days. Time-series models have traditionally been used in econometrics to develop financial models, but have been adapted in other fields, such as health informatics. This study uses a time-series approach to assess whether these impressions are valid. **Methods:** The daily volume of patients presenting to four emergency departments (ED) at the Nova Scotia Health Authority from Jan 2010 to May 2015 were analyzed to assess for the effect of previous volumes on future volumes. Parameters were selected using the auto-correlation (ACF) and partial auto-correlation functions (PACF) for a Seasonal Auto-regressive Integrated Moving Average (SARIMA) model. The Box-Jenkins statistic was assessed for model suitability. To assess for accuracy, a forecast of the model was evaluated with a year of volumes set aside for testing. **Results:** The EDs saw an average of 365.1 patients per day, with a minimum of 188 patients and a maximum of 479. The increasing trend in volumes consistent with the increasing number of ED presentations nation-wide was detrended using linear regression. There was a significant correlation in ACF with the previous day ($\rho_1 = 0.297$). A seasonal, periodic trend was seen weekly. Significant correlations occurred annually ($\rho_{365} = 0.279$) and at 29 days ($\rho_{29} = 0.339$), consistent with the lunar cycle. A seasonal model was postulated incorporating an auto-regressive (AR) coefficient, and a moving average (MA) coefficient for the previous day's volume. An AR and MA seasonal coefficient were each incorporated using the weekly period. When using the model on the test data, the model predicted 4 more patient presentations on average than the true value, with 90% of the values within 37 presentations of the true volume. The Box-Jenkins statistic was non-significant, indicating no problems with model specification. **Conclusion:** The volume of patients presenting to an ED system is correlated with that of the previous day. A weekly seasonal variation was confirmed. Auto-correlations also occur annually and possibly associated with the lunar cycle. Previous ED volumes may be useful in forecasting patient volumes. The time-series approach may discover further ways to predict ED volumes.

Keywords: crowding, time-series, forecasting

P018

A prospective diagnostic support tool for the differentiation of abdominal pain in the adult emergency department population

M.B. Butler, MSc, T. Kenney, PhD, H. Gu, PhD, A. Carter, MD, S. Ling, MSc; Dalhousie University, Halifax, NS

Introduction: The chaotic environment of the emergency department has a deleterious effect on clinical judgement. The diagnosis of abdominal pathology is difficult to differentiate. There are also many diagnoses that could be considered abdominal in nature, exacerbating the task of diagnosing these patients. We propose a novel machine-learning method, Hierarchical Structured Models (HSMs), to provide an adjunct to clinician judgement, that provides a ranking of the probabilities of a patient having each of 39 abdominal pathologies, using only variables at the triage stage of emergency department care, and compare its performance to several machine-learning methods. **Methods:** This was a retrospective analysis of 25,861 patients that presented with one of 39 ICD-9 abdominal pathologies. 90% of the data was used to build and fine-tune the model, and 10% was used for testing. Predictors included age, gender, triage vitals and presenting complaint. All variables were solely collected from the Emergency Department Information System (EDIS). A decision tree structure was built using hierarchical clustering algorithms, and then a support vector machine (SVM) was fit at each node. To optimize the parameters for each node, a grid-search method was used to maximize ten-fold classification accuracy. The output of the decision tree was the probability of a particular presentation having each of the 39 diagnoses. This output was translated to a ranking of the relative likelihood of each of the diagnoses as a suggestion system for the treating physician. The accuracy of the system on the test set was compared to conventional machine-learning methods: pair-wise SVMs, gradient boosted models (GBM), neural networks (NN) and k-nearest neighbours (KNN). **Results:** The HSM ranked the correct diagnosis first 51.0% of the time, and ranked the correct diagnosis within the top three ranks 67.6% of the time. The most accurate model was GBMs (52.3%), and the least was neural networks (50.4%). **Conclusion:** The HSM approach using only variables available electronically at triage successfully ranked the correct diagnosis 51.0% of the time, and within the top three 67.6% of the time. Future research will focus on the inclusion of clinically lab results and radiology reports that are available electronically to improve HSM accuracy, and supplement physician diagnosis.

