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 breeches 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. Vajihi, MSc, A. Azuelos, MD, S. Rosenthal, MD, D. Hopkins, MD, R. Aroutiunian, 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% 0.89-0.92]. **Conclusion:** Machine learning can predict admission to a hospital from the ED using variables that area collected as part of