac arrest each year. CPR and automated external defibrillator (AED) use are modifiable factors. Survival rates drop by 7-10% each minute that defibrillation is delayed, and survival rates are less than 5% after 12 minutes of ventricular fibrillation which stresses the need for bystander AED use in out-of-hospital arrests. Niagara Region lacks a publicly accessible registry of AEDs. AED access is a major focus in King County, Washington which has higher survival rates and has all AEDs registered with Emergency Medical Services. **Aim Statement:** This project aims to log 100 or more AEDs within a year into a publicly accessible registry and to connect the registry information to medical trainees in the Niagara region and all employees of the Niagara Health System involved in patient care. **Measures & Design:** PulsePoint is an application used to register AEDs within the Niagara region. PulsePoint allows users to geotag AEDs while tracking data entries. Over 16 weeks, 4 PDSA cycles tested the effectiveness of logging methods for AEDs including opportunistic logging, daily emailed reminders, and contacting organizations with high likelihood of having an AED. Information about the project and registry was shared with residents and medical students in Niagara. A second phase of cycles involves relaying information to Niagara Health system employees and the medical community. A final cycle will target a broader group of local organizations with intermediate probability of having AEDs. Primary outcome measures include the numbers of regional AEDs logged and members reached by knowledge sharing cycles. **Evaluation/Results:** PulsePoint was found to be an effective, free, publicly accessible resource to log AEDs within the Niagara region. The initial round of 4 PDSA cycles added a total of 56 new AEDs within the region, which were logged into PulsePoint app and the Excel spreadsheet. Through the fourth PDSA cycle, 136 businesses were contacted and made aware of the project and the AED application. In addition, 138 health-related colleagues and medical students were contacted to raise awareness. PDSA cycles five through eight are currently ongoing or in the planning stages. **Discussion/Impact:** Raising awareness among emergency services and sharing information about the registry to local CPR training providers will be paramount. Creating awareness of PulsePoint and installing AEDs in locations that currently lack such devices could ultimately improve cardiac arrest survival rates within Niagara Region.

Keywords: quality improvement and patient safety

P067

Ondansetron and rehydration in pediatric gastroenteritis

S. Léa, MD, E. Laurier, MD, M. Vasil, MD, C. Giasson, MD, S. Royer, MD, Université Sherbrooke, Chicoutimi, QC

Introduction: Gastroenteritis (GE) is one of the most common causes of emergency room visits, especially in pediatrics. The Canadian Paediatric Society and Choosing Wisely have issued high-grade recommendations to physicians working in the Emergency Department. It suggests, trying oral ondansetron followed by oral rehydration before installing venous rehydration in children with GE with adequate hydration or mild to moderate dehydration. This quality of medical care evaluation aims to determine if these recommendations were being applied for children aged 6 months to 12 years, with adequate hydration status or mild to moderate dehydration, who presented to the Chicoutimi emergency room between November 2016 and November 2018. **Methods:** Practice conformity was assessed according to two explicit criteria: prescription of oral ondansetron and appropriate mean of rehydration. A data collection tool was created and files were reviewed by investigators after standardization. Several secondary outcomes were assessed, including, among others, duration of symptoms, the number of vomiting and diarrhea. The hydration status was measured according to the capillary refill, feeling of skin to the touch, condition of buccal mucosa, tears, heart rate and mental status. These variables were analyzed to understand their impact on practice conformity. We excluded cases in which there was infections needing antibiotics, hypoglycemia, hemodynamic instability, no vomiting in the last 24 hours, convulsions and history of diabetes. **Results:** A total of 270 patient files were analyzed, 181 of which were included. Oral ondansetron was tried in 49 % of children. Rehydration was adequate in 55% of cases. The hydration level was written in 18% of files and the hydration status noted by the emergency room physician overestimated the dehydration score in 16% of cases. When hydration status was well assessed, adequate rehydration was observed in 63% of cases, while ondansetron was attempted in only 44% of cases. **Conclusion:** Use of oral ondansetron and adequate mean of rehydration to treat children aged 6 months to 12 years with GE in Chicoutimi emergency department is suboptimal. The difficulty of adequate dehydration assessment may be one of the causes. Concerted dehydration assessment grid and a group prescription for the administration of ondansetron during the nurse triage may constitute potential solutions.

Keywords: gastro-enteritis, ondansetron, pediatrics

P068

Interrelationship between spatial abilities, anatomy knowledge and technical skills performance: a systematic review

J. Langlois, MD, MSc, C. Bellemare, MSc, J. Toulouse, MSc, G. Wells, PhD, CIUSSS de l'Estrie - Centre hospitalier universitaire de Sherbrooke, Sherbrooke, QC

Introduction: Spatial ability has been defined as a skill in representing, transforming, generating and recalling symbolic, non-linguistic information. Two distinct human spatial abilities have been identified: visualization and orientation. A sex difference in spatial abilities favouring male has been documented. A pattern of negative effects with increasing age on spatial abilities has also been demonstrated. Spatial abilities have been correlated to anatomy knowledge assessment using practical examination, three-dimensional synthesis from two-dimensional views, drawing of views, and cross-sections in a systematic review. Spatial abilities have also been correlated to technical

skills performance in beginners and intermediate learners in a systematic review. The objective of this study was to conduct a systematic review of the interrelationship between spatial abilities, anatomy knowledge and technical skills. **Methods:** Search criteria included 'spatial abilities', 'anatomy knowledge' and 'technical skills'. Keywords related to these criteria were identified. A literature search was done up to November 9, 2018 in Scopus and in several medical and educational databases on Ovid and EBSCOhost platforms. A bank of citations was obtained and was reviewed independently by two investigators. Citations related to abstracts, literature reviews, theses and books were excluded. Articles related to retained citations were obtained and a final list of articles was established. Methods relating spatial abilities testing, anatomy knowledge assessment and technical skills performance were identified. **Results:** A series of 385 titles and abstracts was obtained. After duplicates were removed and selection criteria applied, 11 articles were retained, fully reviewed, and subsequently excluded with reasons. **Conclusion:** No eligible articles were found in a systematic review of the interrelationship between spatial abilities, anatomy knowledge and technical skills. The outcome of future studies could help to further understand the cognitive process involved in learning a technical skill in Emergency Medicine. **Keywords:** anatomy knowledge, spatial abilities, technical skills

P069

Implementing supervised consumption service access for emergency department patients

N. Lam, MD, R. Rosenblum, MD, T. Kaban, K. Dmitrienko, MA, MHSc, D. Oczkowski, K. Dong, MD, MSc, University of Alberta, Edmonton, AB

Background: Unintentional opioid overdoses in and around acute care hospitals, including in the ED, are of increasing concern. In April 2018, the Addiction Recovery and Community Health (ARCH) Team at the Royal Alexandra Hospital opened the first acute care Supervised Consumption Service (SCS) in North America available to inpatients. In the SCS, patients can consume substances by injection, oral or intranasal routes under nursing supervision; immediate assistance is provided if an overdose occurs. After a quality assurance review, work began to expand SCS access to ED patients as well.

Aim Statement: By expanding SCS access to ED patients, we aim to reduce unintentional and unwitnessed opioid overdoses in registered ED patients to 0 per month by the end of 2020. **Measures & Design:** Between June 13-July 15, 2019, ARCH ED Registered Nurses were asked to identify ED patients with a history of active substance use who may potentially require SCS access. Nurses identified 69 patients over 43 8-hour shifts (range 0-4 patients per shift); thus, we anticipated an average of 5 ED patients per 24-hour period to potentially require SCS access. Based on this evidence of need, ARCH leadership worked with a) hospital legal team and Health Canada to expand SCS access to ED patients; b) ED leadership to develop a procedure and flowchart for ED SCS access. ED patients were able to access the SCS effective October 1, 2019. **Evaluation/Results:** From October 1 to December 1, 2019, the SCS had 35 visits by 23 unique ED patients. The median time spent in the SCS was 42.5 minutes (range 14.0-140.0 minutes). Methamphetamine was the most commonly used substance (19, 45.2%), followed by fentanyl (10, 23.8%); substances were all injected (91.4% into a vein and 8.6% into an existing IV). In this time period, there were zero unintentional,

unwitnessed opioid poisonings in registered ED patients. Data collection is ongoing and will expand to include chief complaint, ED length of stay and discharge status. **Discussion/Impact:** Being able to reduce unintentional overdoses and unwitnessed injection drug use in the ED has the potential to improve both patient and staff safety. Next steps include a case series designed to examine the impact of SCS access on emergency care, retention in treatment and uptake into addiction treatment.

Keywords: overdose, quality improvement and patient safety, supervised consumption

P070

A systematic assessment of opioid-related advertisements aimed at emergency physicians in North America

A. Kirubakaran, BHSc, A. Dragoman, BHSc, J. Balakumaran, BHSc, T. Got, BHSc, N. Persaud, BA, BSc, MD, MSc, B. O'Neill, MD, DPhil, University of Toronto, Toronto, ON

Introduction: The opioid epidemic has been influenced by immense marketing campaigns produced by pharmaceutical companies. These campaigns include advertisements aimed at emergency medicine (EM) physicians, which may have influenced overprescription. This study is a part of a larger effort to systematically assess opioid ads published in major medical journals in North America. To our knowledge, this is the first study to systematically assess the volume, claims, and levels of evidence for opioid ads aimed at EM physicians.

Methods: Up to two issues per year from 1996 to 2016 of ten major North American medical journals were hand-searched for opioid advertisements. Specifically, we assessed random samples of issues from five major North American emergency medicine journals, including *Annals of Emergency Medicine*, *Emergency Medicine*, *Canadian Journal of Emergency Medicine*, *Emergency Medicine Journal*, and *American Journal of Emergency Medicine*. Five generalist medical journals were assessed including *Journal of the American Medical Association*, *New England Journal of Medicine*, *Canadian Medical Association Journal*, *American Family Physician*, and *Canadian Family Physician*. The volume of advertisements, nature of the claims, and cited evidence were collected by independent reviewers. The referenced evidence was assessed using the Oxford Centre for Evidence-Based Medicine Levels of Evidence rubric. **Results:** Of the 269 issues across the ten journals, opioid ads compromised 95 of the 3392 pharmaceutical advertisements with 79 opioid ads available for analysis. When analysis was completed with two reviewers, interrater agreement was rated as 99.87 (Cohen's kappa of 0.976). 37/79 ads did not mention the addictive potential of opioids, with 60/79 not mentioning the possibility of death. The tamper potential of medications was mentioned in 27/79 ads. Positive claims included efficacy (47/79), fast-acting ability (16/79), patient preference (5/79), convenience (26/79) and reduced side effects (22/79). 26/79 cited references directly in their text. Citations were provided for a total of 19 available original studies, of which a majority (16/19) were Level 2 evidence. Upon examination of conflicts of interest, 100% (19/19) of the referenced studies were funded by a pharmaceutical company. **Conclusion:** A variety of claims were published in medical journals through opioid advertisements, which cite industry studies. Many ads did not mention key negative information, which may have influenced EM physician prescribing.

Keywords: advertisement, opioid

P071**Artificial intelligence in emergency medicine: A scoping review**

A. Kirubakaran, BHSc, A. Taher, BSc, MD, MPH, S. Khan, BHSc, S. Masood, MD, MPH, HBSc, University of Toronto, Toronto, ON

Introduction: The study of artificial intelligence (AI) in medicine has become increasingly popular over the last decade. The emergency department (ED) is uniquely situated to benefit from AI due to its power of diagnostic prediction, and its ability to continuously improve with time. However, there is a lack of understanding of the breadth and scope of AI applications in emergency medicine, and evidence supporting its use. **Methods:** Our scoping review was completed according to PRISMA-ScR guidelines and was published a priori on Open Science Forum. We systematically searched databases (Medline-OVID, EMBASE, CINAHL, and IEEE) for AI interventions relevant to the ED. Study selection and data extraction was performed independently by two investigators. We categorized studies based on type of AI model used, location of intervention, clinical focus, intervention sub-type, and type of comparator. **Results:** Of the 1483 original database citations, a total of 181 studies were included in the scoping review. Inter-rater reliability for study screening for titles and abstracts was 89.1%, and for full-text review was 77.8%. Overall, we found that 44 (24.3%) studies utilized supervised learning, 63 (34.8%) studies evaluated unsupervised learning, and 13 (7.2%) studies utilized natural language processing. 17 (9.4%) studies were conducted in the pre-hospital environment, with the remainder occurring either in the ED or the trauma bay. The majority of interventions centered around prediction ($n = 73$, 40.3%). 48 studies (25.5%) analyzed AI interventions for diagnosis. 23 (12.7%) interventions focused on diagnostic imaging. 89 (49.2%) studies did not have a comparator to their AI intervention. 63 (34.8%) studies used statistical models as a comparator, 19 (10.5%) of which were clinical decision making tools. 15 (8.3%) studies used humans as comparators, with 12 of the 15 (80%) studies showing superiority in favour of the AI intervention when compared to a human. **Conclusion:** AI-related research is rapidly increasing in emergency medicine. AI interventions are heterogeneous in both purpose and design, but primarily focus on predictive modeling. Most studies do not involve a human comparator and lack information on patient-oriented outcomes. While some studies show promising results for AI-based interventions, there remains uncertainty regarding their superiority over standard practice, and further research is needed prior to clinical implementation.

Keywords: artificial intelligence, machine learning, technology

P072**Preventing emergency department visits among patients with cancer: a scoping review**

S. Kirkland, MSc, M. Garrido Clua, MSc, D. Junqueira, MSc, PhD, PharmD, S. Campbell, MLS, B. Rowe, MD, MSc, University of Alberta, Edmonton, AB

Introduction: Patients frequently present to the Emergency Department (ED) with predictable complications associated with radiation and chemotherapy for active cancer. Care alternatives have been proposed to reduce ED visits; however, no systematic review related to ED presentations has been completed. The objective of this scoping review was to examine the effectiveness of interventions designed to reduce ED visits among patients receiving active cancer treatment. **Methods:** A comprehensive literature search involving nine electronic databases and the grey literature was completed. Inclusion criteria considered studies assessing the impact of any intervention to reduce ED

utilization among patients with active cancer. Two reviewers independently assessed relevance and inclusion; disagreements were resolved through third party adjudication. Dichotomous and continuous outcomes were summarized as risk ratio (RR) or mean difference (MD) with 95% confidence intervals (CIs) using a random-effects model, wherever appropriate. **Results:** From 3303 citations, a total of 25 studies were included. Interventions identified in these studies comprised: routine and symptom-based patient follow-up, oncology outpatient clinics, early symptom detection, comprehensive inpatient management, hospital at home, and patient navigators. Six out of eight studies assessing oncology outpatient clinics reported a decrease in the proportion of patients presenting to the ED. A meta-analysis of three of these studies did not demonstrate reduction in ED utilization (RR 0.78; 95% CI: 0.56 to 1.08; $I^2 = 77\%$) when comparing oncology outpatient clinics to standard care; however, sensitivity analysis removing one study reporting rare events supported a decrease in ED visits (RR 0.86; 95% CI: 0.74 to 0.99; $I^2 = 47\%$). Three studies assessing patient follow-up interventions showed no difference in ED utilization (RR 0.69; 95% CI: 0.38 to 1.25; $I^2 = 86\%$). **Conclusion:** A variety of interventions designed to mitigate ED presentations by patients receiving active cancer treatment have been developed and evaluated. Limited evidence suggests that an oncology outpatient clinic may be an effective strategy to reduce ED utilization; however, additional high-quality studies are needed.

Keywords: cancer, emergency department

P073**Emergency department trauma team in situ simulations at an urban, academic centre to improve team communication and detect latent safety threats**

N. Kester-Greene, MD, L. Notario, BSc, MSc, H. Heipel, MD, MSc, L. DaLuz, MD, MSc, A. Nathens, MD, PhD, S. DeSousa, BSc, A. Rzyznski, BHSc, Sunnybrook Hospital, Toronto, ON

Innovation Concept: Effective communication for ad hoc teams is critical to successful management of multisystem trauma patients, to improve situational awareness and to mitigate risk of error. **OBJECTIVES** 1. Improve communication of ad hoc teams. 2. Identify system gaps. **INNOVATION** Team in situ simulations provide a unique opportunity to practice communication and assess systems in the real environment. Our trauma team consists of residents and staff from emergency services, general surgery, orthopedics, anaesthesia, nursing and respiratory therapy. **Methods:** A team of subject matter experts (SME's) from trauma, nursing, emergency medicine and simulation co-developed curriculum in response to a needs assessment that identified gaps in systems and team communication. The simulation occurred in the actual trauma bay. The on-call trauma team was paged and expected to manage a simulated multisystem trauma patient. Once the team arrived, they participated in a briefing, manikin-based simulation and a communication and system focused debriefing. **Curriculum, Tool, or Material:** Monthly scenarios consisted of management of a blunt trauma patient, emergency airway and massive hemorrhage protocol. Teams were assessed on communication skills and timeliness of interventions. Debriefing consisted of identification of system gaps and latent safety threats. Feedback was given by each discipline followed by SME's. Information was gathered from participant evaluations (5-point Likert scale and open ended questions) and group debrief. Feedback was themed and actions taken to co-create interventions to communication gaps and latent safety threats. As a result, cricothyroidotomy trays were standardized

throughout the hospital to mitigate confusion, time delay and unfamiliarity during difficult airway interventions. Participants felt the exercise was an effective means of practicing interprofessional communication and role clarity, and improved their attitude towards the same. **Conclusion:** In situ simulation-based education with ad hoc trauma teams can improve interprofessional communication and identify latent safety threats for the management of multisystem trauma patients.

Keywords: innovations in EM education, simulation, trauma

P074

Emergency department utilization and outcomes for patients with early pregnancy complications

R. Glicksman, BSc, D. Little, BSc, C. Thompson, MSc, S. McLeod, MSc, C. Varner, MD, MSc, University of Toronto, Toronto, ON

Introduction: Affecting roughly 1 in 5 pregnancies, early pregnancy loss is a common experience for reproductive-aged women. In Canada, most women do not establish care with an obstetrical provider until the second trimester of pregnancy. Consequently, pregnant patients experiencing symptoms of early pregnancy loss frequently access care in the emergency department (ED). The objective of this study was to describe the resource utilization and outcomes of women presenting to two Ontario EDs for early pregnancy loss or threatened early pregnancy loss. **Methods:** This was a retrospective cohort study of pregnant (≤ 20 weeks), adult (≥ 18 years) women in two EDs (one community hospital with 110,000 annual ED visits; one academic hospital with 65,000 annual ED visits) between January 2010 and December 2017. Patients were identified by diagnostic codes indicating early pregnancy loss or threatened early pregnancy loss. **Results:** A total of 16,091 patients were included, with a mean (SD) age of 32.8 (5.6) years. Patients had a total of 22,410 ED visits for early pregnancy complications, accounting for 1.6% of the EDs' combined visits during the study period. Threatened abortion ($n = 11,265$, 50.3%) was the most common ED diagnosis, followed by spontaneous abortion ($n = 5,652$, 25.2%), ectopic pregnancy ($n = 3,242$, 14.5%), missed abortion ($n = 1,541$, 6.9%), and other diagnoses ($n = 710$, 3.2%). 8,000 (44.8%) patients had a radiologist-interpreted ultrasound performed during the initial ED visit. Median (IQR) ED length of stay was 3.4 (2.3 to 5.1) hours. There were 4,561 (25.6%) return ED visits within 30 days, of which 2,317 (50.8%) occurred less than 24 hours of index visit, and 481 (10.6%) were for scheduled, next day ultrasound. The total number of hospital admissions was 1,793 (8.0%), and the majority were for ectopic pregnancy ($n = 1,052$, 58.7%). Of admitted patients, 1,320 (73.6%) underwent surgical interventions related to early pregnancy. There were 474 (10.4%) patients admitted to hospital during return ED visits. **Conclusion:** Pregnant patients experiencing symptoms of early pregnancy loss in the ED frequently had radiologist-interpreted US and low rates of hospital admission, yet had high rates of return ED visits. This study highlights the heavy reliance on Ontario EDs to care for patients experiencing complications of early pregnancy.

Keywords: early pregnancy loss, pregnancy, ultrasound

P075

Targeted temperature management was associated with worse outcomes of non-shockable out of hospital cardiac arrest

T. Kawano, MD, PhD, B. Grunau, MD, MHSc, F. Scheuermeyer, MD, MHSc, C. Fordyce, MD, MSc, MHS, R. Stenstrom, MD, PhD, J. Christenson, MD, University of Fukui Hospital, Fukui, Japan

Introduction: We sought to assess the effect of in-hospital targeted temperature management (TTM) on outcomes of non-shockable out-of-hospital cardiac arrest (OHCA). **Methods:** This is a secondary analysis of a randomized controlled trial "A Randomized Trial of Continuous Versus Interrupted Chest Compressions in Out-of-Hospital Cardiac Arrest" (NCT01372748). We included non-traumatic comatose OHCA with non-shockable rhythm who survived to hospital admission. Outcomes of interest were survival at hospital discharge and favorable neurological outcome (modified Rankin scale 0-3). We performed multivariable logistic regression, adjusting for baseline characteristics to determine the association between TTM and outcomes, compared to no TTM, for the entire cohort as well as for the propensity matched cohort. **Results:** Of 1,985 OHCA who survived to hospital admission, 780 (39.3%) were managed with TTM. In TTM patients, 7.3 % patients survived to hospital discharge and 3.9 % had a favorable neurological outcome in contrast to 10.2 % and 6.1 %, respectively, in no TTM patients. Multivariable analyses demonstrated an association between TTM and decreased probability of both outcomes, compared to no TTM (adjusted ORs for survival: 0.67 95% CI 0.48–0.93, and for favorable neurological outcome: 0.57 95% CI 0.37–0.90). Propensity score matched analyses demonstrate the similar results. **Conclusion:** TTM might decrease the probability of neurologically intact survival for non-shockable OHCA.

