INPLASY

Protocol for the systematic review on: Digital transformation in health, artificial intelligence and other technologies for patient safety

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ADMINISTRATIVE INFORMATION

INTRODUCTION

Review question / Objective The guiding question was structured using the following strategy: Population (P), Concept (C), Context (C):
P - Patients - Hospitalized patients
C - Medical Informatics - Information Technology - Artificial Intelligence - Technological advances
C - Hospitals - Hospital care
The research question is: ¿What technologies based on artificial intelligence and digital systems have been implemented for patient safety in hospital settings?

Rationale Patient safety is a strategic priority in healthcare systems worldwide, given that adverse events during healthcare are a leading cause of preventable morbidity and mortality, with direct consequences for the quality of care, patient well-being, and the sustainability of hospital resources. The World Health Organization (WHO), in its 2025

report, reaffirmed the need to incorporate innovative technologies as a fundamental condition for ensuring safe, equitable, and inclusive care for the entire population, from birth throughout the life cycle.

In this context, the rapid expansion of artificial intelligence (AI) and other emerging technologies has opened new possibilities for transforming clinical processes by integrating data analysis, automation, and decision support capabilities in increasingly complex healthcare environments. However, their effective integration into the healthcare sector requires not only technological availability but also robust scientific evidence to guide their implementation in a safe, relevant, and integrated manner, aligned with the knowledge and skills of healthcare personnel.

Therefore, this research is justified by the need to systematize the available evidence on the use of AI and other emerging technologies in patient safety,

as a basis for guiding clinical, institutional and health policy decisions based on updated and quality data.

Condition being studied Patient safety is defined as the absence of potential harm associated with healthcare. Despite advances in medicine and hospital management, adverse events continue to represent a public health problem. The WHO estimates that approximately 134 million adverse events occur each year in low- and middle-income countries, contributing to 2.6 million annual deaths. In high-income countries, it is estimated that one in ten patients suffers some harm during hospitalization, with medication errors, healthcare-associated infections, and falls being the most impactful events. This problem not only compromises the lives and well-being of patients, but also generates estimated additional costs of millions of dollars annually for healthcare systems, stemming from prolonged hospitalizations, additional treatment, legal proceedings, and loss of trust in the healthcare institution.

Despite the implementation of international improvement strategies, such as the WHO's Global Patient Safety Challenges, available indicators show that the magnitude of the problem persists, underscoring the urgency of incorporating innovative, evidence-based approaches that allow for an effective and sustained reduction of the risks inherent in healthcare.

METHODS

Search strategy The keywords and their synonyms were identified through the Health Sciences Descriptors (DeCs) and the Medical Subject Headings (MeSH), which were combined using boolean operators (AND, OR) to structure the search strategy presented below:

MEDLINE/PubMed: (("Patient safety" [Mesh] OR "patient safety" OR "safety culture") AND ("Medical Informatics" [Mesh] OR "Information Technology" [Mesh] OR "health information technology" OR "digital health" OR "artificial intelligence" OR "AI"))

Scielo (includes Spanish and Portuguese) (("Patient safety" OR "patient safety" OR "segurança do paciente") AND ("information technology" OR "information technology" OR "tecnologia de la informação" OR "artificial intelligence" OR "artificial intelligence" OR "artificial intelligence"))

ScienceDirect ("patient safety" OR "pacient harm") AND ("information technology" OR "digital health" OR "artificial intelligence" OR "AI" OR "innovation")

Scopus (("patient safety" OR "patient harm" OR "safety culture") AND ("information technology" OR "medical informatics" OR "digital health" OR "artificial intelligence" OR "AI" OR "health innovation")).

Participant or population Research participants may be:
Patients hospitalized in public or private institutions and in home hospitalization
Relatives of the patients
Health professionals.

Intervention NOT APPLICABLE.

Comparator NOT APPLICABLE.

Study designs to be included The studies to be included in the review will be: Cross-sectional studies, Case studies, Cohort studies, Quasi-experimental studies, Controlled trials, Systematic reviews.

Eligibility criteria The inclusion criteria considered were: original and review articles, available in full text, open access, and published in English, Spanish, or Portuguese. Exclusion criteria included: letters to the editor, grey literature, and studies focused exclusively on traditional patient safety strategies.

Information sources The sources of information will be the scientific databases of: PubMed/MEDLINE, Scielo, ScienceDirect and Scopus.

Main outcome(s) This literature review aims to identify the use of artificial intelligence and other technologies for patient safety in healthcare.
The shared bibliographic manager Mendeley will be used for verification and elimination of duplicates. Article selection will be carried out independently by two reviewers, who will perform the screening process in two successive phases: initially, titles and abstracts will be evaluated, and subsequently, the full text of the preselected documents will be read. The entire selection process follows the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Data management Bibliographic data management is done using shared Mendeley, and then a results table will be created in Word.

Quality assessment / Risk of bias analysis The risk of bias assessment of the primary studies will be carried out individually by two reviewers, using the validated tools proposed by the Joanna Briggs Institute (JBI), selected according to the design of each study: cross-sectional studies, case studies,

cohort studies, quasi-experimental studies, controlled trials, and systematic reviews.

Strategy of data synthesis The data obtained will be synthesized through narrative analysis and presented in a results table that includes the following variables: author, year and country of origin, study objective, type of technology used, and its application to patient safety. This synthesis process will allow for the systematic organization, comparison, and interpretation of the findings from the included studies, identifying convergences, divergences, and common patterns among them. Given that the methodological and conceptual heterogeneity of the studies does not permit a quantitative meta-analysis, the integration of evidence will be carried out through qualitative narrative synthesis, grouping the results according to the areas of technological application identified in relation to patient safety. This approach is consistent with the methodological recommendations for scoping reviews and systematic reviews of mixed literature, in which the diversity of primary study designs requires an interpretive approach that assesses both the consistency and transferability of the findings to the clinical setting.

Subgroup analysis The proposed subgroups of analysis correspond to the patient safety objectives established by the WHO, which guide the thematic classification of findings into the following categories: correct patient identification, improvement of effective communication among healthcare professionals, medication safety, prevention of healthcare-associated infections, reduction of the risk of falls and pressure injuries, and safety in clinical procedures. This grouping allows for a structured analysis of the contribution of artificial intelligence and emerging technologies to each of these priority domains, facilitating a comparative interpretation of the available evidence and a comprehensive assessment of their impact on patient safety during hospital care.

Sensitivity analysis To assess the robustness of the results and ensure the transparency of the selection process, a sensitivity analysis was conducted to examine the impact of methodological decisions made during the review on the final conclusions. This analysis includes three levels of evaluation.
The influence of the risk of bias on the synthesis results was assessed by comparing the conclusions drawn from all included studies with those derived solely from studies that scored 80% or higher on the Joanna Briggs Institute (JBI) checklists. This comparison allows us to determine whether studies with a higher risk of bias alter the direction or magnitude of the reported findings.

Language restriction The languages for the search will be: English, Portuguese, and Spanish.

Country(ies) involved Ecuador/ Pontificia Universidad Católica del Ecuador.

Other relevant information No

Keywords patient safety, technology, innovation, artificial intelligence.

Dissemination plans The plan is to disseminate the research results through publication in a journal indexed in scientific databases.

Contributions of each author
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