INPLASY

Harnessing Artificial Intelligence for Crisis Management: A New Era in Disaster Medicine

INPLASY2025100033

doi: 10.37766/inplasy2025.10.0033

Received: 9 October 2025

Published: 10 October 2025

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ADMINISTRATIVE INFORMATION

Support - No financial support.

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2025100033

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 10 October 2025 and was last updated on 10 October 2025.

INTRODUCTION

Review question / Objective In populations impacted by disasters within a VUCA (Volatile, Uncertain, Complex, and Ambiguous) context, including both victims and emergency medical service providers, how does the integration and application of Artificial Intelligence in disaster medicine and emergency management enhance the efficiency of crisis management? Specifically, how do these technologies contribute to reducing response times?
Therefore, this scoping review will focus on disaster responders as the target population. The primary concept under review is artificial intelligence (AI), including its subtypes. As for the context, it centered on disaster response time.

Background Challenges in disaster medicine arise as it focuses on mass populations rather than individual patient care. In near-ideal resource settings, a critical priority lies in maximizing benefits under scarcity, triage, and surge capacity. As the era of AI continues to progress, it has come to encompass various subfields such as machine learning (ML), deep learning, expert systems, natural language processing, and sometimes robotics. Over the years, this has enabled AI to be applied across many dimensions of disaster medicine, opening new possibilities for overcoming challenges in crisis management. For instance, the speed and accuracy of patient prioritization in mass casualty and disaster settings can be enhanced through AI-based triage systems. Additionally, AI facilitates early warning systems for natural hazards, resource allocation, and anticipating outbreak risk prediction.

Rationale Healthcare systems are increasingly strained due to the continuous surge in disasters frequency, scale, and complexity lies. Thus, exposure of limitations of traditional disaster strategies have become apparent, while emerging AI opportunities. With AI advances in predictive analysis, real-time surveillance, decision-making,

triage optimization, early warning systems, and resource allocation in crisis settings. Despite the growing literature in AI healthcare and emergency response, there remains to be a gap in specific evidence related to disaster medicine evidence. Such review will help guide researchers in shaping a new era of disaster management. Therefore, the objective of this scoping review is to map the evidence of AI in disaster response, including real-time management, preparedness, response time, and accuracy.

METHODS

Strategy of data synthesis Following the literature search of articles utilizing predetermined keywords, the identified studies will be transferred to Rayyan, a digital platform designed to eliminate duplicates and facilitate double-blinded screening. Two reviewers will evaluate the titles and abstracts of the searched articles in a double-blinded manner to determine the relevance of the articles to be included in the scoping review. In instances where a reviewer is uncertain about the relevance of an article, the full text will be reviewed to make a determination.
In cases where there is disagreement between the two reviewers regarding the inclusion of an article, a third reviewer will assess its relevance through a discussion with both reviewers. Following the inclusion of all articles based on their titles and abstracts. A second screening will be conducted, during which the full-text of each article will be evaluated by two independent reviewers to determine their relevance and extract the
pertinent data. Following the full-text evaluation, in the event of any disagreement between the two
reviewers, a third reviewer will be consulted to resolve the discrepancy. To ensure adherence to the standards for scoping reviews in preparation for publication in a peer-reviewed journal, the selection process will comply with the PRISMA-ScR article selection guidelines, along with the corresponding flow diagram. As part of the study selection process, a piloting phase will be conducted. For title and abstract screening, two reviewers will independently screen the first 50 abstracts. Similarly, a pilot will also be conducted for full-text screening using the first 10 studies. The results of the piloting will be compared, and any discrepancies will be discussed until agreement is reached among the reviewers. This piloting step will help ensure consistency in the application of the eligibility criteria and will improve the reliability of the screening process before proceeding with the full review.

Eligibility criteria Studies were included in this review if they were relevant to the fields of disaster medicine and emergency management, with a specific emphasis on the application of artificial intelligence (including deep learning, machine learning, and neural networks) within the context of disaster medicine. as well as the deployment of AI in crisis situations. Eligible studies were those published between 2019 and 2024 and written in English. All types of studies were considered, including but not limited to reviews, cohort studies, and cross-sectional studies. However, grey literature was excluded from this review.

Source of evidence screening and selection The search will be conducted comprehensively across five databases, including PubMed, MEDLINE, Web of Science, ScienceDirect, and EBSCO. This will involve the use of individual keywords or combinations of keywords, employing Boolean operators such as AND and OR. The search will not be restricted solely to the articles identified through the keywords; rather, it will be augmented by conducting citation tracking and hand-searching within pertinent journals.

Data management Rayyan, a digital platform developed to eliminate duplicate entries and facilitate double-blind screening, will be employed for data management.

Reporting results / Analysis of the evidence N/A.

Presentation of the results The data will be presented in a descriptive format. The findings will be organized in alignment with the review questions. Gaps in the existing literature will be identified, and corresponding recommendations will be offered. Finally, graphs and tables will be utilized to summarize and illustrate the findings.

Language restriction In this scoping review, only articles published in the English language will be considered for inclusion.

Country(ies) involved Saudi Arabia - Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia.

Other relevant information This scoping review aims to elucidate the impact of AI and AI-integrated devices, including drones and robotics, on the transformation of disaster medicine and emergency management. It will explore the innovative tools that these technologies provide, which have the potential to enhance the response

of emergency medical services in catastrophic environments.

Keywords machine learning, deep learning, emergency medical services, AI, artificial intelligence, disastermanagement, crisis management, Emergency management, disaster medicine.

Dissemination plans Ethical approval from the Institutional Review Board (IRB) was not mandatory for this scoping review, as it does not involve human participants or medical records. The authors intend to submit the findings of this scoping review to medical journals and present them at relevant conferences.

Contributions of each author

Author 1 - Taha Masri - Supervision, accountability for all aspects of the work, methodology guidance, and final approval of the version to be published.
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