Keywords: non-shockable rhythm, out of hospital cardiac arrest, targeted temperature management

P076

Assessment of a newly integrated and standardized approach for pediatric concussions aimed to improve the concussion recovery process

J. St-Onge, MPH, E. Karreman, PhD, M. McCarron, PhD, L. Harasen, MD, C. Ames, MD, Saskatchewan Health Authority, Regina, SK

Introduction: Children with concussions presenting to emergency departments often receive very different recommendations for how to recover. In addition, there are no instructions for teachers to how children should return to learn and play after a concussion. Therefore, some children take too long to return to learn and play at school while others return too soon, thereby risking long-term problems because their brain injury is not fully healed. The purpose of this project is to determine the impact of a new integrated, standardized approach aimed to help a concussed child recover faster and whether the recovery experience for all involved has improved. **Methods:** Structured interviews were conducted with 11 parents of children treated for concussion at the Emergency Department of Pasqua Hospital in Regina, SK, four of whom received care after a change in practice whereby parents were provided with a return-to-school protocol form prior to discharge. Data were analyzed using an inductive qualitative content analysis approach using NVivo 12 software. **Results:** Three main categories were noted in the data: Parental response to the child's concussion, satisfaction with health services, and the communication amongst parents, physicians, and teachers. It was with regard to the last theme in particular that the impact of the return to school protocol was noted, helping to at least indirectly address the issue of the parent as the "middleman" in the communication triad. Most parents whose children received care prior to the introduction of the protocol suggested that providing written information at discharge to guide parents through the concussion recovery process would be helpful.

Conclusion: Our initial results show a positive impact in regards to the process of children returning to learn and play after a concussion. Specifically, the increased communication between physician, teacher, and parent seems to benefit and improve the child's recovery process.
Keywords: concussion, interview, pediatric

P077

Predicting positive practice improvement: a model for understanding how data and self-perception lead to practice change
R. Kamhawy, BHSc, T. Chan, BSc, MD, MHPE, BEd, S. Mondoux, MD, MSc, BEng, McMaster University, Hamilton, ON

Introduction: Despite studies highlighting the inaccuracies of self-assessment, practicing physicians continue to rely on self-perception to maintain clinical competence. Many approaches have been proposed to augment physician performance. In the realm of Quality Improvement (QI), Audit and Feedback (A&F) has a modest effect. Educators have proposed coaching interventions and academic constructs have invoked training for early-career clinicians. Very few of these are driven by the perceptions and the needs of the end-user – the physicians. We currently lack a model to understand physicians' perceptions of their own practice data and an understanding of the factors which would enable practice change. In this study, we sought to develop a model for data feedback which may best help physicians change practice. **Methods:** In a previous study, we conducted a needs analysis of 105 physicians in the Hamilton-Niagara area in order to understand which data metrics were most valuable to physicians. Using the survey results, we designed an interview guide that was used as a qualitative study of physicians' perspectives on A&F. By intentional sampling, we recruited 15 physicians amongst gender groups, types of practice (academic vs community) and durations of practice. We conducted this interview with all 15 participants which were then transcribed. We then performed thematic analysis and extraction of all interviews using a realist framework. These were then translated into broader themes and, by using a grounded theory framework, created a model to understand how physicians relate practice data to their own sense of self. Interviews were anonymized and no identifying data was shared as part of the interview. All interviewees consented to participation at the outset and could withdraw at any time. **Results:** Via stakeholder interviews from 15 key informants, we developed a model for the understanding of how a physician's sense of self and the nature of the data (quantity and quality) may be combined to understand the likelihood of practice change and the adoption of the change strategy. Using this model, it is possible to understand the conditions under which A&F would provide the greatest opportunity for practice change. **Conclusion:** Physician identity intersects with A&F data to shed insights on practice improvement. Understanding the core identity constructs of different physician groups may allow for increased uptake in A&F processes.
Keywords: audit and feedback, performance measurement, quality improvement

P078

Impact of vaping on lung health and visits to the emergency department: a cross-sectional study
D. Junqueira, MSc, PhD, PharmD, K. Zhou, BMSc, S. Couperthwaite, BSc, J. Meyer, BSc, B. Rowe, MD, MSc, University of Alberta, Edmonton, AB

Introduction: Despite being legal in Canada, the vaporized liquid of vaping systems contains several chemicals presenting unknown risks

to lung health and little is known about their use in patients visiting the emergency department (ED). This study explores associations between exposure to inhaled products and respiratory presentations in the ED. **Methods:** A cross-sectional lung health survey among patients presenting to a Canadian ED was conducted, exploring the association between inhaled toxic exposures (e.g., vaping, cannabis and cigarette smoking) and visits related to respiratory symptoms. Eligible participants were ambulatory (CTAS 2 to 5), stable, adults (≥ 17 years) visiting the ED from July to November, 2019. Results are described as frequencies and percentages (categorical variables) and medians with interquartile range (IQR, continuous variables). Univariate and multivariate logistic regression models report associations as odds ratios (OR) with 95% confidence intervals (CIs). The Health Research Ethics Board approved the study. **Results:** From 1433 eligible patients, 1024 (71%) completed the survey. The median age was 43.5 (IQR: 29, 60), and 51% were female. Overall, 177 (17%) reported ≥ 1 respiratory symptoms and 83 (8%) reported using any vaping products. In a univariate regression analysis, exposure to vaping was positively associated with ED visits related to respiratory symptoms (OR 2.11, 95% CI: 1.26 to 3.54). In the multivariate model, vaping and a previous diagnosis of ≥ 1 respiratory conditions showed positive association with respiratory-related ED visits (OR 1.86, 95% CI: 1.03 to 3.33; and OR 2.13, 95% CI: 1.50 to 3.02, respectively). There was evidence of an additive effect of the combined exposure to cigarettes and vaping and respiratory-related ED visits (OR 3.22, 95% CI: 1.61 to 6.43). Smoking cannabis and cigarettes alone were not associated with increased risk of respiratory-related visits. **Conclusion:** Using vaping products increased the occurrence of respiratory-related ED visits, particularly in people with pre-existing lung conditions. A dose-response relationship exists where the risk is highest in patients inhaling a combination of toxins. Contrary to previous assumptions, the use of vaping products has a negative impact on lung health.

Keywords: adverse effects, e-cigarettes, vaping

P079

Clinical handover from emergency medical services to the trauma team: A gap analysis
A. Javidan, BHSc, A. Nathens, MD, MPH, PhD, H. Tien, MD, MSc, L. da Luz, MD, MSc, University of Toronto, Toronto, ON

Background: Clinical handover between emergency medical services (EMS) and the hospital trauma team can be subject to errors that may negatively affect patient care. Thus far, there has been limited evaluation of the quality of EMS handover. As such, we sought to characterize handover practices from EMS to the trauma team, identify areas for improvement, and determine if there is a need for standardization of current handover practices. **Aim Statement:** Identify areas for improvement in handover from EMS to the trauma team, specifically examining handover content, structure, and discordances between different team members regarding handover expectations. **Measures & Design:** Data were prospectively collected over a nine week period by a trained observer at Canada's largest level one trauma centre. A randomized scheduled was used to capture a representative breadth of handovers. Data collected included outcome measures such as duration of handover, structure of the handover, and information shared, process measures such as questions and interruptions from the trauma team, and perceptions of the handover from nurses, trauma team leaders (TTLs) and EMS according to a bidirectional Likert scale. **Evaluation/Results:** Of 410 trauma team activations, 79 verbal

handovers were observed. Information was often missing regarding airway (present 22%), breathing (54%), medications (59%), and allergies (54%). Handover structure lacked consistency beyond the order of identification and mechanism of injury. Only 28% of handovers had a dedicated question and answer period. Of all questions asked, 35% were questioning previously given information. EMS returned to categories of information unprompted in 84% of handovers. The majority of handovers (61%) involved parallel conversations between team members while EMS was speaking, which was associated with a greater number of interrupting questions from the trauma team (3.15 vs. 1.82, $p = .001$). There was a statistically significant disparity between the self-evaluation of EMS handovers and the perceived quality determined by nurses and trauma team leaders. **Discussion/Impact:** At our trauma centre, we have identified the need for handover standardization due to poor information content, a lack of structure and active listening, significant information repetition, and discordant expectations between EMS, nurses, and TTLs. We intend to use our results to guide the development of a co-constructed framework integrating the perspectives of all team members on the trauma team.

Keywords: emergency medical services, handover, quality improvement and patient safety

P080

Trauma experiences of rural emergency physicians: a self assessment

M. Jamil, MD, T. Oyedokun, MBChB, MD, MMed, J. Stempien, BSc, MD, R. Malik, BSc, D. Goodridge, PhD, University of Saskatchewan, Saskatoon, SK

Introduction: The purpose of this study was to identify, through self-assessment, how comfortable rural emergency medicine (EM) practitioners are in treating critically ill trauma patients, the resources available to treat such patients and their comfort with performing trauma procedures. Our goal is to enhance rural trauma care by identifying obstacles rural EM physicians face in Saskatchewan. **Methods:** This was a cross sectional survey study, emailed to family physicians practicing rural EM in Saskatchewan identified through the Saskatchewan Medical Association database. Inclusion criteria included physicians who are providing EM care currently or within the past year. Rural was assumed to be communities in Saskatchewan that were outside of Saskatoon and Regina. The survey was an anonymous self-assessment regarding demographics, training, hospital resources and comfort. **Results:** 113 physicians of the 479 rural physicians agreed to participate, 78 met our inclusion criteria. Most (67%) were from communities with less than 10,000 population, 70% had less than 300 ED visits per month. Most (68%) were less than 45 years of age. In terms of training, 57% had completed undergraduate training out of Canada and 63% had completed residency training in Canada. Most had been practicing for more than 2 years (76%). Most (59%) had current ATLS credentials, however only 37% had ever completed the EDE course. Regarding available resources, most centers had plain radiography (99%), POCUS (68%), PRBC (78%) and TXA (93%). However, fresh frozen plasma (41%) and platelets (26%) were not widely available. Comfort was measured on a Likert scale. The types of trauma that respondents were least comfortable with included pediatric (39%), vascular (46%), spine (56%) and genitourinary (60%). The types skills that participants were least

comfortable with included pericardiocentesis (19%), and surgical airway (25%). The majority had not performed Pediatric endotracheal tube insertion (79%), surgical airways (99%), pericardiocentesis (99%), central venous line placement (80%) and needle thoracostomy (71%) within the past 12 months. **Conclusion:** This self-assessment helped us identify aspects of rural trauma medicine that are the most challenging for rural practitioners. Understanding the most difficult challenges in light of the critical resources available to rural trauma medicine providers will inform future professional development initiatives.

Keywords: rural, self-assessment, trauma

P081

The summer of the e-scooter: a multicenter evaluation of the emergency department impact of rentable motorized scooters in Calgary

A. Islam, BSc, K. Koger, S. VandenBerg, MD, MSc, D. Wang, E. Lang, MD, University of Calgary, Calgary, AB

Introduction: Calgary's introduction of rentable electronic scooters (e-scooters) in July of 2019 was met with wild popularity, representing the third most popular launch after Tel-Aviv and Paris. The present study aims to characterize the injury burden seen in all Calgary Emergency Departments (EDs) and Urgent Care Centres (UCCs) attributable to e-scooters since their 2019 introduction. **Methods:** We retrospectively reviewed all electronic medical records of patients presenting to Calgary EDs or UCCs with the term "scooter" in the triage note, where exclusion criteria are considered for non e-scooter injuries (e.g. non-motorized scooters). Trends in scooter injuries will be compared between April - October 2018 (control arm preceding e-scooter introduction) and April - October 2019. Injury incidence, types, patient demographics, and relative risk compared to bicycle-related injuries will be determined. Descriptive statistics will be calculated. Moreover, 33 ED visits were brought in by EMS and provide information about injury types and locations of injuries involving EMS transport. **Results:** Preliminary data reveals 540 scooter-related visits (3.10% admitted/transferred) between July 8th and September 30th 2019 (mean age of 28, 56.30% male). Conversely, the number of bicycle-related visits and motor vehicle related injuries were 1482 and 586 (9.90% and 9.70% admitted/transferred) respectively over the same time period suggesting a greater burden but likely a lower per-ride incidence of injury requiring ED or UCC care. Moreover, between July 8th to October 1st 2019, 33 e-scooter presentations involved EMS (21.21% admitted to hospital), where 12.12% involved upper extremity injury, 21.21% were lower extremity injuries, and 6.06% were head injuries (mean age of 34, 48.48% male). Conversely, estimated EMS transfers to EDs or UCCs for bicycle injuries and motor vehicle injuries were 197 and 463 respectively over the same time period. ICU admissions or fatality were not recorded. **Conclusion:** Representing the most comprehensive study of e-scooter injury patterns in Canada to date, we here demonstrate a significant injury burden attributable to e-scooters following their introduction in Calgary in 2019. Bicycle-related and motor vehicle injuries were both more prevalent in this time period, and required more EMS visits. Further characterization of injury types, injuries and comparison with injury patterns prior to e-scooter introduction is yet to be determined.

Keywords: ambulance, e-scooter, injury

P082

Ethical management of incidental findings in emergency care: A critical interpretive literature review

R. Iskander, BSc, C. Ells, PhD, McGill University, Montreal, QC

Introduction: Incidental findings (IFs) are findings discovered in the course of healthcare (e.g., blood tests, genetic tests, imaging) that are unrelated to the primary purpose for which a test was sought. Some IFs constitute new knowledge that have implications for patient autonomy and welfare. IFs found in emergency departments (EDs) are difficult to manage, with one study reporting that of 392 patients with IFs, 122 had no follow-up and 242 had no electronic record of the finding. **Methods:** A critical interpretive literature review was conducted to explore current practices regarding identification, disclosure, and management of IFs in EDs, and to identify ethical challenges that require research focus and policy reform. The search strategy included 'incidental findings' AND 'emergency' and derivatives, retrieving 12,021 studies from databases including PubMed, Scopus, and Web of Science, as well as handsearching and reference list searching. Following screening, 97 studies were included. Data was extracted, analyzed using descriptive statistics, and then critically interpreted to capture key ideas. **Results:** Of 97 included articles, 75 have relevant empirical data. Of the 75, most literature (89%) presented the frequency of IFs in EDs, with an average frequency of 34%. Most (84%) did not report on patient disclosure rates or follow-up rates. When reported, patient notification rates are as low as 2.6% with an average of 15% over 12 studies. Empirical studies included in the review do not address ethical principles or patient preferences on disclosure. The literature reveals suggestions to manage IFs in EDs, including implementation of automatic feedback or alert mechanisms, clarification of responsibilities within treating teams, protocols in radiology departments, and improvements to patient documentation. Test results by letter are noted as insufficient because patients are unable to ask questions. Authors suggest further research on optimal follow-up recommendations to alleviate patient and physician distress. Further results will be presented, critically interpreted, and discussed, with attention to ethical implications and challenges. **Conclusion:** The literature on IFs in EDs focuses too narrowly on frequency, with ad hoc suggestions for practice, research, and policy changes to improve the ethical management of IFs. Numerous factors, including crucial knowledge gaps, contribute to inadequate management of IFs arising in EDs. Research and ethics informed policy guidance is needed.

Keywords: ethics, incidental findings, literature review

P083

Demographic characteristics of people experiencing homelessness presenting to emergency departments

I. Burcul, BSc, J. Dai, BSc, Z. Ma, BHSc, S. Jamani, R. Hossain, MD, S. Strobel, MD, MA, University of Toronto, Toronto, ON

Introduction: Despite the visibility of the homeless population, there is limited data on the information of this patient population. Point-in-time counts and survey data from selected samples (such as those admitted to emergency shelter) have primarily been used. This literature suggests that this hard-to-reach population has high rates of presentation at emergency departments (EDs), and as such, EDs often become their main point of contact for health and social services. Leveraging this fact and administrative data we construct a crude census of homeless persons within Ontario. We further examine demographic characteristics of patients experiencing

homelessness, and compare this data to findings from previous literature. **Methods:** All routinely collected administrative health data from EDs located within Ontario, Canada from 2010-2017 were analyzed to examine patient characteristics. Individuals experiencing homelessness were identified by a marker that was adopted in 2009 replacing their recorded postal code with an XX designation. s. Aggregating by LHIN, date and week of year, we examine the overall number of patients experiencing homelessness and number by LHIN location and seasonality. Demographic outcomes examined include age and sex. **Results:** 640,897 visits to the ED over 7 years were made by 39,525 unique individuals experiencing homelessness. Number of ED visits has steadily increased over 10 years in all of Ontario, despite decline in shelter use for individuals. Presentations were concentrated in large urban centres like Toronto, Ottawa and Hamilton. Fewer presentations occur in the spring and summer months and rise in the winter. Male patients presented older and in greater numbers than female patients. The modal female age of presentation is in the 20-24 age category. The modal male age of presentation is in the 25-29 age category. Older male patients were more likely to have multiple presentations. **Conclusion:** The utilization of administrative health data offers a novel, cost-effective method to measure demographic characteristics of people experiencing homelessness. Identifying characteristics of homeless patients through this method allows for a more complete understanding of the characteristics of a hard-to-reach population, which will allow policy makers to develop appropriate services for this sub-group. Furthermore, through analysis of trends of demographics over time, changes in the homeless population can be tracked in real-time to allow for coordination and implementation of services in a time-sensitive manner.

Keywords: data, demographics, homelessness

P084

Hard-to-reach populations and administrative health data: a serial cross-sectional study and application of data to improve interventions for people experiencing homelessness

R. Hossain, MD, Z. Ma, BHSc, J. Dai, BSc, S. Jamani, R. Hossain, MD, S. Strobel, MD, MA, I. Burcul, BSc, University of Toronto, Toronto, ON

Introduction: Administrative data can aid in study and intervention design, incorporating hard-to-reach individuals who may otherwise be poorly represented. We aim to use administrative health data to examine emergency department visits by people experiencing homelessness and explore the application of this data for planning interventions. **Methods:** We conducted a serial cross-sectional study examining emergency department use by people experiencing homelessness and non-homeless individuals in the Niagara region of Ontario, Canada. The study period included administrative health data from April 1st, 2010 to March 31st, 2018. Outcomes included number of visits, number of unique patients; group proportions of Canadian Triage and Acuity Scale (CTAS) scores; time spent in emergency; and time to see an MD. Descriptive statistics were generated, and t-tests were performed for point estimates and a Mann-Whitney U test for distributional measures. **Results:** Our data included 1,486,699 emergency department visits. The number of unique people experiencing homelessness ranged from 91 in 2010 to 344 in 2017, trending higher over the study period compared to non-homeless patients. The rate of visits increased from 1.7 to 2.8 per person. People experiencing homelessness tend to present later in the day and with higher overall acuity as compared to the general population. Time

in emergency department and time to see an MD were greater among people experiencing homelessness. **Conclusion:** Administrative health data allows researchers to enhance interventions and models of care to improve services for vulnerable populations. Given the challenging fiscal realities of research, our study provides insights to more effectively target interventions for vulnerable populations.

Keywords: data, homelessness, interventions

P085

Remember that patient you saw last week – Characteristics of patients experiencing unanticipated death following emergency department discharge

R. Hoang, MD, HBSc, K. Sampsel, MD, MSc, A. Willmore, MD, K. Yelle-Labre, BScHK, V. Thiruganasambandamoorthy, MSc, MBBS, L. Calder, MD, MSc, University of Ottawa, Department of Emergency Medicine, Ottawa, ON

Background: The emergency department (ED) is an at-risk area for medical error. We measured the frequency and characteristics of patients with unanticipated death within 7 days of ED discharge and whether medical error contributed. **Aim Statement:** This study aimed to calculate the frequency of patients experiencing death within 7 days after ED discharge and determine whether these deaths were related to their index ED visit, were unanticipated, and whether possible medical error occurred. **Measures & Design:** We performed a single-centre health records review of 200 consecutive cases from an eligible 458,634 ED visits from 2014–2017 in two urban, academic, tertiary care EDs. We included patients evaluated by an emergency physician who were discharged and died within 7 days. Three trained and blinded reviewers determined if deaths were related to the index visit, anticipated or unanticipated, or due to potential medical error. Reviewers performed content analysis to identify themes. **Evaluation/Results:** Of the 200 cases, 129 had sufficient information for analysis, translating to 44 deaths per 100,000 ED discharges. We found 13 cases per 100,000 ED discharges were related and unanticipated deaths and 18 of these were due to potential medical errors. Over half (52.7%) of 129 patients displayed abnormal vital signs at discharge. Patients experienced pneumonia (27.1%) as their most common cause of death. Patient characteristic themes were: difficult historian, multiple complaints, multiple comorbidities, acute progression of chronic disease, recurrent falls. Provider themes were: failure to consider infectious etiology, failure to admit high-risk elderly patient, missed diagnosis. System themes included multiple ED visits or recent admission, no repeat vital signs recorded. **Discussion/Impact:** Though the frequency of related and unanticipated deaths and those due to medical error was low, these results highlight opportunities to potentially enhance ED discharge decisions. These data add to the growing body of ED diagnostic error literature and emphasize the importance of identifying potentially high risk patients as well as being cognizant of the common medical errors leading to patient harm.

