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A systematic review of the impact of generative artificial intelligence on the cognitive skills of nursing students: educational benefits and risks regarding critical thinking and decision-making

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Risk of bias assessment.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 6 June 2026 and was last updated on 6 June 2026.

INTRODUCTION

Review question / Objective This systematic review aims to analyze the available scientific evidence on the impact of generative artificial intelligence on the development of cognitive and clinical skills among nursing students, considering both its educational benefits and the potential risks of cognitive offloading in terms of critical thinking, clinical judgment, and decision-making.

In nursing students, how does the use of generative artificial intelligence, compared to traditional learning methods, influence the development of critical thinking, clinical judgment, and decision-making?

Rationale The rapid adoption of generative artificial intelligence tools in higher education has transformed teaching and learning processes. In nursing education, these technologies offer opportunities to improve access to information, clinical scenario simulation, and personalized

learning. However, there is concern that overreliance on these tools may encourage cognitive offloading, hindering the development of fundamental skills such as critical thinking, clinical judgment, and independent decision-making. Given that these competencies are essential for safe, evidence-based nursing practice, it is necessary to synthesize the available scientific evidence to understand the benefits and risks associated with the use of generative artificial intelligence in this educational context.

Condition being studied The impact of using generative artificial intelligence on the development of cognitive skills among nursing students, with an emphasis on critical thinking, clinical judgment, and decision-making, while examining the potential risks associated with cognitive delegation during the learning process.

METHODS

Search strategy A systematic review was conducted in accordance with the PRISMA 2020

guidelines, up to May 25, 2026, in six databases: PubMed, Web of Science, Scopus, SciELO, LILACS, and TESIUNAM, using the following search strategy: (((artificial intelligence) AND (nursing education)) AND (critical thinking)) AND (Decision-making). This search strategy was adapted for each database using terms in English and Spanish. Additionally, a search of the gray literature was conducted to identify relevant unpublished studies that could be included in the review. Subsequently, the full texts of the articles that met the eligibility criteria were reviewed. Quality was assessed using JBI tools.

Participant or population Undergraduate nursing students enrolled at the National Autonomous University of Mexico, regardless of academic semester.

Intervention Use of generative artificial intelligence tools for educational purposes, including, but not limited to, ChatGPT, Gemini, Copilot, Claude, and similar technologies used to support learning in academic settings.

Comparator Traditional teaching and learning methods that do not use generative artificial intelligence tools, such as lectures, problem-based learning, independent study, conventional simulation, academic tutoring, or other standard educational methods.

Study designs to be included This review will include original studies that evaluate the impact of generative artificial intelligence on nursing students. Eligible designs will include randomized clinical trials, pre-experimental studies, non-randomized clinical trials, and other quasi-experimental studies with a comparison group or pre- and post-intervention measurements. Analytical observational studies reporting results related to the variables of interest will also be considered.

Eligibility criteria Inclusion Criteria
Original quantitative, qualitative, or mixed-methods studies.
Studies conducted with nursing students.
Research evaluating the use of generative artificial intelligence in educational or clinical-training contexts.
Studies reporting effects on cognitive skills, critical thinking, clinical reasoning, clinical skills, or technological dependence.
Articles available in full text.
Publications in English or Spanish.

Exclusion Criteria
Studies related to non-generative artificial intelligence.
Diagnostic machine learning without educational interaction.
Research focused on other health professions without specific analysis of nursing.
Editorials, letters, commentaries, protocols, and narrative reviews.
Studies without an evaluation of educational or cognitive outcomes.
Duplicate articles.
Publications without access to full text.

Information sources International electronic health sciences databases were used, including PubMed, Web of Science, Scopus, SciELO, and LILACS. Databases used to search for gray literature included TESIUNAM and Google Scholar.

Main outcome(s) The main results of this systematic review will be the effects of generative artificial intelligence on the cognitive skills of nursing students, specifically: critical thinking, clinical judgment, and efficiency and confidence in clinical decision-making, as assessed using validated instruments, standardized scales, or measures reported by the included studies. Both positive effects (improved cognitive performance, enhanced learning, increased diagnostic accuracy, or improved analytical capacity) and potential negative effects associated with the use of generative artificial intelligence (technological dependence, reduced cognitive effort, cognitive delegation, or decreased autonomy in clinical reasoning) will be considered.

Additional outcome(s) As secondary outcomes, we will analyze educational and academic variables related to the use of generative artificial intelligence among nursing students, including: academic performance, the quality of academic work generated with the support of artificial intelligence, artificial intelligence literacy and digital competencies, reported ethical risks, technological dependence, a decline in autonomous learning, impacts on academic integrity, and facilitating factors and barriers to the implementation of generative artificial intelligence in nursing education.

Data management For data management, two reviewers will independently conduct study selection, data extraction, and information verification. All records identified through the search strategy will be exported to an Excel database for organization and storage. Duplicate records will be manually removed to ensure the

accuracy of the process. The retrieved titles and abstracts will be screened by two reviewers according to the previously established inclusion and exclusion criteria. Disagreements will be resolved through discussion and, when necessary, with the involvement of a third reviewer. Potentially eligible studies will proceed to a full-text evaluation. The reasons for exclusion of studies rejected at this stage will be recorded to ensure the transparency and reproducibility of the process. The study selection flow will be documented using a PRISMA flow diagram.

Quality assessment / Risk of bias analysis The methodological quality and risk of bias of the included studies will be assessed as follows: the RoB 2 tool will be used for randomized clinical trials, and the ROBINS-I tool will be used for non-randomized studies. Disagreements will be resolved through discussion and consensus. The results of the assessment will be considered in the interpretation of the findings and in the formulation of the review's conclusions.

Strategy of data synthesis The included studies will be synthesized using a narrative and descriptive approach. Initially, data extraction tables will be developed to summarize the methodological characteristics of the studies, including author, year of publication, country, study design, population characteristics, type of generative artificial intelligence tool used, intervention, comparator, variables assessed, measurement instruments, primary outcomes, and conclusions.

Subgroup analysis If the number and heterogeneity of the studies permit, subgroup analyses will be conducted based on: Type of generative AI tool used (ChatGPT, Gemini, Copilot, or others), students' academic level (by semester), type of educational activity (theoretical learning, clinical simulation, clinical case resolution, academic tutoring), methodological design of the studies, duration of the intervention.

Sensitivity analysis A sensitivity analysis will be conducted by excluding studies with a high risk of bias or low methodological quality to assess the stability and robustness of the results obtained. If a meta-analysis is performed, the effect of including or excluding studies with atypical results will also be explored.

Language restriction Studies published in English and Spanish will be included.

Country(ies) involved Mexico.

Keywords Generative artificial intelligence, nursing education, critical thinking, decision-making.

Dissemination plans The results of this systematic review will be submitted for publication in an international peer-reviewed scientific journal.

Contributions of each author

Author 1 - Samantha Guadalupe De la Riva Juárez - Design of the review; collection, analysis, and interpretation of data; drafting of the manuscript.

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