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Artificial intelligence in emergency medicine: A scoping review

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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

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Preventing emergency department visits among patients with cancer: a scoping review

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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

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Emergency department trauma team in situ simulations at an urban, academic centre to improve team communication and detect latent safety threats

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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

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