Keywords: medical error, quality improvement and patient safety, unanticipated death

P086

Violence prevention strategies in emergency departments: Key informant interviews

M. Stiphout, MSc, R. Tarraf, MSc, PhD, A. Fraser, MPH, H. Hair, MBA, E. Lang, MD, B. Holroyd, MBA, MD, S. Hastings, MSc, PhD, Alberta Health Services, Calgary, AB

Introduction: Emergency Departments (EDs) are at high risk of workforce-directed violence (WDV). To address ED violence in Alberta Health Services (AHS), we conducted key informant interviews to identify successful strategies that could be adopted in AHS EDs. **Methods:** The project team identified potential participants through their ED network; additional contacts were identified through snowball sampling. We emailed 197 individuals from Alberta (123), Canada (46), and abroad (28). The interview guide was developed and reviewed in partnership with ED managers and Workplace Health and Safety. We conducted semi-structured phone interviews with 26 representatives from urban and rural EDs or similar settings from Canada, the United States, and Australia. This interview process received an ARECCI score of 2. Two researchers conducted a content analysis of the interview notes; rural and urban sites were analyzed separately. We extracted strategies, their impact, and implementation barriers and facilitators. Strategies identified were categorized into emergent themes. We aggregated similar strategies and highlighted key or unique findings. **Results:** Interview results showed that there is no single solution to address ED violence. Sites with effective violence prevention strategies used a comprehensive approach where multiple strategies were used to address the issue. For example, through a violence prevention working group, one site implemented weekly violence simulations, a peer mentorship support team, security rounding, and more. This multifaceted approach had positive results: a decrease in code whites, staff feeling more supported, and the site no longer being on union “concerned” lists. Another promising strategy included addressing the culture of violence by increasing reporting, clarifying policies (i.e., zero tolerance), and establishing flagging or alert systems for visitors with violent histories. Physician involvement and support was highly valued in responding to violence (e.g., support when refusing care, on the code white response team, flagging). **Conclusion:** Overall, one strategy is not enough to successfully address WDV in EDs. Strategies need to be comprehensive and context specific, especially when considering urban and rural sites with different resources available. We note that few strategies were formally evaluated, and recommend that future work focus on developing comprehensive metrics to evaluate the strategies and define success.

Keywords: violence in healthcare, violence prevention

P087

A comparison of how emergency physicians and plastic surgeons evaluate and triage pediatric hand fractures: a prospective trial of the Calgary Kids’ Hand Rule

R. Hartley, BSc, MD, MSc, BEd, A. Baykan, BSc, P. Ronksley, BSc, PhD, A. Harrop, BSc, MD, MSc, F. Fraulin, BSc, MD, University of Calgary, Calgary, AB

Introduction: Hand fractures in children are common and most are adequately managed with immobilization alone. There is a subset of fractures that require surgery as well as a fear of growth plate disturbance. For these reasons, triaging the so-called “complex” fractures that require specialized care by a hand surgeon is critical. In an effort to improve triaging for pediatric hand fractures, we previously derived and internally validated a prediction model for pediatric hand fracture triage using multivariable logistic regression with bootstrapping. The primary outcome was “complex fracture”, a definition we assigned to any fractures that required surgery, closed reduction or more than four appointments with a plastic surgeon. The model identified six significant predictors of complex fractures: angulation, condylar involvement, dislocation or subluxation, displacement, open fracture,

and malrotation with strong performance (C-statistic 0.88) and was named the Calgary Kids' Hand Rule (CKHR). **Methods:** A prospective cohort study was conducted at the Alberta Children's Hospital from April 1 until December 31, 2019. Eligible patients included children 17 years and younger with a radiographically confirmed hand fracture. Both emergency physicians and plastic surgeons completed independent CKHR forms for each new hand fracture. The fracture was predicted as "complex" if any one of the six predictors were present on the form. If none of the six predictors were present, the predicted outcome was "simple". The observed outcome was "complex" if the fracture required surgery, closed reduction, or four or more appointments with a plastic surgeon at three months follow-up. All other fractures were observed outcome "simple". The classification performance of the CKHR was assessed via sensitivity, specificity, and C-statistic. The kappa coefficient for inter-rater reliability between emergency physicians and plastic surgeons was calculated for each predictor. **Results:** To date, 102 pediatric hand fractures have been included in this prospective cohort study. Of the 74 observed simple fractures, 49 were predicted as "simple" and 25 were predicted as "complex". Of the 28 observed "complex" fractures, 25 were predicted as "complex" and 3 were predicted as "simple". These findings correspond to a sensitivity of 89%, specificity of 66%, and a C-statistic of 0.78. Of the 3 observed "complex" fractures that were predicted as "simple", i.e. the 3 false negatives, one was a Seymour fracture of the fourth distal phalanx for which the emergency physician did not tick any boxes on the form. Upon further investigation, we learned that the physician had commented that the fracture was open, thus alluding to their acknowledgement of the predictor "open fracture" as being present). This fracture went on to require surgery. The second false-negative fracture was a non-displaced, intra-articular fracture of the fourth metacarpal head that required multiple appointments with the plastic surgeon. The third false-negative fracture was a non-displaced Salter-Harris II fracture of the thumb proximal phalanx without malrotation that received a closed reduction by the emergency physician. The kappa coefficient for inter-rater reliability between emergency physician and plastic surgeon evaluation of predictors varied by predictor from fair to almost perfect agreement. Condylar involvement had the highest kappa coefficient (kappa = 0.85) followed by malrotation (kappa = 0.65) and dislocation (kappa = 0.64). The predictors with the lowest kappa coefficients were displacement (kappa = 0.42), open fractures (kappa = 0.50), and angulation (kappa = 0.53). **Conclusion:** The Calgary Kids' Hand Rule had a sensitivity of 89% in a prospective cohort of pediatric hand fractures referred to the Alberta Children's Hospital. The sensitivity could likely be improved with knowledge translation and specific education regarding use of the prediction tool. Emergency physicians and plastic surgeons displayed the lowest inter-rater reliability when assessing displacement, open fractures, and angulation. These predictors may represent areas of future research and physician education to delineate and decrease the discordance between emergency physicians and plastic surgeons.

Keywords: hand, pediatrics, prediction model

P088

Dextrose 50% versus dextrose 10% or dextrose titration for the treatment of out-of-hospital hypoglycemia; a systematic review and meta-analysis

M. Hurtubise, BSc, J. Greene, BSc, A. Stirling, BSc, A. Carter, MD, J. Swain, BSc, R. Brown, MSc, D. Fidgen, BSc, J. Goldstein, PhD, Dalhousie University, Halifax, NS

Introduction: Paramedics commonly administer intravenous dextrose to severely hypoglycemic patients. Typically, the treatment provided is a 25g ampule of 50% dextrose (D50). This dose of D50 is meant to ensure a return to consciousness. However, this dose may be unnecessary and lead to harm or difficulties regulating blood glucose post treatment. We hypothesize that a lower dose such as dextrose 10% (D10) or titrating the D50 to desired level of consciousness may be optimal and avoid adverse events. **Methods:** We systematically searched Medline, Embase, CINAHL and Cochrane Central on June 5th 2019. PRISMA guidelines were followed. The GRADE methods and risk of bias assessments were applied to determine the certainty of the evidence. We included primary literature investigating the use of intravenous dextrose in hypoglycemic diabetic patients presenting to paramedics or the emergency department. Outcomes of interest were related to the safe and effective reversal of symptoms and blood glucose levels (BGL). **Results:** 660 abstracts were screened, 40 full text articles, with eight studies included. Data from three randomized controlled trials and five observational studies were analyzed. A single RCT comparing D10 to D50 was identified. The primary significant finding of the study was an increased post-treatment glycemic profile by 3.2 mmol/L in the D50 group; no other outcomes had significant differences between groups. When comparing pooled data from all the included studies we find higher symptom resolution in the D10 group compared to the D50 group; at 99.8% and 94.9% respectively. However, the mean time to resolution was approximately 4 minutes longer in the D10 group (4.1 minutes (D50) and 8 minutes (D10)). There was more need for subsequent doses in the D10 group at 23.0% versus 16.5% in the D50 group. The post treatment glycemic profile was lower in the D10 group at 5.9 mmol/L versus 8.5 mmol/L in the D50 group. Both treatments had nearly complete resolution of hypoglycemia; 98.7% (D50) and 99.2% (D10). No adverse events were observed in the D10 group (0/871) compared to 12/133 adverse events in the D50 group. **Conclusion:** D10 may be as effective as D50 at resolving symptoms and correcting hypoglycemia. Although the desired effect can take several minutes longer there appear to be fewer adverse events. The post treatment glycemic profile may facilitate less challenging ongoing glucose management by the patients.

Keywords: emergency medical services, hypoglycemia, prehospital

P089

Reducing preventable patient transfers from long-term care facilities to emergency departments: a scoping review

K. Grant, D. Lee, BSc, I. Cheng, MD, MSc, PhD, G. Baker, PhD, University of Toronto, Toronto, ON

Introduction: Emergency Department (ED) crowding is an international health system issue that is worsening. Further, ED crowding and "hallway medicine" has been identified as one of the most significant healthcare challenges currently facing Canadians. One contributor is preventable transfers from long-term care facilities (LTCFs) to Emergency Departments (EDs). In Canada, there were 63,752 LTCF patient transfers to the ED in 2014, with 24% (15,202) of them due to potentially preventable conditions. Each preventable transfer exposes patients to transport and hospital-related complications, and costs the healthcare system thousands of dollars. There have been many proposed and studied interventions aimed at alleviating the issue, but few attempts to assess and evaluate different interventions across institutions in a systematic manner. **Methods:** A scoping review of the literature using three electronic databases was conducted. A scoping

review methodology was used due to the range of interventions and the heterogeneity in study design and outcome. Inclusion criteria included: studies on interventions designed to reduce transfers from LTCFs, studies that reported key outcomes such as number of ED transfers, and studies with a control or comparison group. Articles were screened by two independent reviewers (Cohen's $k = 0.68$), and study quality was assessed using the National Heart, Lung, Blood Institute quality assessment tools. **Results:** Findings were organized into five intervention types (telemedicine, outreach teams, interdisciplinary teams, integrated approaches, and other), and both a tabular and narrative synthesis was completed. Eleven studies had a good quality assessment rating, 13 studies had a fair rating, and two studies had a poor rating. Twenty out of the 26 studies reported statistically significant reductions in ED transfer rate, ranging from 10-70%. Interdisciplinary healthcare teams staffed within LTCFs were the most effective interventions. **Conclusion:** There are several promising interventions that have successfully reduced the number of preventable transfers from LTCFs to EDs, in a variety of health system settings. Further analysis of the relative resource requirements of each intervention, and practices that can enable successful implementation are needed to inform healthcare policy and administrative decision making. Widespread implementation of these interventions has the potential to considerably reduce ED crowding.

Keywords: crowding, long-term care facility, preventable transfer

P090

Validation of a palliative or end of life care case-finding measure in emergency medical services

J. Goldstein, PhD, A. Carter, MD, MPH, M. Harrison, MSc, M. Arab, MSW, B. Stewart, BN, J. Jensen, MAHSR, A. Muise, MHA, Dalhousie University, Halifax, NS

Introduction: The novel Paramedics Providing Palliative Care at Home program has been developed to address the mismatch between traditional paramedic practice and patient's goals of care. Case-finding is key to estimate potential impact for systems looking to establish such programs, continuous quality improvement once operational, and for prospective identification of patients who might benefit from referral to palliative care. Typical paramedic charting templates do not provide direct identification of these cases. Our objective was to test the validity of a previously derived Palliative Support Composite Measure (PSCM) and two modifications. **Methods:** A priori Gold Standard criteria for determining whether a response was appropriate for a paramedic palliative care approach were identified by expert consensus. Excluding chief complaints and clinical conditions that were universally identified as not appropriate for paramedic palliative support, these criteria were applied by two trained chart abstractors to 500 consecutive charts to classify calls as appropriate for paramedic palliative support, or not. The PSCM and modifications (added criteria call location type and registration in a palliative care program, text mining terms) were applied to the same cohort, and sensitivity, specificity, positive and negative predictive (PPV/NPV) values calculated. **Results:** Of the 500 cases, 21 (4.2%) were classified as appropriate for paramedic palliative support by the Gold Standard (kappa 0.734). 9 cases with initial disagreement were reviewed with 8 ultimately being deemed to fit the palliative support criteria. The PSCM performed poorly (using the "potential palliative" cut point): sensitivity 71.4% (95%CI: 47.8-88.7), specificity 71.4% (95%CI: 67.1-75.4) and PPV of 9.9% (95%CI: 7.5-12.9) and NPV of 98.3% (95%CI: 96.7-99). The modified PSCM: sensitivity 61.9% (95% CI:

38.4-81.9), specificity 99% (95%CI: 97.6-99.7), PPV 72.2% (95% CI: 50.5-86.9) and NPV 98.3% (95%CI: 97.2-99). A Modified PSCM plus pall* text term performed similarly: sensitivity 100% (83.9-100), specificity 97.3% (95% CI: 95.4-98.5), PPV 61.8% (95%CI: 48.6-73.4) and NPV 100%. **Conclusion:** A modified PSCM provides moderate sensitivity, specificity and PPV, improved by the text term Pall* if feasible. This query will be helpful to systems considering a paramedic palliative care program or when one is already operational.

Keywords: emergency medical services, palliative, paramedic

P091

Essential elements to implementing the paramedics providing palliative care at home program: an application of the Consolidated Framework for Implementation Research (CFIR)

A. Carter, MD, MPH, M. Harrison, MSc, J. Kryworuchko, PhD, T. Kekwaletswe, MSc, S. Wong, PhD, J. Goldstein, PhD, G. Warner, PhD, Dalhousie University, Halifax, NS

Introduction: Providing comfort care support at home without transport to hospital has not traditionally been part of paramedic practice. The innovative Paramedics Providing Palliative Care at Home Program includes a new clinical practice guideline, medications, a database to share goals of care, and palliative care training. This study aimed to determine essential elements for scale and spread of this model of care through the application of an implementation science model, the Consolidated Framework for Implementation Research (CFIR). **Methods:** Deliberative dialogue sessions were held with paramedic, palliative care, primary care, and administrative experts in a province that had the Program (Nova Scotia, March 2018) and one that had not (British Columbia, July 2018). Sessions were audio recorded and transcribed. The CFIR was used as the foundation for a framework analysis, which was conducted by four team members independently. Themes were derived by consensus with the broader research team. **Results:** Inter-sectoral communication between paramedics and other health care providers was key, and challenging due to privacy concerns. Relationships with health care providers are critical to promoting the new model of care to patients, managing expectations, and providing follow up/ongoing care. Training was an essential characteristic of the intervention that can be adapted to suit local needs, although cost is a factor. There were challenges due to the culture and implementation climate as a shift in the mindset of paramedics away from traditional roles is required to implement the model. Paramedic champions can play an important role in shifting the mindset of paramedics towards a new way of practice. **Conclusion:** The CFIR construct of cosmopolitanism, emphasizing the importance of breaking down silos and engaging diverse stakeholders, emerged as one of the most important. This will be helpful for successful scale and spread of the program.

Keywords: end of life, palliative, paramedic

P092

Caregiver perspectives on children's functional outcomes following fracture: a qualitative study

S. Golden-Plotnik, BA, MD, S. Ali, MDCM, N. Poonai, MD, MSc, A. Drendel, MSc, DO, M. Mackenzie, MSc, BScN, V. Michael, MD, PhD, University of Alberta, Edmonton, AB

Introduction: Fractures are a common childhood presentation to the emergency department (ED). While ED providers are aware of treating pain, we are less aware of the functional impact of these fractures.

Eighty percent of children with a fracture experience compromise in their daily function. Understanding the functional outcomes of fractures will help optimize discharge instructions for at-home care. The primary objective of our study was to describe caregivers' perspectives on the impact of their child's fracture on: (1) child functioning, (2) caregiver functioning and (3) family life. **Methods:** We performed a qualitative study interviewing caregivers of children (5 to 11 years) who received care for acute (< 24 hours old), non-operative long bone fractures at a Canadian tertiary care pediatric ED. Audio-recorded, semi-structured telephone interviews were completed 1-2 weeks post-ED visit, until thematic saturation was achieved. Transcripts were read and coded by two researchers concurrent with data collection. We applied content analysis to the interview material, explicating themes to summarize the data utilizing NVivo software. **Results:** Twenty-five interviews were completed. Most children (23/25) suffered upper extremity fractures and most participants were mothers (21/25). All caregivers reported a change in their child's function. The most commonly affected areas included: sleep, play and activities of daily living (ADL's; ie. dressing, bathing, eating). Children were impacted by pain and related negative emotional responses. All children required additional help from their caregivers to carry out ADL's. Strategies included changing household routines and missing work. Importantly, caregivers described a disrupted family dynamic. Adapting to their injured child's functional deficits and caring for pain and distress took time and attention away from the household's previously well-functioning routine. This burden was felt by all family members. Key concerns from caregivers included pain management, fracture healing/complications, and regression of their child's independence. **Conclusion:** Function is universally impaired in younger children with fractures. We suggest 5 main points to include in discharge instructions: (1) monitoring pain and providing analgesia, (2) helping children with ADL's, even if previously independent, (3) allotting extra time for morning and bedtime routines, (4) offering safe choices for play and (5) coaching children in positive thinking and problem-solving.

Keywords: children, fractures, functional outcomes

P093

Evaluating factors related to effective interpersonal communication during mandatory paramedic patches

D. Kelton, BSc, MD, S. Doran, BA, BSc, MD, BEd, M. Davis, MD, MSc, K. Van Aarsen, MSc, J. Momic, BSc, Western University, London, ON

Introduction: Delegation of controlled medical acts by physicians to paramedics is an important component of the prehospital care framework. Where directives indicate that physician input is needed before proceeding with certain interventions, online medical control (a "patch") exists to facilitate communication between a paramedic and a Base Hospital Physician (BHP) to request an order to proceed with that intervention. Many factors contribute to success or failure of effective interpersonal communication during a patch call. The aim of this study was to examine areas of potential improvement in communication between paramedics and physicians during the patch call. **Methods:** Prehospital paramedic calls that included a mandatory patch point (excluding requests for termination of resuscitation and those records which were unavailable) were identified through review of all patch records from January 1, 2014 to December 31, 2017 for Paramedic Services in our region. Written Ambulance Call Reports (ACRs) and audio recordings of paramedic patches were

obtained and reviewed. Pre-specified time intervals, clinical factors, specific patch requests and resulting orders from the BHP to the paramedics were extracted. Differences between groups were compared using t-tests. **Results:** 214 records were initially identified and screened. 91 ACRs and audio patch records were included in the analysis. 51/91 (56%) of patch order requests for interventions were granted by the BHP. Clarification of information provided by the paramedic or reframing of the paramedic's request was required less often, but not statistically significant, in calls ultimately resulting in granted requests versus those that were not granted (mean 1.4 versus 1.7, Δ -0.28; 95% CI -0.75-0.18 p =0.64). The mean time from first contact with the BHP to statement of the request was similar in patches where the request was granted and not granted (44.9 versus 46.3, Δ -1.4; 95% CI -12.9-10.2, p =0.49). **Conclusion:** The communication between BHPs and paramedics is an important and under-investigated component of prehospital emergency care. This retrospective review presents some novel targets for further research and potential education in patch communication to improve efficiency and quality of prehospital care for patients.

Keywords: mobile communication, online medical control, prehospital

P094

Use of high fidelity simulation to improve quality of care within Correction Canada's maximum security facilities: A Canada's first

F. Gilic, MD, A. Valeriano, BSc, E. Johannessen, BHSc, MSc, J. Nickason, BAA, I. Irving, BN, Queen's University, Kingston, ON

Innovation Concept: Nurses working in corrections facilities are routinely faced with acute care scenarios requiring skilled management. There are also increasing numbers of inmates with chronic health conditions and acute exacerbations. Correctional Service Canada (CSC) has partnered with the Clinical Simulation Lab at Queen's University to develop a simulation-based training program aimed at improving acute care skills of Corrections nurses and staff. This novel quality improvement program encompasses a range of presentations that commonly occur in correctional environments. **Methods:** The program consisted of two laboratory sessions focused on acute care and trauma followed by an in-situ simulation session. The sessions were organized around the 4-component instructional design that enhances complex learning. Both lab sessions began with scaffolded part-task training (IV insertion, ECG interpretation, airway, circulatory support, etc) and then progressed to six team-based high-fidelity simulations that covered cardiac arrhythmias, hypoglycemia, agitated delirium, drug overdoses, and immediate trauma management. Participants rated the effectiveness of each session. Lastly, an in-situ session was conducted at the Millhaven maximum security facility for nursing and correctional staff. It comprised of five scenarios that incorporated actors, a high-fidelity manikin, and simulated security issues. Participants completed a validated self-assessment before and after the session grading themselves on aspects of acute care. **Curriculum, Tool, or Material:** Our multi-modal simulation curriculum enhanced self-assessed knowledge of CSC learners. Of 71 attendees in the acute care skills session, 70 agreed or strongly agreed that the exercise enhanced their knowledge, satisfied their expectations, and conveyed information applicable to their practice. All 13 participants in the trauma session agreed or strongly agreed to these sentiments. We used Wilcoxon signed rank test item by item on the in-situ questionnaire. There was significant improvement in majority of skills

sampled: airway management, O2 delivery, team organization and assessment/treatment of cardiac arrest. **Conclusion:** This initiative is the first time high-fidelity simulation training has been used with Corrections nurses and the first in-situ simulation in a maximum security institution in Canada. The sessions were well-liked by participants and were assessed as very effective, validating the demand for further implementation of clinical simulation in correctional facilities. **Keywords:** acute care, innovations in EM education, simulation training

P095

Bridging knowledge gaps in anaphylaxis management through a video-based educational tool

S. Gabrielli, MSc, J. Karim, MD, B. Torabi, MD, MSc, A. Byrne, MD, MSc, S. De Schryver, MD, V. Gadoury-Lévesque, MD, R. Alizadehfard, MD, C. McCusker, MD, MSc, M. Vincent, MD, J. Morris, MD, MSc, J. Gerds, BComm, M. Ben-Shoshan, MD, MSc, McGill University Health Centre, Montreal, QC

Introduction: Cases of anaphylaxis in children are often not appropriately managed by caregivers. We aimed to develop and to test the effectiveness of an education tool to help pediatric patients and their families better understand anaphylaxis and its management and to improve current knowledge and treatment guidelines adherence. **Methods:** The GEAR (Guidelines and Educational programs based on an Anaphylaxis Registry) is an initiative that recruits children with food-induced anaphylaxis who have visited the ED at the Montreal Children's Hospital and at The Children's Clinic located in Montreal, Quebec. The patients and parents, together, were asked to complete six questions related to the triggers, recognition and management of anaphylaxis at the time of presentation to the allergy clinic. Participants were automatically shown a 5-minute animated video addressing the main knowledge gaps related to the causes and management of anaphylaxis. At the end of the video, participants were redirected to same 6 questions to respond again. To test long-term knowledge retention, the questionnaire will be presented again in one year's time. A paired t-test was used to compare the difference between the baseline score and the follow-up score based on percentage of correct answers of the questionnaire. **Results:** From June to November 2019, 95 pediatric patients with diagnosed food-induced anaphylaxis were recruited. The median patient age was 4.5 years (Interquartile Range (IQR): 1.6–7.4) and half were male (51.6%). The mean questionnaire baseline score was 0.77 (77.0%, standard deviation (sd): 0.16) and the mean questionnaire follow-up score was 0.83 (83.0%, sd: 0.17). There was a significant difference between the follow-up score and baseline score (difference: 0.06, 95% CI: 0.04, 0.09). There were no associations of baseline questionnaire scores and change in scores with age and sex. **Conclusion:** Our video teaching method was successful in educating patients and their families to better understand anaphylaxis. The next step is to acquire long-term follow up scored to determine retention of knowledge.

