

P071**Artificial intelligence in emergency medicine: A scoping review**

A. Kirubarajan, 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; I² = 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; I² = 47%). Three studies assessing patient follow-up interventions showed no difference in ED utilization (RR 0.69; 95% CI: 0.38 to 1.25; I² = 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 on 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.