Keywords: machine-learning, artificial intelligence

P019

Understanding patient perceptions of emergency department wait time publication: a mixed-methods needs assessment

S.M. Calder-Sprackman, BSc, BPHE, MD, E.S. Kwok, MD, R. Bradley, MSc, J. Landreville, BSc, MD, L.A. Calder, MD, MSc; University of Ottawa, Ottawa, ON

Introduction: Many emergency departments (EDs) have begun publishing wait times. This study seeks to develop an understanding of patients' needs with respect to publishing ED wait times, which, to our knowledge, has not been described in the literature. **Methods:** We conducted a two-stage mixed methods study at a dual campus tertiary care academic center. First, we held focus group discussions comprising of 7 patient advocacy hospital committee members. Themes generated from focus group discussions were then utilized to create a patient survey. Focus groups were analyzed using content theme analysis. Hospital sites for survey administration were randomized and pre-assigned shifts were established to ensure a balance of weekdays, weekends, days, evenings, and overnights. All adult patients (age > 18) in the waiting room were eligible, but excluded if they were directly referred to a specialty service or did not speak French or English. Survey data was analyzed using descriptive statistics. **Results:** We found 9 dominant focus group themes: definition of wait time, wait time posting, lack of communication, education in waiting room, patient expectations, utilization of the ED, patient behavior, physical comfort, and patient empowerment. Of the 240 patient questionnaires administered, 81.3% (195) wanted to know ED wait times before arrival to hospital and 90.8% (217) wanted ED wait times posted in the ED waiting room. The most popular choice for publishing wait times outside the ED was a website (46.7%) whereas, within the ED, patients were not particular about the specific display modality as long as times were displayed (39.6%). Overall, 76.7% (184) stated their satisfaction with the ED would be improved if wait times were posted. **Conclusion:** ED patients we surveyed strongly supported both the idea of having access to wait time information prior to arrival, as well as physical display of wait times in the waiting room.

Keywords: wait-times, patient-centered, waiting room

P020

Paramedic comfort with providing palliative support: pre-implementation survey

A. Carter, MD, MPH, M. Arab, MSW, M. Harrison, BSc, J. Goldstein, PhD, J. Jensen, MAHSR, M. Lecours, MD, K. Houde, BSc, K. Downer, MSc; Dalhousie University, Halifax, NS

Introduction: Paramedics are sometimes called for crisis management and relief of symptoms or for patients receiving palliative care. To address the mismatch between the system protocols and resources, and patient's goals of care, a new protocol, new medications, and an 8-hour training program Learning Essentials Approach to Palliative Care (LEAP) were implemented in our provincial EMS system. **Methods:** Prior to attending their training session paramedics received an invitation to complete an online survey regarding their comfort, confidence, and attitudes toward delivering palliative care. Comfort and confidence questions were scored on a 4-point Likert scale, while attitudes toward specific aspects of care were scored on a 7-point Likert scale. Descriptive statistics were calculated. Identifiers will permit linkage of these responses to a repeat survey post-implementation. **Results:** 188 (58%) paramedics completed the survey of the 325 who opened the link. 134 (68%) were male with a mean age of 38.5 years. 95 (50%) were primary care paramedics. The average experience as a paramedic was 12.7 years, with an estimated mean number of palliative calls per year of 9.6 each. On a 4 point scale, most (156, 83%) were comfortable with providing care to someone with palliative goals, and 130 (69.1%) were comfortable providing care without transport. Only 82 (43.6%) were confident they had the tools to deliver this care, and 76 (40.4%) were confident they could do so without transport to hospital. On a 7 point scale, paramedics disagreed with the statement "caring for dying persons is not a worthwhile experience for me", median 7 (IQR 5-7). Paramedics also disagreed with the statement "Dying persons make me feel uneasy", median 5 (IQR 4-6). **Conclusion:** Prior to the implementation of the new protocol, medications, and training, most paramedics were comfortable with the concept of providing care with palliative goals and felt that caring for dying persons is a worthwhile experience, but they were not confident that they have the tools and resources to do so. This suggests paramedics would be open to system improvements to meet an unmet healthcare need for crisis management of patients with palliative goals of care.
Keywords: system design, paramedic, expanded scope