Keywords: anaphylaxis, education tool

P096

Non-legislative interventions to promote helmet use in adult cyclists: a scoping review

A. Javidan, BHSc, A. Kirubarajan, BHSc, D. Lee, BSc, D. Porplycia, BSc, MSc, S. Friedman, MD, MPH, University Health Network, University of Toronto, Toronto, ON

Introduction: Helmets are effective in preventing brain injury and fatality in cyclists. Methods to promote their use include legislation

and non-legislative interventions (NLIs) such as education, social interventions, and subsidies. These have been systematically reviewed and proven effective in pediatric populations. We conducted a scoping review regarding NLIs to promote helmet use amongst adult cyclists. **Methods:** We conducted a scoping review of NLIs to promote helmet use amongst cyclists age 18 or older. PRISMA guidelines were followed. Databases searched included MEDLINE, EMBASE, CINAHL, PsycINFO, and SportDiscus, in addition to grey literature. Articles were excluded if non-English, focused on age <18, on legislative interventions, or did not report on outcomes related to helmet use or ownership. Study inclusion and data extraction were conducted in duplicate. Data were extracted regarding participant demographics, setting, intervention details and effects, and were reported using descriptive statistics with a narrative synthesis. A limited quality assessment was conducted. **Results:** A total of 16 papers were included, stratified as 4 randomized-controlled trials and 12 pre-post studies. Only 4 were specific to adults. Community cyclists (5/16, 31%) and community members were most commonly targeted, with most interventions taking place in the community (8/16, 50%) or in a healthcare setting (4/16, 25%). Most interventions were multi-faceted, involving components of community awareness programs, education, information distribution, helmet giveaways and monetary incentives, use of mass media, motivational interviewing, and social marketing. The studies were heterogeneous in quality. Changes in helmet rate use varied between -6% and 26%, with half the studies (8/16, 50%) noting a statistically significant increase. Duration of follow-up of helmet use rates following the intervention varied between 4.5 weeks and 11 years (median 1.38 years, mean 3.0 years.) **Conclusion:** NLIs to encourage bicycle helmet use were frequently multi-faceted and generally associated with an increase in use amongst adults. Studies were heterogeneous in quality, varied in their targeted audiences and often not focused on adults. Further evidence is needed to better characterize the efficacy of non-legislative interventions to achieve sustained helmet use in adult cyclists.

Keywords: bicycle helmet, cycling, head injury

P097

The emergency department experience for patients and caregivers referred from an outpatient oncology clinic

M. Freymond, MSc, E. O'Connor, MD, MSc, University of Toronto, Toronto, ON

Introduction: Outpatient oncology clinics have become the mainstay of cancer treatment, but their limited services and hours of operation often lead to emergency department (ED) referrals. With Canada's aging population and cancer survival rates improving, cancer-related ED visits are becoming a significant aspect of emergency medicine. A cancer-related visit to the ED is associated with unique challenges for patients, their caregivers and clinicians. This study focuses on understanding the ED experience of patients and their caregivers sent from an outpatient oncology clinic to a separate affiliated large academic hospital. **Methods:** A descriptive, phenomenological study of interviews was conducted using the method of Giorgi. The sample included 12 participants (n = 9 patients, 3 caregivers) referred to the ED at a large academic hospital (i.e., Toronto General Hospital, TGH) following a same-day outpatient oncology appointment at an affiliated cancer centre (i.e., Princess Margaret Hospital, PMH). Interviews continued until thematic saturation. All transcripts were analyzed by 2 reviewers with bracketing to ensure accuracy. **Results:** Four themes were identified from analysis: (1) communication; (2)

expectations; (3) care and symptom management and (4) potential improvements. Overall patients and caregivers felt communication between PMH and TGH, and from providers could have been better. Many felt there was a break-down in communication as they did not expect to go through the usual ED triage process, which caused additional anxiety and frustration with the wait times. The majority felt their symptoms were managed in a timely manner and reported the staff to be friendly, caring and professional; however, often felt forgotten and anxious due to a lack of “checking-in”. Their experience could have been improved by receiving more information on the process, a more welcoming environment and separate waiting area or private room for those who are immunocompromised. **Conclusion:** Although referral from an outpatient oncology clinic to the ED of an affiliated hospital is a common process within Canada, this is the first study to explore the patient and caregiver experience. Understanding the patient and caregiver experience is valuable for identifying quality improvement initiatives. Our analysis revealed the patient and caregiver experience could be improved with better communication and expectation setting regarding the ED process before and throughout the visit.

Keywords: cancer, emergency department, patient experience

P098

Patterns of utilization and time-course of events for cancer-related emergency department visits following same-day outpatient oncology appointments

M. Freymond, MSc, E. O'Connor, MD, MSc, University of Toronto, Toronto, ON

Introduction: Nearly 50% of Canadians will develop cancer in their lifetime (1), and the vast majority of those with cancer will visit the emergency department (ED) in their last 6 months of life (2). Considering the aging population, improvement in cancer survival and current practice of managing cancer in outpatient settings, cancer-related emergencies are becoming a significant aspect of emergency medicine. The presenting symptoms and rates of hospitalization for cancer-related ED visits have largely been established. The current study characterizes the patterns of ED utilization and time-course of events for cancer-related ED visits following same-day outpatient oncology appointments resulting in admission to hospital compared to those not admitted. **Methods:** A retrospective chart-review was used to identify 231 adult patients who visited the ED at a large academic hospital (i.e., Toronto General Hospital) following a same-day outpatient oncology appointment at an affiliated cancer centre (i.e., Princess Margaret Hospital) from March to May 2019, using administrative data. **Results:** All visits occurred on weekdays (avg = 4 visits/d) and 57% of visits resulted in hospitalization. Between those admitted and not admitted to hospital, there was no difference in triage time [17:23 + 0:14 vs. 17:01 + 0:20 h, $p = 0.47$; mean(SD)]. Visits resulting in hospitalization were more urgent (median CTAS score = 2 vs. 3, $p < 0.001$) and required more consultation services (64 vs. 17 % of visits, $p < 0.001$), but did not differ for imaging (36 vs. 33 % of visits, $p = 0.63$). The length of stay in the ED was longer for those admitted [16.6(0.9) vs. 5.3(0.3) h, $p < 0.01$], they waited longer for their initial assessment [2.6(1.9) vs. 1.8(1.3) h, $p < 0.01$] and spent 10.1(9.9) h waiting for a bed on the ward. There was no difference in time from initial assessment to disposition, imaging or consult reports ($p > 0.05$) between groups. The patients

transferred from oncology clinics were triaged at 17:13(0:11) h compared to 13:56(0:03) h for all ED visits during the same time frame.

Conclusion: Most patients sent from oncology clinics to the ED are admitted, and when admitted they spend an additional 10 h waiting for a bed on the ward. These patients tend to arrive later in the day compared to other ED patients. Understanding utilization patterns and time-course of events allows for objective identification of quality improvement initiatives. 1 Canadian Cancer Society, 2015 2 Barbera et al. CMAJ, 2010

Keywords: cancer, emergency department, oncology

P099

Extending the trimodal distribution of death; trauma patients die at increased rates after discharge. Linking trauma registry data to vital statistics and hospital datasets identifies opportunities to save life

J. French, MBChB, C. Somayaji, MSc, D. Dutton, PhD, S. Benjamin, BN, P. Atkinson, BSc, MBChB, MA, Dalhousie University, Saint John, NB

Introduction: The New Brunswick Trauma Registry is a database of injury admissions from eight hospitals throughout the province. Data tracks individuals in-hospital. By linking this information with vital statistics, we are able to observe outcomes post-discharge and can model health outcomes for participants. We want to know how outcomes for trauma patients compare with the general population post discharge. **Methods:** Using data from 2014-15, we followed over 2100 trauma registry observations for one year and tracked mortality rate per 1,000 people by age-group. We also compared the outcomes of this group to all Discharge Abstract Database (DAD) entries in the province (circa. 7500 total). We tracked mortality in-hospital, at six months, and one year after discharge. We truncated age into groups aged 40-64, 65-84, and 85 or older. **Results:** In-hospital mortality among those in the trauma registry is approximately 20 per 1,000 people for those age 40-64, 50 per 1,000 people for those aged 65-84, and 150 per 1,000 people aged 85 or older. For the oldest age group this is in line with the expected population mortality rate, for the younger two groups these estimates are approximately 2-4 times higher than expected mortality. The mortality at six-month follow-up for both of the younger groups remains higher than expected. At one-year follow-up, the mortality for the 65-84 age group returns to the expected population baseline, but is higher for those age 40-64. Causes of death for those who die in hospital are injury for nearly 50% of observations. After discharge, neoplasms and heart disease are the most common causes of death. Trends from the DAD are similar, with lower mortality overall. Of note, cardiac causes of death account for nearly as many deaths in the 6 months after the injury in the 40-64 age group as the injury itself. **Conclusion:** Mortality rates remain high upon discharge for up to a year later for some age groups. Causes of death are not injury-related. Some evidence suggests that the injury could have been related to the eventual cause of death (e.g., dementia), but questions remain about the possibility for trauma-mitigating care increasing the risk of mortality from comorbidities. For example, cardiac death, which is largely preventable, is a significant cause of death in the 40-64 age group after discharge. Including an assessment of Framingham risk factors as part of the patients rehabilitation prescription may reduce mortality.

Keywords: epidemiology, mortality, trauma

P100**Une activité de simulation de table à des fins de formation interprofessionnelle pour enseigner une nouvelle procédure intra-hospitalière de code rose : une étude pilote exploratoire et rétrospective sur la perception des apprenants**

A. Frégeau, MD, A. Cournoyer, MD, N. Soucy, PhD, D. Fortier, MD, P. Desaulniers, MD, V. Castonguay, MD, MEd, R. Fleet, MD, PhD, Université de Montréal, Montréal, QC

Introduction: Les erreurs médicales sont causées par des failles de système plutôt qu'un seul individu. Dans ce contexte, de multiples designs pédagogiques de formation interprofessionnelle (FIP) ont été proposés pour développer une meilleure collaboration interprofessionnelle. L'une des initiatives pédagogiques proposées en médecine de désastre est la simulation de table (TTX). La TTX consiste à simuler une situation de code orange dans un environnement informel où les participants doivent discuter de la suite logique des actions à prendre. Le protocole d'arrêt cardiaque intra-hospitalier chez le nourrisson de moins de 30 jours (code rose) ayant été mis à jour au Centre hospitalier de l'Université de Montréal (CHUM), cela a généré un besoin de FIP au sein des équipes. Ainsi, nous avons développé une FIP innovante en utilisant la TTX pour enseigner un nouveau protocole de code rose. L'objectif primaire de la présente étude est d'évaluer la perception des apprenants à propos de cette FIP. **Methods:** La présente étude rétrospective de cohorte s'est déroulée en mars 2019 au centre de simulation du Centre hospitalier de l'Université de Montréal. Un groupe interprofessionnel (médecins, infirmières, inhalothérapeutes, préposés aux bénéficiaires, etc.) a été recruté. Un sondage de satisfaction des participants leur a été remis immédiatement après la TTX. Des statistiques descriptives (n, %) ont été réalisées. Les commentaires recueillis lors du débriefage ont permis de nuancer les résultats et d'apporter des changements à la nouvelle procédure de code rose. **Results:** Un total de 13 participants ont participé à la TTX, dont 10 ont répondu au sondage (10/13 : 77%). 3 observateurs ont participé à la TTX et ont tous répondu à certaines questions du sondage (3/3 : 100%). Suite à la TTX, 80% (n = 8) des participants ont eu l'impression de mieux comprendre leur propre rôle et 90% (n = 9) des participants ont eu l'impression de mieux comprendre le rôle des autres professionnels. Tous (100%, n = 13) ont apprécié la TTX et ont affirmé qu'il était probable ou très probable qu'ils participent à nouveau à une telle activité de FIP s'ils y étaient invités et qu'ils recommanderaient à un collègue d'y participer. **Conclusion:** Il est possible de réaliser une TTX pour une autre procédure d'urgence que le code orange, c'est-à-dire pour le code rose et cela est apprécié des participants. Ces derniers se sont sentis plus confiants dans leur rôle et dans leur connaissance du rôle des autres professionnels.

Keywords: interprofessional education, tabletop exercises

P101**Seasonal variations in modes of presentation in ST elevation myocardial infarction**

B. Forestell, BSc, M. Hewitt, MD, BMSc, S. Mondoux, MD, MSc, BEng, McMaster University, Hamilton, ON

Introduction: For patients with ST-elevation myocardial infarction (STEMI), time is myocardium. The sooner STEMI patients receive a definitive intervention, the better their outcomes. The first point of contact with the healthcare system for STEMI patients is either via Emergency Medical Services (EMS), or self-transportation to an Emergency Department (ED). Despite a reduced time to definitive intervention, STEMI patients who use EMS have increased mortality

compared to those who self-transport. In an effort to optimize STEMI care pathways, we characterized variations in modes of presentation of STEMI patients in our region. **Methods:** This study used a retrospective cohort design from a regional STEMI registry. Patients presenting to Hamilton Health Sciences between January 1, 2016, and December 31, 2018 meeting STEMI criteria were included in our analyses. Self-transport patients were analyzed from two academic EDs in Hamilton, Ontario. One hospital was PCI capable and the other, non-PCI capable. Patients transferred from other health regions were excluded from our analyses. Dichotomous variables were compared using χ^2 tests. Group means were compared using the Student t-test. **Results:** Eight hundred and seventy-one patients were included in the analysis, including 675 EMS users, and 196 self-transporting to EDs. Patients self-transporting to EDs were younger (61.5 v. 64.6 y, $p < 0.002$) and more often male (82.6 v. 69.2%, $p < 0.0002$) compared to EMS users. There was a non-significant trend towards an increased rate of all STEMI patients self-transporting in the summer months compared to the winter (63 of 215 in summer v. 41 of 185 in winter, 29.3 v. 22.2%, $p = 0.10$). Comparative analysis between both hospitals yielded an increased rate of self-transportation to the PCI-capable hospital in the summer months compared to winter (46 v. 28, 23.2 v. 16.3%, $p = 0.09$), but not the other hospital (18 v. 13, 10.6 v. 8.3%, $p = 0.57$). The majority of self-transporting patients came from postal codes bordering each hospital, and the different rates of self-transportation between hospitals were not associated with recent specialist follow up at those sites. **Conclusion:** Seasonal trends in modes of presentation in STEMI patients may present an opportunity to optimize STEMI care pathways through resource utilization and patient education. A larger dataset and possible multicenter analysis should be done to determine if significance is obtained with larger sample size.

Keywords: modes of presentation, myocardial infarction, seasonal variation

P102**What are Canadian emergency physicians' attitudes toward, understanding of, and willingness to treat patients who have attempted suicide?**

J. Fernandes, BSc, MPH, A. Chakraborty, MBChB, PhD, F. Scheuermeyer, MD, MSc, S. Barbic, PhD, D. Barbic, MD, MSc, University of British Columbia, Vancouver, BC

Introduction: Suicide is the 9th leading cause of death in Canada, and a common reason for patients to present to Canadian emergency departments (ED). Little knowledge exists around Canadian emergency physicians (EPs) attitudes toward and understanding of individuals who have attempted suicide. **Methods:** We developed a web-based survey on attitudes around suicide, which was pilot tested by two EPs and one psychiatrist for clarity and content. The survey was distributed via email to attending physician members of the Canadian Association of Emergency Physicians. Data were described using counts, means, medians and interquartile ranges. We used the Understanding of Suicidal Patients (USP) Scale, an 11-point questionnaire utilized in previous studies to assess healthcare providers' attitudes toward individuals who have attempted suicide. Each question was graded as a five-point Likert, with a score of 1 indicating complete agreement and a 5 indicating complete disagreement. A total USP score is calculated by adding together the score from each question and ranges from 11 to 55; a lower score indicates greater empathy and understanding of individuals who have attempted suicide.

Results: 193 EPs responded to the survey, with 42% of EPs practicing in Ontario. 35% of EPs were female, the mean age was 48 (95% CI 47.3–48.7), and mean years in practice was 17 (95% CI 16.3–17.7). Academic practice location was reported by 55% of EPs, and 81% reported access to an inpatient psychiatry service. The mean USP score was 21.8 (95% CI 21.1–22.5) with a Cronbach's alpha of 0.75, the median was 22 [IQR 14–29]. The item that had most agreement from EPs was "I would like to help a person who has attempted suicide" (1.58, 95% CI 1.50–1.67), while the item that had the least agreement was "patients who have attempted suicide are usually treated well in my work unit" (2.54, 95% CI 2.40–2.69). **Conclusion:** Canadian EPs have a generally positive attitude toward treating individuals who have attempted suicide. EPs scored highly on a scale that measured willingness to provide care for and empathize with suicidal patients, yet identified that overall care for these patients could be improved.

Keywords: attitude, emergency physician, suicide

P103

How knowledgeable are Canadian emergency physicians about the risk factors of completing suicide in patients presenting to the ED with suicidal thoughts?

J. Fernandes, BSc, MPH, A. Chakraborty, MBChB, PhD, F. Scheuermeyer, MD, MSc, S. Barbic, PhD, D. Barbic, MD, MSc, University of British Columbia, Vancouver, BC

Introduction: Suicide is the 9th leading cause of death in Canada, and a common reason for patients to present to Canadian emergency departments (ED). Little knowledge exists around Canadian emergency physicians (EPs) knowledge about the risk factors of completing suicide in patients presenting to the ED with suicidal thoughts. **Methods:** We developed a web-based survey on suicide knowledge, which was pilot tested by two emergency physicians and one psychiatrist for clarity and content. The survey was distributed via email to attending physician members of the Canadian Association of Emergency Physicians. Data were described using counts, means, medians and interquartile ranges. **Results:** 193 EPs responded to the survey (response rate 16%), with 42% of EPs practicing in Ontario. 35% of EPs were female, the mean age was 48 (95% CI 47.3–48.7), and mean years in practice was 17 (95% CI 16.3–17.7). Academic practice location was reported by 55% of EPs, and 81% reported access to an inpatient psychiatry service. Twenty four (12%) EPs had personally considered suicide, and 45% had experience with suicide in their personal lives. The top three risk factors for suicide identified by EPs were: intent for suicide (90%); a plan for suicide (89%); prior suicide attempt (88%). A majority of EPs were able to correctly identify the other risk factors for completion of suicide except for the following: diagnosis of anxiety disorder (25%), chronic substance use (43%), prior non-suicidal self-injury (37%), low socioeconomic status (34%). **Conclusion:** Canadian EPs have substantial personal experience with suicide. A majority of EPs were able to correctly identify known risk factors for suicide completion, yet important gaps in knowledge exist.

Keywords: emergency physician, knowledge, suicide

P104

What are the current practices and barriers to screening for suicidal thoughts in Canadian emergency departments?

J. Fernandes, BSc, MPH, A. Chakraborty, MBChB, PhD, F. Scheuermeyer, MD, MSc, S. Barbic, PhD, D. Barbic, MD, MSc, University of British Columbia, Vancouver, BC

Introduction: Suicide is the 9th leading cause of death in Canada, and a common reason for patients to present to Canadian emergency departments (ED). Little knowledge exists around Canadian emergency physicians (EPs) current practices and barriers to screening for suicidal thoughts (ST). **Methods:** We developed a web-based survey on suicide knowledge, which was pilot tested by two emergency physicians and one psychiatrist for clarity and content. The survey was distributed via email to attending physician members of the Canadian Association of Emergency Physicians. Data were described using counts, means, medians and interquartile ranges. **Results:** 193 EPs responded to the survey (response rate 16%), with 42% of EPs practicing in Ontario. 35% of EPs were female, the mean age was 48 (95% CI 47.3–48.7), and mean years in practice was 17 (95% CI 16.3–17.7). Academic practice location was reported by 55% of EPs, and 81% reported access to an inpatient psychiatry service. 142 EPs (82%) reported no protocol for screening for ST in their ED. Of EPs reporting an existing protocol, the most common practice was routine screening at triage (43%). The most commonly identified screening tools were HEADS-ED (25%) and PHQ-9 (21%). 70% of EPs felt the ED was a good place for screening for ST, yet 66% identified slower clinical care as a potential barrier. A strong commitment to treatment and follow up was identified by 68% of EPs as a necessary requirement to implementing ST screening in their ED. A targeted 2–4 question screen was the preferred screening option for 62% of EPs responding. **Conclusion:** A majority of EPs report no protocol for screening for ST in their ED, yet identify the ED as a good place for screening efforts. Potential barriers to widespread ST screening in the ED include a strong commitment to patient treatment and follow up, and diminished clinical efficiency.

Keywords: emergency physician, screening, suicide

P105

Observational study of distribution of time and activities over the course of an emergency physician's shift

E. Feng, BSc, Z. Zia, BHSc, C. Tong, MD, N. Cornell, MD, McMaster University, Kitchener, ON

Introduction: The growing scrutiny to improve Emergency Department (ED) wait times and patient flow have resulted in many efforts to increase efficiency and maximize patient throughput via systems improvements. This study investigates areas of efficiency improvement from the Emergency Physician (EP) perspective by examining EP workflow in a two phased observational time-motion study. In the initial phase, the distribution of time and activities of EPs were dissected to identify potential sources for streamlining to maximize physician productivity. The first phase of the study was completed during the period immediately preceding the implementation of an Electronic Health Records (EHR). The second phase of the study will repeat the analysis one year post EHR implementation. This data will be dissected to again identify sources for streamlining in an EHR environment and to identify shifts in work flow from a paper-based system. **Methods:** An observational time motion study was conducted at St. Mary's Hospital ED, in Kitchener Ontario. An observer was paired with an EP for the duration of an 8 hour shift, to a total of 14 shifts in the first phase of the study. Nine task categories were measured concurrently with a stopwatch application on a tablet, along with the number of interruptions experienced by the EP. Means of each category were calculated and converted to percentages, representing the amount of time per 8 hour shift dedicated to each activity. The second phase will be repeated in Fall 2020, 1 year after EHR

implementation. **Results:** A total of 14 shifts were observed, accounting for 112 hours of observation. EP's time was allocated amongst the following categories: direct patient interaction (40.8%), documentation (27.1%), reviewing patient results (18.4%), communicating with ED staff (7.63%), personal activities (5.7%), writing orders (5.1%), communicating with consultants (3.3%), teaching (1.7%) and medical information searches (1.3%). On average, EPs experienced 15.8 interruptions over the course of an 8 hour shift. **Conclusion:** In a paper charting system, the direct patient interaction accounts for the largest timeshare over the course of a given shift. However, the next two largest categories, documentation and reviewing patient data, both represent areas of potential streamlining via clerical improvements. Additionally, detailed measurements of EPs' activities have proven feasible and provides the potential for future insight into the impact of EHR's on EP workflow.

Keywords: productivity, time-motion, workflow

P106

The BPPV Tool: designing a smartphone app to aid in the diagnosis of benign paroxysmal positional vertigo

L. Farnell, BSc, M. Anderson, D. Savage, MD, PhD, R. Ohle, MSc, MBBCh, MA, Northern Ontario School of Medicine, Sudbury, ON

Innovation Concept: Dizziness is an increasingly common presenting complaint in the emergency department (ED), accounting for >2% of visits annually or almost 30% of visits in patients aged over 65. Approximately half of all cases of dizziness in older adults are caused by benign paroxysmal positional vertigo (BPPV). The use of computerized tomography (CT) to rule out serious but rare underlying central nervous system (CNS) causes in patients with dizziness in the ED is increasing despite guidelines supporting the use of clinical exam maneuvers such as the Dix-Hallpike test and therapeutic canalith repositioning maneuvers. Evidence indicates that these clinical tools are underutilized due to clinician discomfort or lack of understanding in performing and interpreting the maneuvers, supporting brief and accessible clinical resources that incorporate video examples to address this. **Methods:** Through an iterative process the authors have developed a smartphone app that is designed to facilitate the clinical diagnosis of BPPV and provide treatment maneuvers where appropriate. The app is being tested by clinicians practicing emergency medicine or primary care in Northern Ontario. **Curriculum, Tool, or Material:** The BPPV Tool is designed as a step-wise guide to diagnose BPPV. Clinicians will be prompted to perform specific exam maneuvers based on clinical findings, and can follow short example videos or written directions. Potentially precipitated nystagmus is described along with example videos. Provocative tests include the Dix-Hallpike and Supine Roll. If appropriate, the clinician will be prompted to perform therapeutic repositioning maneuvers such as the Epley or Gufoni, with associated sample videos, descriptions, and billing information where available. If at any point a clinician's exam findings are not in keeping with a diagnosis of BPPV, they will be alerted to this and stop progressing through the app. **Conclusion:** The BPPV Tool is an accessible and easily disseminated smartphone app designed to improve clinician comfort in reliably diagnosing BPPV. Diagnosing this common condition clinically is supported in the literature and can reduce the number of unnecessary CT scans performed, which would reduce healthcare costs and ED length of stay for these visits, and could reduce the number of patient transfers from peripheral sites for imaging.

Keywords: benign paroxysmal positional vertigo, innovations in EM education, mobile app

P107

Use of activity trackers to count steps of older emergency department patients: a feasibility and validity study

J. Estrada-Codecido, MD, MSc, J. Lee, MD, MSc, M. Chignell, PhD, C. Whyne, PhD, University of Toronto/Sunnybrook Health Science Centre, Toronto, ON

Introduction: Mobility is an evidence-based non-pharmacologic strategy shown to reduce delirium and functional decline among older patients in the acute care setting. Activity trackers have been used in previous studies to objectively measure mobility in older hospitalized patients. This study aims to compare the feasibility and validate the accuracy of three accelerometer-based activity trackers (Fitbit Zip, Fitbit Charge HR and StepWatch). This is the first step in a program of research to objectively measure as a potential marker of delirium risk. **Methods:** This is a prospective study of patients 65 years of age and older during their ED visit. We excluded those with critical illness, unable to communicate or provide consent; and any ambulatory impediments. Consenting participants wore the trackers for up to 8 hour, and completed a 6-meter walk test while a research assistant manually counted their steps. Our primary feasibility measure was the proportion of eligible patient for which we were able to recover the tracker and recorded their steps. The primary validation endpoint was the concordance between steps recorded by the tracker compared to a gold standard manual step count over a fixed distance. Sample size was based on the desired precision of the final estimate of feasibility. Intraclass correlation coefficient (ICC) was calculated to assess agreements between devices and manual count. We will report proportions with exact binomial 95% confidence intervals (CI) for feasibility and validity endpoints. **Results:** 41 participants were enrolled in this study. Mean age was 74.6 years (+/- 5.76) and 59% were females. The total subjects that wore the Fitbit Zip, Fitbit Charge HR and StepWatch during study participation was, 40/41 (97.5%, CI 0.87–0.99), 33/34 (97%, CI 0.84–0.99) and 31/32 (96.8%, CI 0.83–0.99), respectively. Total subjects with completed data extracted from the Fitbit Zip, Fitbit Charge HR and StepWatch was, 38/41 subjects (92.6%, CI 0.80–0.98), 34 (100%, CI 0.89–1.00), and 32 (100%, CI 0.89–1.00), respectively. All devices were recovered after use (100%, 95% CI 0.91–1.00). **Conclusion:** Our results suggest: 1) the use of gait-tracking devices in the ED is feasible, 2) consumer and research-grade devices showed good validity against the gold standard, and 3) the use of small, inexpensive, consumer-grade trackers to objectively measure mobility of older adults in the ED.

Keywords: activity trackers, mobility, older adults

P108

Alcohol-related emergency department visits by youth aged 12-24: trends over 4 years in one Canadian centre

H. Murray, MD, MSc, L. Erlikhman, BA, T. Graham, BSc, M. Walker, PhD, Queen's University, Kingston, ON

Introduction: Recent evidence shows an increase in alcohol-related emergency department (ED) visits among youth. Highly publicized collegiate rituals such as Homecoming may create a climate for problematic alcohol use. This study describes the frequency of youth alcohol-related ED visits per year and during pre-specified ritualized

drinking dates in one academic centre. **Methods:** This was a chart review of patients aged 12-24 with alcohol-related ED presentations between Sept 2013-Aug 2017. The National Ambulatory Care Reporting System (NACRS) database was searched for visits with ICD-10 codes related to alcohol. The Canadian Hospital Injury Reporting and Prevention Program (CHIRPP) database was also searched using the keyword alcohol. Duplicate visits were removed. Visits were excluded if patients had a history of psychosis, were held in the ED for involuntary psychiatric assessment, were homeless, were inmates from a correctional institute, if alcohol use was not mentioned and for complaints of sexual assault/domestic violence. Data abstraction by two reviewers used a standard form with variables pre-determined. Differences were resolved with third party adjudication. Interrater reliability of the reviewers was assessed through duplicate review of 10% of randomly selected charts. A further 10% were assessed by a 3rd reviewer for extraction accuracy. **Results:** A total of 3,256 ED visits were identified with 777 meeting exclusion criteria. The remaining 2,479 visits were reviewed and subclassified into injury (51.8%), acute intoxication (45.1%) and mental health issue (3.2%). Interrater agreement was high for extracted variables with Kappa scores > 0.8. Despite a decrease in the region's youth population during the study period (28,325 to 25,125), overall standardized ED visits by youth increased by 12% (66,538 to 78,129). Adjusted for population, youth alcohol-related visits increased by 86.4% from 1,557 in 2013-14 to 2,902 in 2016-17. Co-ingestion of other substances was reported in 292 (11.8%) of visits, with cannabis the most common (57%). The 17 pre-specified ritualized days saw 578 (23.3%) of ED visits. **Conclusion:** Alcohol-related ED visits in youth are increasing in our region. Ritualized drinking dates appear to be particularly risky for youth with high rates of observed ED utilization. Strategies to manage high volume ritual days are being piloted, including temporary diversion to an in-hospital sobriety centre.

Keywords: alcohol intoxication, substance use/misuse, youth

P109

Does an elevated troponin ultimately matter? An assessment of outcomes in patients presenting to the emergency department with non-cardiac complaints

K. Endres, BSc, B. Chow, MD, H. Garuba, MD, University of Ottawa Heart Institute, Ottawa, ON

Introduction: Acute myocardial infarction (MI) is one of the most time-sensitive diagnoses made in the emergency department (ED). Troponin (TNI) measurement is an invaluable tool; however, its utility depends on the clinical context and is highest where there is a strong pre-test probability. Studies show that most TNI elevations are due to non-cardiovascular causes; however, elevated TNI has been associated with increased morbidity and mortality, often prompting additional investigations. The aim of our study was to compare 1-year cardiac outcomes of patients who presented to the ED with non-cardiac complaints and elevated TNI who had further cardiac testing versus those who did not. **Methods:** We conducted a retrospective chart review of patients ≥ 18 seen in the ED for non-cardiac complaints with a high TNI from January-June 2016. Patients were stratified into two groups: 1) those who received diagnostic testing for ischemia and/or a cardiac consultation and 2) those without cardiac consultation or testing. Data was also collected on major adverse cardiac events within 1-year of ED presentation. Chi-squared analysis assessed the difference in proportions of outcomes between groups. We present our preliminary data. **Results:** In total, 1500

patients met inclusion criteria and 861 have been analyzed thus far. Of these 861, 209 went on to have either diagnostic testing for ischemia and/or a cardiology consult while 652 had no further investigations. There was no statistically significant difference in the proportion of patients who developed unstable angina ($p = 0.9824$), ST-elevation myocardial infarction (STEMI) ($p = 0.9956$), non-STEMI ($p = 0.9008$), stroke/TIA ($p = 0.9657$), revascularization ($p = 0.8873$), cardiac hospitalization ($p = 0.9446$) or died ($p = 0.8972$), within 1-year of their ED presentation. **Conclusion:** In patients with isolated elevated TNI and non-cardiac complaints, preliminary data showed no difference in mortality or cardiac event rates between those who had further testing/consultations and those who did not. TNI ordering could be cautiously limited to only presenting complaints/preliminary diagnoses likely to have cardiac etiology or sequelae or those in whom further testing would impact management/outcomes. Quality of care may be improved by reducing length of stay in the ED and potential risks of unnecessary tests. Future studies include determining cost implications and classifying what level of TNI elevation in non-ACS patients may predict a future cardiac outcome.

Keywords: non-cardiac, non-cardiovascular, troponin

P110

Chest tube thoracostomy in the ED: predictors of complications

M. Careau, C. Malo, MD, MSc, V. Boucher, MSc, M. Émond, MD, MSc, Université Laval, Quebec, QC

Background: Chest tube thoracostomy is frequently performed in the emergency department (ED) for patients with traumatic thoracic injuries. However, this procedure is associated with a high complication rate. **Aim Statement:** The aim of this study was to describe and assess predictors of complications following chest tube thoracostomy. **Measures & Design:** A retrospective chart review was conducted in a level 1 trauma center. Patients aged ≥ 16 who required a chest tube for a traumatic injury between 2016 and 2019 were identified. Variables including demographic data, Charlson Comorbidity Index, mechanism of injury, Injury Severity Score (ISS), chest tube insertion and technique (i.e. position, dislodgement, obstruction, organ perforation), complications and interventions were collected using a standardized data collection form. A second reviewer assessed all ambiguous files. Descriptive statistics and adjusted odds ratios were calculated. **Evaluation/Results:** 179 patients were included in the study, of which 141 were male (79%). Mean age was 54 [2] 18 and median ISS was 17 (Q1-Q3: 9-27). 207 chest tube thoracostomies were performed for pneumothorax (81%) or a hemothorax (38%) mainly after a blunt injury (92%). 183 standard chest tube (88%) and 24 pigtail catheters (12%) were installed. Overall, emergency medicine physicians/residents performed 70% of these procedures and 54% were performed by residents. Sixty-one patients (34%) suffered a total of 73 complications: 45 were infectious (62%) and 28 were technique-related (38%). Pneumonia was the most frequent complication (19%) followed by reintroduced or replaced chest tube (12%). After adjusting for the ISS, there was no statistically significant association between the type of tube (OR 0.36 95% CI: 0.08-1.68), the medical specialty (OR 1.19 95% CI: 0.55-2.58) or the level of training (OR 1.29 95% CI: 0.63-2.64) of the clinician and the incidence of at least one complication. **Discussion/Impact:** Our results show that one out of three patients experienced at least one complication following a chest tube thoracostomy in the ED, which confirmed existing literature (5%- 38%). After adjustment, the type of tube used, the

specialty and level of training of the health professional who performed the procedure was not associated with the incidence of at least one complication.

Keywords: chest tube, predictors, thoracostomy

P111

Kussmaul's sign for the diagnosis of right ventricular myocardial infarction

E. Dubé, BHSc, MD, MPH, M. Crozier, BHSc, A. Middleton, BHSc, BSc, B. Best, BSc, MSc, Northern Ontario School of Medicine, Sudbury, ON

Introduction: Kussmaul's sign, the absence of a drop in JVP or a paradoxical increase in JVP on inspiration, can be elicited clinically as an indicator of right ventricular myocardial infarction (RVMI). RVMI poses unique diagnostic and management challenges. It complicates 30-50% of inferior MI and is associated with increased mortality when compared to inferior MI without RV involvement. Early recognition allows maintenance of preload by avoiding use of nitroglycerin, diuretic and narcotic medication, and treatment with fluids and vasopressors. We reviewed the evidence for Kussmaul's sign for diagnosis of RVMI. **Methods:** We conducted a librarian assisted search using PubMed, Medline, Embase, the Cochrane database, relevant conference abstracts from 1965 to October 2019. No restrictions for language or study type were imposed. All studies with patients presenting with acute myocardial infarction were reviewed. Two independent reviewers extracted data from relevant studies. Studies were combined when similar study populations were present. Study quality was assessed using the QUADAS-2 tool. Random effects meta-analysis was performed using metaprop in Stata for the 3 reference standards combined. Subset analysis for each of the 3 reference standards was completed. **Results:** We identified 122 studies: 10 were selected for full text review. Eight studies had comparable populations with a total of 469 consecutive patients admitted to the coronary care unit with acute inferior myocardial infarction and were included in the analysis. Prevalence of RVMI was 36% (CI 95% 31.8-40.5). Reference standards for the diagnosis of RVMI included echocardiography, 16 lead ECG and haemodynamic studies. A gold standard for diagnosis of RVMI is lacking and thus the reference standards were combined. Kussmaul's sign had a sensitivity of 69.3% (CI 95% 46.3 - 85.5, I² 86.7%), specificity of 95.1% (CI 95% 75.6 - 99.2, I² 89.3%) and LR + 14.1 (CI 95% 2.6-73.2). Subset analysis of echocardiography, ECG and haemodynamic studies revealed sensitivity of 45%, 77% and 82% (I² 62%, N/A, 70%) respectively and specificity of 92%, 84% and 92% (I² 86%, N/A, 86%). **Conclusion:** Kussmaul's sign is specific for acute right ventricular myocardial infarction and may serve as an important clinical sign of right ventricular dysfunction requiring preload preserving management.

Keywords: clinical exam, Kussmaul's sign, right ventricular myocardial infarction

P112

Strengthening inter-professional collaboration in home-based community paramedic programs

K. Jagos, MScN, I. Drennan, M. McNamara, MD, J. Limoges, PhD, University of Toronto, Toronto, ON

Introduction: Community paramedic programs are being implemented to leverage existing resources and contribute to a sustainable patient-centered healthcare system. Expanding the role of paramedics into home care requires new collaborative relationships with

healthcare providers such as nurses and physicians. Developing effective and productive collaborative relationships will enhance and support the integration of community paramedic programs. Our objective was to describe the barriers and facilitators to effective collaboration between nurses, physicians, and paramedics within home-based community paramedicine. **Methods:** We conducted semi-structured interviews with nurses, physicians, paramedics, and faculty who teach in paramedic programs. We explored the attitudes, perceptions, barriers, and enablers to collaboration in home-based community paramedic programs. Participants were recruited utilizing the professional networks of the researchers as well as snowball sampling. Recruitment in each group stopped when saturation was achieved. We conducted a thematic analysis of the interviews to generate findings related to our objectives. **Results:** We interviewed 33 participants with a typical cross-section of age, years of experience, and education. Overall, participants felt that collaboration was important for effective integration of community paramedics into home care and for ensuring a patient-centered approach to care. Currently, collaboration mostly occurs between physicians and paramedics and community paramedicine appears to be a siloed rather than integrated service. Few collaborative relationships exist between paramedics and nurses, despite the fact that nurses are highly involved in home care. We identified several barriers to effective collaboration including lack of understanding of the contributions of the different health providers, and regulatory and funding constraints. Inter-professional education that supports collaboration and facilitates dismantling of professional and service silos can support the effective integration of paramedics into home care. **Conclusion:** Strengthening networks of collaboration between nurses, physicians, and paramedics can help dismantle silos and enhance inter-professional collaboration to support appropriate integration of paramedics into home care. The willingness and positive attitudes for collaboration are assets that provide an excellent foundation upon which to move forward. Continuing education to support inter-professional collaboration is needed.

Keywords: community paramedicine, inter-professional collaboration

P113

Examining emergency physicians' self-reported opioid prescribing practices for the treatment of acute pain: A Newfoundland perspective

P. Doran, BSc, MD, MSc, G. Sheppard, MD, BSc (Hons), B. Metcalfe, BSc, MD, Memorial University, St. John's, NL

Introduction: Canadians are the second largest consumers of prescription opioids per capita in the world. Emergency physicians tend to prescribe stronger and larger quantities of opioids, while family physicians write the most opioid prescriptions overall. These practices have been shown to precipitate future dependence, toxicity and the need for hospitalization. Despite this emerging evidence, there is a paucity of research on emergency physicians' opioid prescribing practices in Canada. The objectives of this study were to describe our local emergency physicians' opioid prescribing patterns both in the emergency department and upon discharge, and to explore factors that impact their prescribing decisions. **Methods:** Emergency physicians from two urban, adult emergency departments in St. John's, Newfoundland were anonymously surveyed using a web-based survey tool. All 42 physicians were invited to participate via email during the six-week study period and reminders were sent at weeks two and four. **Results:** A total of 21 participants responded to the survey. Over half

of respondents (57.14%) reported that they “often” prescribe opioids for the treatment of acute pain in the emergency department, and an equal number of respondents reported doing so “sometimes” at discharge. Eighty-five percent of respondents reported most commonly prescribing intravenous morphine for acute pain in the emergency department, and over thirty-five percent reported most commonly prescribing oral morphine upon discharge. Patient age and risk of misuse were the most frequently cited factors that influenced respondents’ prescribing decisions. Only 4 of the 22 respondents reported using evidence-based guidelines to tailor their opioid prescribing practices, while an overwhelming majority (80.95%) believe there is a need for evidence-based opioid prescribing guidelines for the treatment of acute pain. Sixty percent of respondents completed additional training in safe opioid prescribing, yet less than half of respondents (42.86%) felt they could help to mitigate the opioid crisis by prescribing fewer opioids in the emergency department. **Conclusion:** Emergency physicians frequently prescribe opioids for the treatment of acute pain and new evidence suggests that this practice can lead to significant morbidity. While further research is needed to better understand emergency physicians’ opioid prescribing practices, our findings support the need for evidence-based guidelines for the treatment of acute pain to ensure patient safety.

Keywords: acute pain, opioid prescribing guidelines, opioid prescription

P114

Barriers and facilitators affecting implementation of a decision aid for the diagnosis of acute aortic syndrome: a qualitative study
C. Dmitriew, PhD, R. Ohle, MBChB, MSc, MA, Northern Ontario School of Medicine, Sudbury, ON

Introduction: Acute aortic syndrome (AAS) is an uncommon, life-threatening emergency that is frequently misdiagnosed. The Canadian clinical practice guidelines for the diagnosis of AAS were developed in order to reduce the frequency of misdiagnoses and number of diagnostic tests. As part of the guidelines, a clinical decision aid was developed in order to facilitate clinician decision-making based on practice recommendations. The objective of this study was to identify barriers and facilitators among physicians to implementation of the decision aid. **Methods:** We conducted semi-structured interviews with emergency room physicians working at 5 sites distributed between urban academic and rural settings. We used purposive sampling, contacting ED physicians until data saturation was reached. Interview questions were designed to understand potential barriers and facilitators affecting the probability of decision aid uptake and accurate application of the tool. Two independent raters coded interview transcripts using an integrative approach to theme identification, combining an inductive approach to identification of themes within an organizing framework (Theoretical Domains Framework), discrepancies in coding were resolved through discussion until consensus was reached. **Results:** A majority of interviewees anticipated that the decision aid would support clinical decision making and risk stratification while reducing resource use and missed diagnoses. Facilitators identified included validation and publication of the guidelines as well as adoption by peers. Barriers to implementation and application of the tool included the fact that the use of D-dimer and knowledge of the rationale for its use in the investigation of AAS were not widespread. Furthermore, scoring components were, at times, out of alignment with clinician practices and understanding of risk factors. The complexity of the decision aid was also identified as a potential barrier

to accurate use. **Conclusion:** Physicians were amenable to using the AAS decision aid to support clinical decision-making and to reduce resource use, particularly within rural contexts. Key barriers identified included the complexity of scoring and inclusion criteria, and the variable acceptance of D-dimer among clinicians. These barriers should be addressed prior to implementation of the decision aid during validation studies of the clinical practice guidelines.