P021
Impact of emergency department surge and end of shift on patient workup and treatment prior to referral to internal medicine
V. Charbonneau, MD, MSc, I.G. Stiell, MD, MSc, E.S. Kwok, MD, L. Boyle, MD; University of Ottawa, Ottawa, ON

Introduction: The goal of this study was to determine if emergency department (ED) surge and end of shift assessment of patients affect the extent of diagnostic tests, therapeutic interventions performed and accuracy of diagnosis prior to referral of patients to Internal Medicine as well as the impact on patient outcomes. **Methods:** This study was a health records review of consecutive patients referred to the internal medicine service with an ED diagnosis of heart failure, COPD or sepsis, at two tertiary care EDs. We developed a scoring system in consultation with senior emergency and internal medicine physicians to uniformly assess the treatments and investigations performed for patients diagnosed in the ED with heart failure, COPD or sepsis. These scores were then correlated with surge levels and time of day at patient assessment and disposition. Rate of admission and diagnosis disagreements were also assessed. **Results:** We included 308 patients (101 with heart failure, 101 with COPD, 106 with sepsis). Comparing middle of shift to end of shift, the overall weighted mean scores were 92.2% vs. 91.7% for

investigations and 73.5% vs. 70.0% for treatments. Comparing low to high surge times, the overall weighted mean scores were 89.9% vs. 92.6% for investigations and 68.6% vs. 71.7% for treatments. Evaluating each condition separately for investigations and treatments according to time of shift or surge conditions, there were no consistent differences in scores. We found overall high admission rates (93.1 % for heart failure, 91.1% for COPD, 96.2% for sepsis patients), and low rates of diagnosis disagreement (4.0 % heart failure, 10.9% COPD, 8.5% sepsis). **Conclusion:** We found that surge levels and end of shift did not impact the extent of investigations and treatments provided to patients diagnosed in the emergency department with heart failure, COPD or sepsis and referred to internal medicine. Admission rates for the patients referred were above 90% and there were very few diagnosis disagreements or diversion to alternate service by internal medicine. We believe this supports the emergency physician's ability to adapt to time and surge constraints, particularly in the context of commonly encountered conditions.
Keywords: Surge

P022
Geriatrics care in the ED: Acute care use after the introduction of an interdisciplinary care program in Sunnybrook Health Sciences Centre's Emergency Department
N. Khatib, MD, CM, MBA, J. Charles, MD, MSc, J.S. Lee, MD, MSc; University of Toronto, Toronto, ON

Introduction: Currently the top 5% of complex patients consume 84% of Ontario's Hospital and Home Care costs. There is a critical need for a dynamic, person-centred care planning process for medically complex patients with real time dialogue between ED/acute care and community care providers at care transitions. A care pathway was developed in the Sunnybrook Health Science Centre's Emergency Department using quality improvement methodology and team. The purpose of this study is to evaluate the impact of the emergency room huddle for complex care patients on emergency doctors' perceptions of patient safety and ED efficiency measures such as department flow and delays. **Methods:** **Intervention -** Medically complex patients with frequent ED use are now automatically flagged upon registration in the Emergency Department (ED) and an ED Care Coordination team is notified by secure email: GEM nurse, ED CCAC Care Coordinator, SW, OT/PT. The GEM nurse initiates a comprehensive patient assessment in the Emergency Department right after triage and the CCAC Care Coordinator initiates a teleconference with the patient's family physician and community Care Coordinator with the patient's consent. Usual physician assessment is preceded and followed by an inter-professional huddle (including the EM doctor, GEM nurse, CCAC nurse and SW, OT, PT) to ensure patient's needs, goals and team recommendations are clear. Emergency doctors who have participated in an inter-professional huddle for complex care patients are contacted via a semi-structured interview and Qualtrics surveys evaluating perceptions of patient safety and ED efficiency measures such as department flow and delays. **Results:** Qualitative analysis of the results will be conducted and results updated at a later date. **Conclusion:** Safety is enhanced through better communication between ED providers, patients, their family physicians and community care providers. It is essential that the inter-professional huddle is recognized by emergency physicians as an important element of patient safety and care. An evaluation of ED doctor's perception of the huddle will help us understand enablers and barriers to the process and inspire further quality improvements to enhance patient care.
Keywords: geriatrics, communication, patient-centered care