Keywords: decision tool, acute aortic syndrome, aortic dissection

P115

Improving the diagnosis of pulmonary embolism in the emergency department

K. de Wit, MBChB, MD, MSc, S. Zarabi, BSc, T. Chan, MD, MSc, F. Germini, MD, MSc, S. Mondoux, MD, MSc, C. Kearon, MBChB, PhD, McMaster University, Hamilton, ON

Background: Emergency physicians (EPs) can choose from several evidence-based pathways to diagnose pulmonary embolism (PE), however literature suggests that EPs frequently use computer tomography (CT) scanning as a stand-alone test for PE. This is a program of research to improve adherence to evidence-based PE diagnosis in the emergency department (ED). **Aim Statement:** To create a novel approach to PE diagnosis in the ED based on a framework explaining EP diagnostic PE behaviour and barriers to using evidence-based PE testing. **Measures & Design:** We conducted two types of qualitative interviews: 1). EPs in 5 Canadian cities watched videos of 2 simulated cases and then explained how they would test the patient. 2). Semi-structured EP interviews using the theoretical domains framework (TDF). The results of our analyses informed the construction of an explanatory framework for common EP diagnostic PE behaviours. Barriers to evidence-based behaviour were classified into domains. A Canadian EP expert group reviewed these results along with the existing evidence on ED PE diagnostic implementation. We developed a new approach to diagnosis of PE in the ED which addresses each of our domains. **Evaluation/Results:** We conducted 71 interviews. We identified 4 domains, each addressed in our pathway. ‘PE in a mythical and deadly beast’ PE kills and can masquerade so EPs look for PE in places where it does not exist and are rewarded for ‘over-testing’. Response: Creating a departmental conversation about missing PE, talking about the facts, busting the myths. EP feedback on PE testing including positive rate. ‘The end goal is CTPE’ PE creates anxiety for EPs and ordering a CTPE hands over responsibility to the radiologist. Response: A departmental protocol for PE testing which starts with D-dimer for every patient. Shifting focus to ruling out PE with D-dimer. Protocol is automated once initiated by EP. ‘PERC eases anxiety’ PERC is documented when it is negative and allows EP to stop. Response: EPs can choose to use and document PERC. ‘No-one has been fighting for the Wells score’ Poor understanding of purpose and function. Often at odds to Gestalt. Response: Protocol does not use Wells score. **Discussion/Impact:** We have developed a new diagnostic PE pathway which addresses current barriers to evidence-based practice which we will evaluate further.

Keywords: computer tomography scan, pulmonary embolism, quality improvement and patient safety

P116

Colder, but no less safe: A comparison of bicycle related traumas in winter compared to summer cyclists

S. Davis, BA, MD, PhD, J. Delaney, BSc, MD, McGill University, Montreal, QC

Introduction: This study aimed to examine difference in trauma injuries between bicycle users in winter months compared to summer months. Behavioral variables were also examined to assess seasonal variability, as well as associations with traumas. **Methods:** This was a retrospective cohort study of all bicycle related traumas presenting to a level I trauma center between the years 1998-2018. All data was collected through a standardized trauma database. Seasonal differences were examined by comparing trauma severity and behavior patterns between patients arriving in the months May-September (summer) and those arriving in November-March (winter). Outcome measures included: Injury Severity Scale, GCS, type of accident, helmet use, demographics and alcohol level. Groups were compared using t-tests and Chi-square analysis as appropriate. **Results:** A total of 980 bicycle related traumas were analyzed. There were a significantly greater number of injuries in the summer as compared to winter months (879 in summer vs. 101 in winter). While most injuries in both groups were rated in the severe range of the Injury Severity Scale, there were no differences in injury severity, initial GCS, deaths, or head injuries between the two seasons. There were also no differences in drug, alcohol, or helmet use. The only significant difference between seasons was that winter riders were more likely to be male. Overall, helmet use was associated with lower injury severity, less head trauma, and a higher initial GCS. Use of alcohol was associated with less likelihood of wearing a helmet. **Conclusion:** In conclusion, bicycle use in winter does not appear to be associated with worse outcomes than summer. Public health interventions can continue to encourage winter bicycle use, with the encouragement of helmet use and avoidance of alcohol when cycling as an important protective factor in both seasons.

Keywords: bicycle, environment, trauma

P117

A multicenter analysis of an emergency physician lead on department flow and the provider experience

K. Crowder, BN, BSc, MD, E. Domm, MN, PhD, BScN, R. Lipp, BScN, O. Robinson, BSc, S. Vatanpour, MSc, PhD, D. Wang, MSc, E. Lang, MD, University of Calgary Cumming School of Medicine, Calgary, AB

Introduction: Emergency department (ED) flow is a strong predictor of patient safety, quality of care and provider satisfaction. Throughput interventions have been shown to improve flow metrics, yet few studies have considered MD leadership roles and evaluated provider experience. Our objective was to evaluate the emergency physician lead (EPL) role, a novel MD staffing initiative. **Methods:** This mixed-method observational time series analysis evaluated ED metrics at two tertiary EDs including ED length of stay (LOS), EMS Park LOS and physician initial assessment (PIA) time as well as 72-hour readmit and left without being seen (LWBS) rates. Data was collected from the ED information system database for control (Dec 6, 2017-Feb 28, 2018 SITE1 and Mar 1-May 31, 2018 SITE2), pre (Sept 3-Nov 30, 2018 SITE 1 and Dec 3, 2018-Feb 28, 2019 SITE2) and post (Dec 3, 2018 -Feb 28, 2019 SITE1, Mar 1- May 31, 2019 SITE2) periods for adult patients presenting to each site. Site data was analyzed independently using descriptive and inferential statistics to calculate differences in means, and means were compared using t-tests. A survey elicited provider feedback from ED physicians, nurses, and EMS professionals on the effect of the EPL on throughput, timeliness of admissions and discharges, provider workload, and the EPL as a resource to other professionals. **Results:** The number of ED visits

at SITE1 were 13136 (Ctrl), 13236 (Pre) and 13137 (Post), and at SITE2 were 14371(Ctrl), 13866 (Pre) and 14962 (Post). Mean ED LOS was decreased by 17 min in post vs control and 20 min vs pre at SITE1 ($p < 0.01$). SITE2 saw an increase in ED LOS by 7 min vs control and 8 min vs pre ($p < 0.01$). EMS LOS at SITE1 was decreased by 21 min vs control and 22 min vs pre ($p < 0.01$), but was increased at SITE2 by 2 min vs control ($p = 0.09$) and 14 min vs pre ($p < 0.01$). PIA time at SITE1 was decreased by 15 min vs control ($p < 0.01$) and 13 min vs pre and increased by 5 min vs control and 12 min vs pre at SITE2 ($p < 0.01$). 72 hour readmit and LWBS rates were unchanged at both sites. Qualitative feedback from ED providers highlighted the early provision of treatments and investigations by the EPL, and many felt the EPL was an important resource. **Conclusion:** The inclusion of both quantitative and qualitative data in this study provided a robust analysis of the impact of the EPL role and demonstrated modest but important improvements. A site-dependent, carefully considered implementation of the EPL role may improve ED metrics and provider experiences.

Keywords: emergency physician lead, emergency medical services park, provider experiences

P118

Impact des bêtabloquants pour les patients souffrant d'un arrêt cardiorespiratoire avec un rythme initial défibrillable : une revue systématique et méta-analyse

A. Cournoyer, MD, J. Soucy-Legault, MD, A. Frégeau, MD, M. Iseppon, MD, A. Iseppon, PharmD, J. Lessard, MD, V. Huard, MD, J. Morris, MD, MSc, J. Chauny, MD, MSc, M. Marquis, MSc, J. Paquet, PhD, R. Daoust, MD, MSc, Université de Montréal, Montréal, QC

Introduction: Malgré les progrès au niveau des soins de réanimation lors des dernières années, le pronostic des patients souffrant d'un arrêt cardiorespiratoire (ACR) demeure abyssal et aucun médicament ne semble influencer leur devenir au long cours. Cependant, les résultats de quelques études évaluant l'impact des bêtabloqueurs chez cette population s'avèrent cependant très encourageants. L'objectif de cette revue systématique, est d'évaluer l'évidence disponible quant à l'impact des bêtabloqueurs sur le devenir des patients traités pour un ACR dont le rythme initial est défibrillable. **Methods:** La présente revue systématique a été préalablement enregistrée sur Prospero (CRD42018105453). Les moteurs de recherche Medline, Embase et CENTRAL ont été fouillés de leur création jusqu'au 17 octobre 2018. La recherche de littérature grise s'est faite via Web of Science et Google Scholar. Les références de tous les articles inclus ainsi que des méta-analyses existantes sur le sujet ont également été révisées. Tous les types de devis ont été considérés, sauf les études de cas et les séries de cas. Les études devaient inclure des adultes (16 ans et plus) en ACR dont le rythme initial était défibrillable, dont une partie avait reçu un médicament bêtabloquants par voie intraveineuse pendant leur ACR et l'autre un traitement standard, et présenter une mesure de résultat centrée sur le patient (retour de circulation spontanée [RCS], survie ou bon devenir neurologique). La qualité des articles a été évaluée à l'aide du 'Newcastle Ottawa scale'. **Results:** Deux études observationnelles rétrospectives, menées auprès d'un total de 66 patients, ont été incluses. Il y avait une association positive entre l'administration de bêtabloquants et l'occurrence d'un RCS (rapport de cotes [RC] = 5.76 [intervalle de confiance [IC] à 95% = 1.79-18.52], $p = 0.003$), ainsi qu'avec la présence d'un bon devenir neurologique (RC = 4.42 [IC95% = 1.05 - 18.56], $p = 0.04$). Une

telle association n'a cependant pas été observée par rapport à la survie au congé hospitalier. **Conclusion:** L'administration de bêta-bloquants semble associé à un meilleur devenir chez les patients en ACR avec un rythme initial défibrillable. Étant donné la nature du devis de ces études et leur petite taille, une étude prospective de qualité serait nécessaire afin de déterminer l'efficacité de cette classe de médicament et de faire une recommandation forte à ce sujet.

Keywords: arrêt cardiaque, bêta-bloquant, rythme défibrillable

P119

Emergency department census is useful as a real-time measure of crowding

R. Clouston, MD, M. Howlett, MD, D. Canales, MA, J. Fraser, BN, D. Sohi, BSc, S. Lee, MD, P. Atkinson, MBChB, Dalhousie University, Saint John, NB

Introduction: Crowding is associated with poor patient outcomes in emergency departments (ED). Measures of crowding are often complex and resource-intensive to score and use in real-time. We evaluated single easily obtained variables to establish the presence of crowding compared to more complex crowding scores. **Methods:** Serial observations of patient flow were recorded in a tertiary Canadian ED. Single variables were evaluated including total number of patients in the ED (census), in beds, in the waiting room, in the treatment area waiting to be assessed, and total inpatient admissions. These were compared with Crowding scores (NEDOCS, EDWIN, ICMED, three regional hospital modifications of NEDOCS) as predictors of crowding. Predictive validity was compared to the reference standard of physician perception of crowding, using receiver operator curve analysis. **Results:** 144 of 169 potential events were recorded over 2 weeks. Crowding was present in 63.9% of the events. ED census (total number of patients in the ED) was strongly correlated with crowding (AUC = 0.82 with 95% CI = 0.76 - 0.89) and its performance was similar to that of NEDOCS (AUC = 0.80 with 95% CI = 0.76 - 0.90) and a more complex local modification of NEDOCS, the S-SAT (AUC = 0.83, 95% CI = 0.74 - 0.89). **Conclusion:** The single indicator, ED census was as predictive for the presence of crowding as more complex crowding scores. A two-stage approach to crowding intervention is proposed that first identifies crowding with a real-time ED census statistic followed by investigation of precipitating and modifiable factors. Real time signalling may permit more standardized and effective approaches to manage ED flow.

Keywords: crowding, emergency department, scoring

P120

A survey of Ontario Family Health Teams: Family physicians are reliant on emergency services for complicated early pregnancy loss

J. Cirone, BSc, C. Thompson, MSc, S. McLeod, MSc, C. Varner, MD, MSc, University of Western Ontario, Windsor, ON

Introduction: The majority of first trimester pregnancy care in Canada is provided by family physicians and emergency departments (EDs). Early pregnancy loss occurs in approximately 30% of pregnancies, and the majority take place in first trimester when many patients do not yet have an obstetrical care provider. In Ontario, nearly 70% of patients are rostered to a family physician, many of whom practice in Family Health Teams (FHTs). The objective of this study was to determine how Ontario family physicians manage early pregnancy complications and explore the services available for patients experiencing early pregnancy loss or threatened early pregnancy loss.

Methods: Family physician leads from 104 Ontario FHTs were contacted by email and invited to complete a 19-item, online questionnaire using modified Dillman methodology. The survey was developed by investigators based on a review of relevant literature and consultation with clinical experts. Prior to distribution, the questionnaire was peer reviewed and tested for face and construct validity, as well as ease of comprehension. **Results:** Respondents from 50 FHTs across Ontario completed the survey (response rate 48.1%). Of the respondents, 45 (90.0%) reported access to an ED in their community, 45 (90.0%) had access to an obstetrician/gynecologist, 33 (66.0%) had access to an early pregnancy clinic, and 18 (36.0%) reported comprehensive obstetrical care from first trimester to delivery within their FHT. The following services were only accessible through the ED: administration of RhoGAM (n = 28; 56.0%); surgical management of spontaneous or missed abortion (n = 22; 44.0%); same day serum quantitative beta human chorionic gonadotropin (n = 21; 42.0%); same day radiologist-interpreted ultrasound assessment (n = 15; 30.0%); and medical management of spontaneous or missed abortion (n = 12; 24.0%). Forty (80.0%) respondents stated physicians in their practice would provide urgent follow-up care for patients with spontaneous abortion, 35 (70.0%) would provide care for threatened abortion, and 26 (52.0%) would provide urgent care for missed abortion. For patients with a stable ectopic pregnancy, 37 (74.0%) respondents would refer to the ED. **Conclusion:** This study suggests FHTs in Ontario provide comprehensive care to patients with uncomplicated early pregnancy loss such as spontaneous abortion, yet rely on the ED for management of complicated early pregnancy loss, when medical or surgical management is indicated or for ectopic pregnancy.

Keywords: early pregnancy complications, miscarriage, primary care

P121

A quality improvement project to improve medical imaging ordering workflow in the emergency department

J. Choi, MD, MPH, R. Bhayana, MD, D. Wang, BHSc, MD, E. Bartlett, MD, MPH, R. Menezes, PhD, University Health Network, Toronto, ON

Background: Many computerized tomography (CT) scans ordered after-hours from the emergency department (ED) at our institution required a discussion between the emergency physician (EP) and radiology resident (RR), leading to workflow inefficiency. **Aim Statement:** The aim was to improve workflow efficiency and provider satisfaction, and reduce CT turnaround time, without significantly affecting CT utilization within six months. **Measures & Design:** We created a new workflow by creating an electronic list of ED CT requests that RRs monitor. RRs protocolled all requests and only called the ED physician for more details when required. The intervention was implemented in a stepwise fashion via plan-do-study-act cycles. An electronic survey measured qualitative outcomes, and quantitative outcomes were analyzed via statistical process control (SPC) charts and other statistical methods. **Evaluation/Results:** Survey response was high (76% EP, 79% RR). Most EPs and RRs felt more efficient (96.3%, 73.3%), RRs felt fewer disruptions (83.3%), and most EPs felt that scans were done faster (84.1%). We analyzed CT turnaround times and utilization using SPC charts and segmented regression analyses. Turnaround time trended to improvement (33 mins vs 29 mins on weekdays [WD], 37 mins vs 33 on weekends [WE]), but was not statistically significant. There was background rising CT utilization over time (+0.7 and +1.9 CT/100 ED visits/year on WD and WE, respectively, $p < 0.0005$), but the intervention itself did

not cause a significant change. The total number of pages to RR (a measure of workflow disruption) decreased significantly on the WDs (23 vs 19 pages, $p = 0.0011$), but not on WE (79 vs 75 pages, $p = 0.1663$). However when adjusting for number of scans ordered, there was a decrease in paging rates (0.73 vs 0.54 pages per scan ordered on WD [$p < 0.00005$], 3.24 vs 2.63 pages per scan ordered on WE [$p = 0.0012$]). **Discussion/Impact:** Our intervention led to improved work satisfaction and perceived efficiency experienced by both EPs and RRs. It did not statistically significantly affect imaging turnaround times or utilization rates. Our project shows that calling for preapproval of imaging studies does not seem to provide any benefit in our setting.

Keywords: computerized provider order entry, quality improvement and patient safety, workflow optimization

P122

The evaluation of various point of care ultrasound features in Stanford type A aortic dissections

T. Chiang, MD, BMLSc, G. Puri, BSc, MD, University of Toronto, Toronto, ON

Introduction: Type A aortic dissection (AD) is one of the most lethal diseases in medicine. Its mortality rate increases 1-2% per hour from the onset of symptoms to treatment. Timely diagnoses of ADs, therefore, are crucial to improve survival and decrease morbidity. There are various proposed clinical guidelines to help emergency physicians decide when a CTA is urgently needed with most widely quoted being the validated Aortic Dissection Detection Risk Score (ADD-RS) recommended by the American Heart Association. The addition of D-Dimer for further risk stratification has also been entertained. A recent article published in the American Journal of Emergency recommends using point of care ultrasound (POCUS) to expedite diagnosis. With the rising use of POCUS in the emergency department, it can be the missing link to timely AD diagnoses. This project aims to elucidate the prevalence of positive POCUS findings (pericardial effusion and dilated aortic root) in type A AD via a retrospective chart review. **Methods:** This study is a retrospective chart review of 200 patients with the diagnosis of AD treated at Southlake Regional Hospital. We included patients diagnosed with type A AD and excluded those diagnosed with type B AD. We collected data on their demographics, ADD-RS scores, investigation results, treatments, and clinical outcomes. The main focus of the chart review was on the presence of pericardial effusion or dilated aortic root on echocardiograms. Binomial statistical analysis was used to analyze the collected data. **Results:** We identified 126 patients with type A AD out of 200 charts reviewed. Thirteen (14% CI 8-23%, $n = 93$ $p = 0.05$) had wide mediastinum on their chest X-rays; twenty (95% CI 75-100%, $n = 21$ $p = 0.05$) had elevated D-dimer levels; and ninety-one (72% CI 64-80%, $n = 126$ $p = 0.05$) had positive ADD-RS. Only 88 out of 126 AD cases had documented echocardiograms. Sixty-eight (77% CI 67-86%, $n = 88$ $p = 0.05$) had either pericardial effusions or dilated aortic roots on their echocardiograms. Eighty-one (92% CI 84-95%, $n = 88$ $p = 0.05$) had either positive ADD-RS or positive echocardiogram findings, which is 20 (23% CI 14-33%, $n = 88$ $p = 0.05$) more cases than ADD-RS would have picked up alone. **Conclusion:** The absence of both pericardial effusion and dilated aortic root on echocardiogram in combination with a negative ADD-RS has a high sensitivity for ruling out type A AD. Our data support further research into the use of POCUS to expedite the diagnosis of type A AD in the emergency department.

Keywords: aortic dissection, diagnosis, point-of-care ultrasound

P123

Emergency department utilization by patients with advanced chronic kidney disease and dialysis: A population based study

R. Chhibba, BSc, MD, S. Leon, MD, MSc, C. Rigatto, MD, MSc, T. Ferguson, MSc, P. Komenda, MD, N. Tangri, MD, PhD, University of Manitoba, Winnipeg, MB

Introduction: Chronic Kidney Disease (CKD) is a potent risk factor for kidney failure, cardiovascular events and all cause hospitalizations. In addition to higher outpatient resource use, patients with CKD may present more frequently to the emergency department (ED) and may be more likely to be admitted for hospitalization. In Manitoba, we previously demonstrated an 8-fold increase in the frequency of ED presentations by patients on dialysis as compared to a non-dialysis population. Comparable data on ED visits remain sparse for patients with CKD G3-G5, not on dialysis. Here, we aim to describe the frequency of ED visits and highlight differences in reasons for visit in patients with CKD stages G3-G5 and those on dialysis when compared to a non-CKD population. **Methods:** We performed a retrospective cohort study using administrative health data from the Winnipeg Regional Health Authority, Canada. We included all adults (≥ 18 years) with CKD stages G3-G5 and patients undergoing dialysis between January 1st, 2010 and December 31, 2014. Secular trends in the rates of ED visits were calculated for those with CKD, those on dialysis and in the non-CKD population. **Results:** Over the study period, patients undergoing dialysis had the highest incidence of ED visits, followed by patients with CKD and those with normal kidney function (150 vs 106 vs 34 per 100 persons per year respectively). These rates were stable over the period studied. Among the non-CKD population, the most common reasons for an ED visit were musculoskeletal complaints (25.6%), followed by gastrointestinal (11.04%) and cardiovascular complaints (10.26%). In the CKD and dialysis cohort, ED visits were more commonly secondary to cardiovascular complaints (21.54% and 18.99% respectively), followed by respiratory and gastrointestinal complaints. Admission to hospital was higher in CKD and dialysis populations than in the non-CKD population (29.56%, 26.07% vs 10.61%, respectively). **Conclusion:** Patients with CKD present frequently to the ED, and are often admitted after presentation. Cardiovascular and respiratory complaints are more common in the CKD population when compared to the general population.

Keywords: chronic kidney disease, dialysis, glomerular filtration rate

P125

Low dose intravenous ketorolac in renal colic, a pilot randomized controlled trial

J. Chao, BSc, MD, MSc, P. Brasher, PhD, K. Cheung, MD, MPH, R. Sharma, MD, BSFN, K. Badke, BScPharm, PharmD, C. Hohl, BSc, MDCM, MHSc, University of British Columbia, Vancouver, BC

Introduction: Non-steroidal anti-inflammatory drugs (NSAIDs) are first-line analgesics for emergency department (ED) patients with renal colic. Lower doses of intravenous (IV) ketorolac may provide similar pain relief to standard dosing in patients with acute pain. Patients with renal colic may be at increased risk of acute kidney injury; exposing them to lower doses of NSAIDs may put them at lower risk while providing equally effective analgesia. We conducted a pilot study to determine the feasibility of a randomized trial

comparing the effectiveness and safety of low with standard ketorolac dosing in ED patients with suspected renal colic. The primary objective was to demonstrate the ability to achieve an enrolment target of 2 patients per week. **Methods:** We enrolled a convenience sample of adults presenting to an academic urban ED with unilateral flank pain suspected to be renal colic. We randomized patients to 10 mg (low dose, intervention) or 30 mg (standard dose, control). Participants, treating physicians and nurses, and researchers were blinded to treatment allocation. Our main feasibility outcome was the recruitment rate. Secondary outcomes were changes in pain scores (0-10) at 30 and 120 minutes post-ketorolac administration, vital signs, adverse events and ED length of stay. **Results:** We approached 82 patients, of whom 47 (57.3%) were eligible. Of these, 36 consented to participating and 30 were randomized. The proportion of screened patients who were enrolled was 36.6% (30/82). We completed enrolment over a 21-week period, with an average recruitment rate of 1.5 patients/week (range 0-4). The average baseline pain score for all participants was 6.9 (SD = 2.1). At 30 minutes post-ketorolac administration, the low dose group had a mean pain reduction of 2.0 points compared to a pain reduction of 1.7 in standard dose group (difference = 0.3, 90% CI: -0.7 to 1.4). **Conclusion:** These preliminary results support the possibility that low dose ketorolac may be efficacious in this patient population. We did not meet our target recruitment of 2 patients per week as this was primarily due to restricted recruitment hours. To successfully conduct a larger trial, we would need to expand both recruitment hours and the number of sites.

Keywords: ketorolac, pain control, renal colic

P126

Utilization and outcomes of children presenting to an emergency department by ambulance

Z. Cantor, BA, M. Aglipay, MSc, A. Plint, MD, MSc, Children's Hospital of Eastern Ontario, Ottawa, ON

Introduction: Children account for a low proportion of paramedic transports. Evidence suggests that many pediatric transports are of low acuity, but there are few studies comparing these patients to those that self-present to the ED. Our primary objective was to determine if illness severity was associated with presentation by ambulance among pediatric patients. **Methods:** We undertook a single centre, retrospective cohort study at a tertiary care pediatric centre. All patients presenting to the ED in 2015 by any route other than air ambulance were eligible. Patients were divided into two groups based on the route of presentation – ambulance or self-presentation. The primary outcome was disposition decision; the secondary outcome was CTAS level. To determine whether patient discharge disposition or CTAS was associated with the method of arrival, we conducted generalized estimating equations (GEE) to account for correlation within patients with multiple ED visits. **Results:** Of the 69,092 visits, 69,034 were eligible and analyzed. Of those, 4478 (6.5%) arrived by ambulance, while 64,556 (93.5%) self-presented. Those arriving by ambulance had a median age of 10 years [IQR: 2-5 years] vs. 4 years [IQR: 1.75-10 years] in the self-presenting group and were 52.6% male (vs. 52.8%). Two percent of the ambulance cohort were admitted to the ICU (vs. 0.2%), and 16.6% were admitted to the ward (vs. 5%). Patients presenting by ambulance had higher CTAS scores – 5.3% CTAS 1 (vs. 0.3%), 16.4% CTAS 2 (vs. 7.0%), 61.2% CTAS 3 (vs. 45.8%), and 17.1% CTAS 4-5 (vs. 46.9%). The odds of arriving by ambulance were 10.2 x higher for patients admitted to the ICU (OR = 10.2, 95%CI: 7.9 to 13.3) vs.

those discharged home. The odds of arriving by ambulance were 64.2 x (OR = 64.2, 95% CI: 48.6 to 84.7) higher for patients CTAS 1 patients vs. CTAS 5 patients. The top 3 complaints among ambulance patients were neurological (22.5%), respiratory (22.7%), and orthopaedic (11.3%). Among self-presenting patients, the top three were general/minor (20.4%), respiratory (16.4%), and gastrointestinal (14.3%). **Conclusion:** Children presenting to the ED via ambulance are at higher risk for admission to the ward and critical care unit. It is important that paramedics have sufficient training to ensure adequate skills to manage critically ill children. Given the low proportion but higher severity of illness of pediatric transports, further research and consideration must be given to how best to enable paramedics in the management of children.

Keywords: emergency medical services, paediatrics, prehospital

P128

Emergency physician efficiency benchmarking and diagnostic imaging use

S. Weerasinghe, PhD, N. Chandratilleke, BSc, S. Campbell, MBChB, Dalhousie, Halifax, NS

Introduction: As part of our audit and feedback process, Emergency Physicians (EP) are provided feedback on flow metrics and resource utilization. We analysed the relationship between two specific metrics (adjusted workload measurement (AWM), with the number of patients seen per hour adjusted according to CTAS, and percentage of revisits within 72 hours and diagnostic imaging use. Unfortunately, we are unable to evaluate quality of care, nor appropriateness of DI indication at this stage. **Methods:** We used data from 86 physicians at an academic ED, from June 1, 2015 to May 31, 2017. The Data Envelope Analysis (DEA) model incorporated performance quality measures as outputs and efficiency measures as inputs. DEA is a method widely used in physician performance analysis. The method provides a score (optimal performance efficiency-OPE) for each EP based on maximization of the performance (AWM) in proportion to the combination of efficient use of resources, diagnostic imaging (DI). The score was used to regress against demographic characteristics and training. **Results:** The median AWM was 6.8 (quartiles Q1-Q3 = 6.4-7.4) with the median diagnostic imaging use of percentages of CT (median = 10.1, 8.6-11.9), US (median = 4.7, 3.6-5.6) and x-ray (80, 74-84). The EPs who had highest AWM combined with least use of DI (OPE = 100%), provided median AWM of 9.1 (range 8.9-9.7) with percentage CT, US and x-ray medians at 5.8% (range 5.8-6.2), 2.7% (range 2.4-3.6) and 59% (range 59-72). These provided benchmarks for optimal performance indicators. We found statistically significant differences of OPE scores based on gender (men 4.1 times higher, $p < 0.001$) and degree (RCPS < CCFPEM, Other < CCFPEM, $p < 0.001$). Overall AWM diminishes at the rate of 14% (95%CI: 9-20%) for a combination of 100 DI tests ordered. In order to reach the optimal level of performance, to reach an OPE of 100%, the median CT use percentage needs to be reduced by 6% (quartile range 3.9- 7.7%), US by 2.2% (quartile range 1.5-3.4%) and x-rays by 37.2% (quartile range: 26.8-44.3%). Return visit rates were not associated with DI use, possibly due to homogeneity in the percentage of return visits. **Conclusion:** We found significant performance variations in terms of average workload measurement in proportion to the weighted average of diagnostic imaging use, with increased use of DI being associated with decreasing AWM. Percentage of return visits does not appear to be useful as a performance indicator.

Keywords: audit and feedback, diagnostic imaging, efficiency

P129

A phase IV real world study on the use of low dose methoxyflurane (PENTHROX™) for the treatment of moderate to severe trauma pain in the Canadian emergency department (ADVANCE-ED): an interim report on secondary outcomes

S. Campbell, MBChB, E. Simard, MD, A. Arcand, MD, HBSc, L. Blagrove, BScN, P. Piraino, PhD, S. Dhani, PhD, Dalhousie University, Halifax, NS

Introduction: Inhaled low dose methoxyflurane (MEOF) was recently approved in Canada for the short-term relief of moderate to severe acute pain associated with trauma or interventional medical procedures in conscious adult patients. ADVANCE-ED is an ongoing phase IV, prospective open label study undertaken to generate real-world evidence to complement the global clinical development program through evaluation of the effectiveness of low dose MEOF in Canadian emergency departments (EDs). **Methods:** This multicentre study is enrolling adult (≥ 18 yrs) patients with moderate to severe acute pain ($\text{NRS0-10} \geq 4$) associated with minor trauma. To address limitations from the pivotal study, this study allows patients who were excluded in the pivotal trials: namely, those with severe (≥ 7) pain, and those using OTC or stably dosed analgesics for other conditions, including chronic pain. Eligible patients receive a single treatment of up to 2 x 3 mL MEOF (2nd 3 mL to be provided only upon request), self-administered by the patient under medical supervision. Rescue medication is permitted at any time, if required. **Results:** Here we describe the patient demographics and treatment satisfaction (Global Medication Performance, GMP) at 50% enrolment ($n = 49$). Mean (SD) patient age is 48.0 (17.1) yrs and 55.1% are female. Mean pain (SD) reported at enrolment is 8.3 (1.5), with 73.4% of patients with $\text{NRS0-10} \geq 8$. Injuries are overwhelmingly limb trauma (87.8%). The most common type is sprain/strain (40.8%), followed by fracture (32.7%). At 5 minutes post-start of administration (STA) of MEOF, 80.4% of patients reported pain relief; this increased to 91.3% at 15 minutes, and 100% of patients reported pain relief by 30 minutes post-STA. GMP was assessed as "good", "very good" or "excellent" by $\geq 80\%$ of patients both 20 minutes post-start of administration (STA) of MEOF (83.3%) and at discharge (85.8%). When asked to what extent their expectation of pain relief had been met, 32.7% responded good, 26.5% responded "very good" and 22.4% responded "excellent". Three quarters of enrolled patients (75.5%) did not require rescue medication. The most common ($\geq 5\%$) treatment-related adverse events were dizziness ($n = 14$, 28.6%) and euphoric mood ($n = 4$, 8.2%). No serious adverse events have been reported. **Conclusion:** Based on 50% of the patients enrolled in this prospective, open label study, responses to inhaled low-dose MEOF are within expectation for both effectiveness and tolerability.

Keywords: low-dose methoxyflurane, real-world evidence, trauma

P130

Feasibility of self-assessing functional status in older emergency department patients

V. Boucher, MSc, V. Boucher, MSc, M. Lamontagne, PhD, J. Lee, MD, MSc, M. Émond, MD, MSc, CHU de Québec-Université Laval, Québec, QC

Introduction: Geriatric Emergency Department (ED) guidelines recommend systematic screening of older patients for geriatric syndromes. However, compliance issues to this recommendation have already been observed. Self-assessment tools could be an interesting

solution as self-assessed general, mental and physical health was shown to be predictive of functional decline and mortality. The Older Americans Resources and Services scale (OARS), is a simple geriatric functional assessment scale that is widely used by professionals to quantify patients' ability to perform activities of daily living (ADL) and instrumental activities of daily living (IADL). However, its use as a self-assessment tool has never been tested. Objective: to evaluate the feasibility of the self-assessed OARS compared to its standard administration by a research assistant (RA) in older ED patients. **Methods:** A planned sub-analysis of a single center randomized cross-over pilot study in 2018 was realized. Patients aged ≥ 65 who consulted to the ED for any medical reason were included. Patients were excluded if they: 1) required resuscitation (CTAS 1); 2) were unable to consent/to speak French; 3) had a physical condition preventing the use of an electronic tablet. Patients were randomized 1:1 to either 1) tablet-based functional status self-assessment or 2) the RAs questionnaire administration at first, after which they crossed-over to the other assessment method. Paired t-tests were used to assess the score differences. **Results:** 60 patients were included. Mean age was 74.4 ± 7.6 and 34 (56.7%) participants were women. Mean OARS score according to RA was 25.1 ± 3.3 and mean self-assessed OARS score was 26.4 ± 2.5 ($p < 0.0001$). There was also differences when looking at the AVQ and AIVQ separately. Mean AVQ scores were 12.5 ± 1.8 and 13.5 ± 0.9 ($p < 0.0001$) and mean AIVQ scores were 12.6 ± 1.8 and 12.9 ± 1.8 ($p = 0.04$) for RA assessment and self-assessment, respectively. **Conclusion:** Our results show a statistically significant difference between RA assessment and patient self-assessment of functional status, and this difference seems to be more pronounced regarding AVQ than AIVQ. The study confirms that self-assessment of functional status by older ED patients is feasible, but further testing is required in order to confirm the validity and psychometric values of this self-administered version of the OARS.

Keywords: emergency department, functional status, self-assessment

P131

Practice patterns of emergency department physicians administering naloxone for patients with suspected opioid overdose

M. Blaszk, BSc, MD, S. Chilton, BSc, MD, K. Van Aarsen, MSc, J. Yan, MD, MSc, S. Detombe, PhD, S. Knezevic, BSc, M. Riggan, BSc, MD, Schulich School of Medicine and Dentistry, Western University, London, ON

Introduction: Naloxone is recommended for reversing opioid-associated respiratory depression. There is wide variability in emergency department (ED) practice patterns regarding naloxone use, dosing, and observation time post-administration. This study describes the naloxone practice patterns of ED physicians managing suspected opioid overdose patients. **Methods:** A retrospective chart review was conducted of adult patients (≥ 18 years) presenting to an academic tertiary care centre (consisting of two EDs with an annual census 150,000 visits) in 2017 with suspected opioid overdose who were administered naloxone in the ED. Patients were identified electronically and the following information was abstracted from patient charts: demographics, naloxone dosage and infusion initiation, disposition data, indications for naloxone administration, response to therapy, and adverse effects. Variability in initial and total dose was examined. Initial dose was also compared in those with cardiorespiratory compromise (CPR given, respiratory rate < 8 , or desaturation below 89%) using independent samples median tests. Data was

analyzed using standard descriptive statistics. **Results:** 113 patients met inclusion criteria. Indications for naloxone administration were: level of consciousness (50.5%), respiratory depression (4.0%), miosis (1.0%), a combination of factors (19.8%), or undocumented (24.8%). Median initial dose was 0.40 mg (IQR: 0.20-0.40 mg). Median total naloxone administered in the ED was 0.48 mg (IQR: 0.35-1.2 mg). The initial dose resulted in a response in 43.1% of patients, with 36.0% of responding patients later experiencing subsequent respiratory depression. 31% of patients received a naloxone infusion. Initial dose in patients with cardiopulmonary compromise was significantly different only comparing patients who received CPR versus those who did not (median 0.40 mg; IQR: 0.20-0.80 mg; $P = 0.019$). Four patients experienced emesis following naloxone. Median length of ED stay was 7.0 hours (IQR: 4.0-9.5 hours), and median hospital length of stay was 3.0 days (IQR: 1.0-5.0 days). Median ED observation time prior to discharge was 4.0 hours (IQR: 2.0-8.0 hours). Ultimate disposition home, to the ward, or to the intensive care unit was 47.1%, 42.2%, and 9.8% respectively (1.0% deceased). **Conclusion:** The dose and usage of naloxone by ED physicians in this study is variable. Further prospective studies are needed to determine the effective naloxone dosing strategy.

Keywords: naloxone, opioid, overdose

P132

Optimizing a physician surge protocol to address emergency department wait times during times of increased patient demand
T. Bhate, BSc, MD, MHSc, S. Dowling, BA, MD, N. Collins, MD, University of Calgary, Calgary, AB

Background: Emergency Department overcrowding remains a significant problem. Interventions have often focused on areas external to the ED, with patient flow in the ED receiving less attention. Efforts to address ED flow are complicated by daily fluctuations in patient volume and acuity. Our local protocol brings in additional physicians when internal metrics indicate patient demand can't be met by current physician resources (a 'surge' period). However, anecdotal evidence suggests a lack of satisfaction and efficacy. We therefore undertook a project to improve our local management of these surge periods.

Aim Statement: To improve the effectiveness of an ED Physician Surge Protocol to allow for a physician scheduling strategy that is reflective of the needs of the ED. **Measures & Design:** This project consists of 3 phases. Phase 1 was an analysis of current surge metrics (including frequency, temporal patterns and physician response), with concurrent literature search to identify any best practices or easily addressable protocol changes, with first planned PDSA cycle. Phase 2 is a mixed methods survey of local staff to identify barriers and enablers of our current protocol, concurrent with a national survey of current practices. Phase 3 will be the implementation of a revised protocol, followed by a second mixed methods survey and analysis of metrics of interest. **Evaluation/Results:** Analysis of surge data (Oct 2018-Oct 2019) demonstrated a high volume of surges per month (78.7 +/- 10.9), highest at Foothills Medical Centre (94.3). Across all sites, afternoon periods had highest frequency of surges (absolute peak 1400 - 1500) with a secondary peak 2200-2300, both peaks occurring most frequently on weekends (Fri-Sun) However, physician response to surge calls was < 10% (5.8-9.1%), with no discernable temporal pattern, even accounting for the significant number of automatic surge calls cancelled by clinicians. Analysis of data, in addition to literature review and engagement with senior administration suggested no immediate protocol changes, therefore project

moved to 2nd phase. This phase is currently in progress, with planned analysis using Pareto Chart methodology. **Discussion/Impact:** Our initial data clearly demonstrates that current procedures are inadequate to address this ongoing issue, with no readily apparent solutions. Analysis of local barriers and enablers is currently underway, in addition to a national survey, with the results expected to inform an extensive redesign of current procedures.

Keywords: emergency department flow, emergency department staffing, quality improvement and patient safety

P133

A novel addictions curriculum for emergency medicine residents
B. Bérczi, BMBS, BComm, K. Chan, MD, BEng, McMaster University, Hamilton, ON

Innovation Concept: In the era of the current opioid crisis, addiction medicine is becoming a core competency of patient care. Despite the prevalence of addiction-related presentations, there is a paucity of formal education on the topic in emergency medicine; with time and lack of qualified staff cited as barriers to implementation. We aimed to correct this gap in education through the curriculum design of an addictions elective that can be easily implemented by Emergency Medicine Program Directors across Canada. **Methods:** Learning objectives were developed based on expert consensus and the list of entrustable professional activities (EPAs) mandated by the Royal College. A local needs assessment was conducted to identify existing addictions curriculum and identify opportunities for improvement. **Curriculum, Tool, or Material:** A one-month block addictions selective was developed specifically for emergency medicine residents. Elements of this curriculum included a suggested schedule, a list of supplemental resources, and an evaluation tool to track EPAs. A pre and post survey was created for distribution to all participants to track knowledge acquisition and to collect feedback on the education intervention. In the 2019-2020 academic year, 4 residents participated in this selective and multiple have expressed interest for the future. **Conclusion:** In Ontario alone, the rate of opioid-related deaths has quadrupled and has escalated to a rate of 2 deaths every day. Alcohol and other substance use is commonly a chief concern, catalyst, or comorbidity for patient presentations in the emergency department. Our selective curriculum seeks to address a gap for emergency medicine residents. Ongoing program evaluation will take place to continue to optimize this learning experience.

Keywords: addictions, innovations in education, opioids

P134

Orthopedic procedural videos as teaching tools in emergency medicine

N. Bazaracai, MD, BASc, J. Dong, BSc, MD, McMaster University, Hamilton, ON

Innovation Concept: Video has been proven to be an effective educational tool that is valued by learners and objectively improves knowledge and testing scores. It can simplify complex concepts and is more efficient and effective than audio or reading in tests of 3-day material recall. Our objective in this project was to develop a series of instructional videos geared towards emergency and family physicians on proper application of casts and splints in the emergency department. **Methods:** We created two procedural videos, each 5-6 minutes long. They each reviewed the process, indications, and precise steps for application for each of two splints: the ulnar gutter and the thumb spica. After finalizing the videos, we created a survey

to assess feedback, asking questions about the applicability of the videos to the viewer's clinical practice, how interesting they found the content of the videos, what they liked and disliked, and how willing they would be to access future procedural videos if we were to make them. We also had respondents provide suggestions for topics of future videos. We then sent the videos and accompanying survey to a group of McMaster University medical students, residents, and attending physicians in family medicine and emergency medicine. Upon reviewed the results it seemed that there was a large difference in perceived utility of the videos between attending physicians and trainees, and so we proceeded with subgroup analysis of trainees and staff. **Curriculum, Tool, or Material:** Orthopedic procedural videos as described above. **Conclusion:** Using a 5-point Likert scale, we found that overall trainees (4.3, SD 0.76 CI 0.41) found the videos more useful and interesting than did attending physicians (3.4, SD 0.68 CI 0.37), with respondents commenting that they were very clear and easy to follow for junior trainees. Most respondents also indicated that they would access future videos we made (4.2 SD 0.74 CI 0.39 for trainees, 3.2 SD 0.65 CI 0.34) for attendings). Future directions include making the videos more concise and adding more visual summaries to improve viewership, and targeting videos for specific learner level. We are hoping to implement these videos into future curriculum development for our learners and, if successful, other Emergency Medicine residency programs across Canada.

Keywords: innovations in EM education, procedural skills

P135

Administrative codes for heat illness: a validation study in Ontario, Canada

H. Baassiri, BSc, T. Varghese, BSc, M. Columbus, PhD, K. Clemens, MD, MSc, J. Yan, MD, MSc, Schulich School of Medicine and Dentistry, London, ON

Introduction: Extreme heat events due to climate change are becoming increasingly frequent and severe, and may have an impact on human health. Administrative database studies using International Classification of Diseases 10th revision codes (ICD-10) are powerful tools to measure the burden of acute heat illness (AHI) in Canada. We aimed to assess the validity of the coding algorithm for emergency department (ED) encounters for AHI in our region. **Methods:** Two independent reviewers retrospectively abstracted data from 507 medical records of patients presenting at two EDs in Ontario between May-September 2015-2018. The Gold Standard definition of an AHI is chart-documented heat exposure with a heat related complaint, such as syncope while working outdoors on a hot day. To determine ICD coding algorithm positive predictive value (PPV), records that were previously coded as ICD-10 heat illnesses were compared to the Gold Standard for AHI. To determine sensitivity (Sn), specificity (Sp) and negative predictive values (NPV), the Gold Standard was compared to randomly selected records. A total of 326,702 ED visits were included in study period with 208 having an ICD-10 code related to heat illness. Sample size calculation demonstrated a need to manually review 62 previously coded heat illnesses and 931 random cases, of which 50 and 474 have been reviewed, respectively. In both abstractions, 20% of cases underwent a blinded duplicate review. **Results:** In our review of 474 random records, 2 cases were identified as AHI but without an appropriate ICD-10 code, 445 were not AHIs, and no cases had been identified as having an AHI ICD-10 inappropriately applied. In our review of 50 previously coded heat illnesses, 34 were

found to be appropriately coded and 16 inappropriately coded, as AHI ICD-10. Average patient age and gender of heat illness vs non-heat illness ED presentations were 32 and 48 years of age and 49% and 64% male, respectively. The leading complaint in AHI was heat stroke/exhaustion (39%), followed by headaches (15%), dizziness (9%), shortness of breath (9%) and syncope/presyncope (6%). 76% of all heat illness presentations presented following a period of physical exertion. **Conclusion:** Final calculation of Sn, Sp, PPV, NPV for the algorithm will occur upon completion of the review. Preliminary results suggest that ICD-10 coding for AHI may be applied correctly in the ED. This study will help to determine if administrative data can accurately be used to measure the burden of heat illness in Canada.

Keywords: coding, heat, validation

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What happens to bypassed trauma patients meeting Field Trauma Triage standards?

M. Austin, MD, J. Sinclair, MSc, S. Leduc, BSc, S. Duncan, J. Rouleau, BSocSc, P. Price, MMngt, C. Evans, MD, MSc, C. Vaillancourt, MD, MSc, The Ottawa Hospital, Ottawa, ON

Introduction: Prehospital field trauma triage (FTT) standards were reviewed and revised in 2014 based on the recommendations of the Centers for Disease Control and Prevention. The FTT standard allows a hospital bypass and direct transport, within 30 min, to a lead trauma hospital (LTH). Our objectives were to assess the impact of the newly introduced prehospital FTT standard and to describe the emergency department (ED) management and outcomes of patients that had bypassed closer hospitals. **Methods:** We conducted a 12-month multi-centred health record review of paramedic and ED records following the implementation of the 4 step FTT standard (step 1: vital signs and level of consciousness (physiologic), step 2: anatomical injury, step 3: mechanism and step 4: special considerations) in nine paramedic services across Eastern Ontario. We included adult trauma patients transported as urgent that met FTT standard, regardless of transport time. We developed and piloted a data collection tool and obtained consensus on all definitions. The primary outcome was the rate of appropriate triage to a LTH which was defined as: ISS ≥ 12 , admitted to intensive care unit (ICU), non-orthopedic surgery, or death. We have reported descriptive statistics. **Results:** 570 patients were included: mean age 48.8, male 68.9%, falls 29.6%, motor vehicle collisions 20.2%, stab wounds 10.5%, transported to a LTH 76.5% (n = 436). 72.2% (n = 315) of patients transported to a LTH had bypassed a closer hospital and 126/306 (41.2%) of those were determined to be an appropriate triage to LTH (9 patients had missing outcomes). ED management included: CT head/cervical spine 69.9%, ultrasound 53.6%, xray 51.6%, intubation 15.0%, sedation 11.1%, tranexamic acid 9.8%, blood transfusion 8.2%, fracture reduction 6.9%, tube thoracostomy 5.9%. Outcomes included: ISS ≥ 12 32.7%, admitted to ICU 15.0%, non-orthopedic surgery 11.1%, death 8.8%. Others included: admission to hospital 57.5%, mean LOS 12.8 days, orthopedic surgery 16.3% and discharged from ED 37.3%. **Conclusion:** Despite a high number of admissions, the majority of trauma patients bypassed to a LTH were considered over-triaged, with a low number of ED procedures and non-orthopedic surgeries. Continued work is needed to appropriately identify patients requiring transport to a LTH.

Keywords: bypass, paramedic, trauma

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Distal radial fractures: adequacy of reductions performed in the emergency department

P. Atkinson, BSc, MBChB, MA, R. Montazeri, MD, J. Wagg, MD, J. Mayich, MD, H. King, MD, J. Swan, MD, J. Fraser, BN, S. Benjamin, BN, A. Sibley, MD, Dalhousie University, Saint John, NB

Introduction: Distal radial fractures (DRF) remain the most commonly encountered fracture in the Emergency Department (ED). The initial management of displaced DRFs by Emergency Physicians (EP) poses considerable resource allocation. We wished to determine the adequacy of reduction, both initially and at follow up. This data updates previously presented high level findings. **Methods:** We performed a mixed-methods study including patients who underwent procedural sedation and manipulation by an EP for a DRF. Radiological images performed at initial assessment, post-reduction, and clinic follow up were reviewed by a panel of orthopedic surgeons and radiologists blinded to outcomes, and assessed for evidence of displacement. Demographic data were pooled from patient records and included in statistical analysis. **Results:** Seventy patients were included and had follow-up completed. Initial reduction was deemed to be adequate in 37 patients (53%; 95% CI 41.32 to 64.10%). At clinic follow-up assessment, 26 reductions remained adequate; a slip-page rate of 30% (95% CI of 17.37 to 45.90). Overall 7 patients (10%; 95% CI 4.65 to 19.51%) required revision of the initial reduction in the operating room. Agreement on adequacy of reduction on post-reduction radiographs between radiologists and orthopedic surgeons was 38.6% (95% CI -38.3 to -7.4, Kappa -0.229). The statistical strength of this agreement is worse than what would be expected by chance alone. There was no association found between age, sex, or of time of initial presentation and final outcomes. **Conclusion:** Although blinded review by specialists determined only half of initial EP DRF reductions to be radiographically adequate, only 10 percent actually required further intervention. Agreement between specialists on adequacy was poor. The majority of DRFs reduced by EPs do not require further surgical intervention.

Keywords: emergency department, fractures, reductions

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Parental leave policies and culture for physicians in emergency medicine

J. Andruko, BHSc, MD, T. Green, MD, MSc, University of British Columbia, Vancouver, BC

Introduction: Medicine demands a sacrifice of physicians' personal life, but culture has slowly changed towards valuing a balanced work life. Parental leave is linked to better physical and mental health, but policies and culture surrounding parental leave are largely unstudied in the Canadian Emergency Medicine landscape. Anecdotally, experiences vary widely. This study was designed to determine what proportion of Canadian Emergency Departments have formal parental leave policies (maternity, paternity, and other ex. adoption) and what proportion of Canadian EM physicians are satisfied with their department's parental leave policies. **Methods:** Two surveys were generated; one to assess attitudes and experiences of emergency physicians, and a second survey for department chiefs assessed the policies and their features. These were approved by the UBC REB and distributed through the CAEP Research Committee. Primary outcomes were physician satisfaction with their department's parental leave policy (4-5/5 Likert Scale), and departments with a formal parental leave

policy (Y/N). **Results:** 38% (8/21) of department chiefs reported having a formal policy for maternity leave, 29% (6/21) for paternity leave, and 24% (5/21) other. The survey of Emergency Physicians revealed similar rates at 48% (90/187) maternity, 40% (70/184) paternity, 29% (53/181) other. Among physicians who were aware of them, 69% (62/90) were somewhat or very satisfied with the maternity leave policies, 58% (51/88) with paternity leave policies, and 48% (39/81) with other parental leave. Less than 10% were somewhat or very dissatisfied with any of these. Several department chiefs commented that they had never refused anyone parental leave, but have no formal policy. However, 87% (147/187) of physicians reported a formal maternity leave policy was somewhat or very important to them; similarly 80% (134/187) paternity leave. Less than 15% felt each was somewhat or extremely unimportant. **Conclusion:** Presence and type of parental leave policy varies across the country. Most physicians were satisfied with the support they had available, but the vast majority felt that a formal maternity and paternity leave policy itself was important. This study would suggest that, without actually changing practice, the introduction of a formal parental leave policy is of value. Our research group will use this data to collaborate on a template parental leave policy to be made available for this purpose.

Keywords: leadership, policy, wellness

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The impact of a pancreatitis admission algorithm on emergency department length of stay in a tertiary care academic hospital

A. Albina, BHSc, MD CM, F. Kegel, BHSc, F. Dankoff, BSc, MDCM, G. Clark, MD, McGill University Health Centre, Westmount, QC

Background: Emergency department (ED) overcrowding is associated with a broad spectrum of poor medical outcomes, including medical errors, mortality, higher rates of leaving without being seen, and reduced patient and physician satisfaction. The largest contributor to overcrowding is access block – the inability of admitted patients to access in-patient beds from the ED. One component to addressing access block involves streamlining the decision process to rapidly determine which hospital service will admit the patient. **Aim Statement:** As of Sep 2011, admission algorithms at our institution were supported and formalised. The pancreatitis algorithm clarified whether general surgery or internal medicine would admit ED patients with pancreatitis. We hypothesize that this prior uncertainty delayed the admission decision and prolonged ED length of stay (LOS) for patients with pancreatitis. Our project evaluates whether implementing a pancreatitis admission algorithm at our institution reduced ED time to disposition (TTD) and LOS. **Measures & Design:** A retrospective review was conducted in a tertiary care academic hospital in Montreal for all adult ED patients diagnosed with pancreatitis from Apr 2010 to Mar 2014. The data was used to plot separate run charts for ED TTD and LOS. Serial measurements of each outcome were used to monitor change and evaluate for special cause variation. The mean ED LOS and TTD before and after algorithm implementation were also compared using the Student's t test. **Evaluation/Results:** Over four years, a total of 365 ED patients were diagnosed with pancreatitis and 287 (79%) were admitted. The mean ED LOS for patients with pancreatitis decreased following the implementation of an admission algorithm (1616 vs. 1418 mins, $p=0.0006$). The mean ED TTD was also reduced (1171 vs. 899 mins, $p=0.0006$). A non-random signal of change was suggested by a shift above the median prior to algorithm implementation and one below

the median following. **Discussion/Impact:** This project demonstrates that in a busy tertiary care academic hospital, an admission algorithm helped reduce ED TTD and LOS for patients with pancreatitis. This proves especially valuable when considering the potential applicability of such algorithms to other disease processes, such as gastrointestinal bleeding and congestive heart failure, among others. Future studies demonstrating this external applicability, and the impact of such decision algorithms on physician decision fatigue and within non-academic institutions, proves warranted.

Keywords: emergency department, length of stay, quality improvement and patient safety

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Variability in practice patterns in the emergency department treatment of hyperkalemia

R. Alaraimi, MBChB, S. Gosselin, MD, G. Clark, MD, H. Gangatharan, MBS, R. Tam, MD, E. Villeneuve, B.Pharm, MSc, PharmD, C. Meyers, MD, D. Iannuzzi, MSc, A. Grunbaum, MD, McGill University, Montreal, QC

Introduction: Hyperkalemia is a common electrolyte disturbance associated with morbidity and mortality. Commonly used therapies for hyperkalemia include IV calcium, sodium bicarbonate, insulin, beta-adrenergic agents, ion-exchange resins, diuretics and hemodialysis. This study aims to evaluate which treatments are more commonly used to treat hyperkalemia and to examine factors which influence those clinical decisions. **Methods:** This is a retrospective chart review of all cases of hyperkalemia encountered in 2017 at a Canadian adult ED. Potassium values were classified as mild (5.5 - 6.5 mEq/L), moderate (>6.5 - 7.5 mEq/L) and severe (>7.5 mEq/L). Treatment choices were then recorded and matched to hemodynamic stability, degree of hyperkalemia and ECG findings. More statistical methods to test correlation between treatment and specific variables will be performed over the next 2 months, including logistic regression to highlight potential determinants of treatment and Chi-square tests to verify randomness and to construct 95% confidence intervals. **Results:** 1867 ED visits were identified, of which 479 met the inclusion criteria. 89.1% of hyperkalemia cases were mild, 8.2% were moderate, and 2.7% were severe. IV insulin was used in 22.1% of cases, followed by Kayexalate in 20.5%, sodium bicarbonate in 12.3%, IV calcium in 9.4%, frusemide in 7.3%, salbutamol in 2.7%, and dialysis in 1.9%. Moderate and severe hyperkalemia were associated with higher use of insulin (79.5% and 64.3% respectively), IV calcium (41% and 64.3% respectively), sodium bicarbonate (56.4% and 85.7% respectively). Bradycardia was associated with higher insulin and IV calcium use (46.7% and 33.3% respectively). Hypotension was associated with a similar increase in use of insulin and IV calcium (34.2% and 23.7% respectively). There were only 15 cases of cardiac arrest in which sodium bicarbonate and IV calcium were more frequently used (80% and 60% respectively). **Conclusion:** This study demonstrates variability in the ED management of hyperkalemia. We found that Insulin and Kayexalate were the 2 most common interventions, with degree of hyperkalemia, bradycardia and hypotension influencing rates of treatment. Overuse of kayexalate for emergent treatment of hyperkalemia is evident despite weak supporting evidence. Paradoxically, beta adrenergic agents were underutilized despite their rapid effect and safer profile. The development of a widely accepted guideline may help narrow the differences in practice and potentially improve outcomes.

Keywords: emergency, hyperkalemia, potassium

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Education innovation: Equity, Diversity, Advocacy, and Cultural Safety (EDACS) curriculum

C. Acton, MBChB, E. Dell, MD, MPH, K. Hayman, MD, MPH, University Health Network, Toronto, ON

Innovation Concept: Upon completion of training, Canadian physicians are expected to respond to patient needs to advocate for change both within and beyond the immediate clinical environment.¹ In the current EM curriculum, residents are not explicitly taught skills necessary to engage in clinical care nor policy change that would improve the social determinants of health (SDOH) of patients. In response to this challenge, we have developed and are piloting a 2 year curriculum on "Equity, Diversity, Advocacy, and Cultural Safety (EDACS)", to equip EM trainees with the knowledge and skills to advocate and influence policy - to empower residents to act on healthcare inequities rather than simply be aware of them. **Methods:** We developed the curriculum utilizing the Structural Competency paradigm, a theoretical framework within which clinical and advocacy skills to address the SDOH at a structural level can be taught and practiced. This paradigm includes five intersecting skill-sets, including recognizing the structures that shape clinical interactions, developing an extra-clinical language of structure, and imagining structural interventions. **Curriculum, Tool, or Material:** The educational intervention will consist of 8 hour-long sessions and one 3-hour long session held over a 2-year period. The 3-hour long session will consist of a walking tour of sites accessed by individuals living in poverty in the Toronto downtown core, including a homeless shelter, a needle exchange program, and others. This session will be facilitated by a physician lead, with input at each site from community organizers. Prior to the walking tour, residents will receive an introductory session outlining themes to reflect on during and after the walking tour. Hour-long sessions will be delivered by invited healthcare providers with specific clinical expertise in the topics of discussion, which will address the care of and advocacy for various marginalized populations. **Conclusion:** To our knowledge, this is the first curriculum of its kind being implemented in an EM training program in Canada. Upon completion of the curriculum, students will be able to apply the five skillsets outlined in the Structural Competency Framework to address and improve upon inequitable conditions that influence patients treated in the emergency department. We intend to use formal and informal feedback from residents, clinicians, and lecturers to refine future curriculum cycles, and hope to inform similar programs elsewhere.

Keywords: advocacy, cultural safety, innovations in EM education

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Perspectives of medical students and undergraduate students on their experience as medical scribes in the Saint John Regional Hospital Emergency Department

I. Abelev, BSc, D. Lewis, BSc, MBChB, J. Fraser, BN, P. Atkinson, MBChB, Dalhousie University, Saint John, NB

Introduction: Electronic medical records (EMR) have placed increasing demand on emergency physicians and may contribute to physician burnout and stress. The use of scribes to reduce workload and increase productivity in emergency departments (ED) has been reported. This objective of this study was to evaluate the educational and experiential value of scribing among medical and undergraduate students. We asked: "Will undergraduates be willing to scribe in exchange for clinical exposure and experience?"; and, "Should

scribing be integrated into the medical school curriculum?" **Methods:** A mixed-methods model was employed. The study population included 5 undergraduate, and 5 medical students. Scribes received technical training on how to take physician notes. Undergraduate students were provided with optional resources to familiarize themselves with common medical terminology. Scribes were assigned to physicians based on availability. An exit interview and semi-structured interviews were conducted at the conclusion of the study. Interviews were transcribed and coded into thematic coding trees. A constructivist grounded theory approach was used to analyze the results. Themes were reviewed and verified by two members of the research team. **Results:** Undergraduate students preferred volunteering in the ED over other volunteer experiences (5/5); citing direct access to the medical field (5/5), demystification of the medical profession (4/5), resume building (5/5), and perceived value added to the health care team (5/5) as main motivators to continue scribing. Medical students felt scribing should be integrated into their curriculum (4/5) because it complemented their shadowing experience by providing unique value that shadowing did not. Based on survey results, five undergraduate students would be required to cover 40 volunteer hours per week. **Conclusion:** A student volunteer model of scribing is worthwhile to students and may be feasible; however, scribe availability, potentially high scribe turnover, and limited time to develop a rapport with their physician may impact any efficiency benefit scribes might provide. Importantly, scribing may be an invaluable experience for directing career goals and ensuring that students intrinsically interested in medicine pursue the profession. Medical students suggested that scribing could be added to the year one curriculum to help them develop a framework for how to take histories and manage patients.

Keywords: emergency medicine, medical education, scribe

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The use of the erector spinae plane block to decrease pain and opioid consumption in the emergency department: A literature review

K. Abdelhamid, H. ElHawary, MSc, J. Turner, MD, MSc, McGill University Faculty of Medicine, Montréal, QC

Introduction: Acute pain represents one of the most common reasons for emergency department (ED) visits. In the opioid epidemic that North America faces, there is a significant demand for novel pain control modalities that are both safe and effective. Regional anesthesia techniques have revolutionized perioperative pain management, and they are currently thought to be indicated for acute pain relief in the ED. The erector spinae plane block (ESPB) is a novel regional block that has the ability to block multidermatomal sensation, including cervical, thoracic and lumbar regions, depending on the vertebral level at which the anesthetic is injected along the erector spinae muscle. Under ultrasound guidance, the landmarks involved are easy to identify, and there are no vital structures in the immediate vicinity of the site of injection. By reviewing the literature on ESPB, this review aims to summarize all its indications and efficacy for acute pain management in the ED. **Methods:** In April 2019, PUBMED, EMBASE, MEDLINE as well as CINAHL databases were systematically searched for articles discussing the use of ESPB in the ED. In compliance with the PRISMA guidelines, the search results were selected against inclusion and exclusion criteria. Due to the novelty of the block, all types of articles were included. **Results:** Ten studies on 7 different indications have been published on the use of ESPB in the ED. It is currently most commonly used for rib and spine fractures. Other indications include, mechanical back pain, burn injuries, herpes zoster, renal colic, and acute pancreatitis. ESPB was administered at the vertebral level of region of most pain, unilaterally or bilaterally for complete dermatomal block. It was injected as a single or continuous block - in the seated, lateral, or prone position. All of the studies demonstrate a significant reduction in pain. Furthermore, it has been reported to improve respiratory function, and it has not been associated with any complications following administration. **Conclusion:** This review shows initial data on the promising effect of ESPB in acute pain management in the ED. Current evidence shows its effectiveness and safety for the most common presenting cases of pain, such as rib and spine fracture, mechanical back pain, burn injuries, herpes zoster, renal colic, as well as acute pancreatitis. ESPB is flexible in administration and relatively easy to perform under ultrasound guidance.

Keywords: opioid addiction, pain management, regional anesthesia

On behalf of the CAEP Research Committee, it is our pleasure to introduce the dedicated team of volunteers who made CAEP's 2019/20 Grant and Abstract Competitions such a huge success. We could not have achieved this without the support of our volunteers and our generous EM Advancement Fund (EMAF) donors.

Sincerely,
Andrew McRae, MD, PhD

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Questions? Contact:

CHRISTINA BOVA
SENIOR MANAGER MEMBERSHIP & PUBLIC AFFAIRS
CBOVA@CAEP.CA

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"I am a pediatric emergency physician at the Stollery Children's Hospital (Edmonton) and an Associate Professor of Pediatrics at the University of Alberta. I have a research program that is studying the best ways to treat children's pain in the emergency department. After securing protected time and a small amount of start-up funds for a teeny tiny research program, I joined forces with Dr. Amanda Newton, and we secured a second CAEP grant of \$5000. This allowed me to delve into the word of both physical and psychological pain in the ED. Now, flash forward 6 years, and my research team has grown. We have secured both provincial and national funding for the study of acute pain in children. I have national and international collaborations for trials, systematic review, knowledge translation, and quality improvement projects in this area. CAEP provided me with my first peer-reviewed grants, and this gave me 'legitimacy' when applying for other external funding. On a national level, CAEP has supported pediatric emergency researchers, and shown the emergency medicine community that our littlest of patients matter."

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