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Artificial intelligence to support clinical judgement in nursing: A scoping review protocol

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ABSTRACT

Introduction: As artificial intelligence becomes increasingly explored in healthcare, its potential to influence nurses' cognitive processes—including assessment, reasoning, and decision-making—has garnered growing attention. Nevertheless, the extent to which these technologies effectively support clinical judgment in nursing remains insufficiently understood, particularly regarding epistemological alignment, practical implementation, and documented outcomes.
Objectives: To map and characterize the existing literature on how artificial intelligence technologies have been developed, implemented, or evaluated to support clinical judgment in nursing.
Methodology: This scoping review follows the Joanna Briggs Institute guidelines and addresses the question: How has artificial intelligence been used to support clinical judgment in nursing practice? The search will include multiple international databases and grey literature, with no language restrictions, and will cover studies published from January 2015 to June 2025. Article selection will be based on predefined inclusion and exclusion criteria aligned with the Joanna Briggs Institute methodology. Eligible studies will include those involving nurses or nursing students in which artificial intelligence supports cognitive, interpretative, or reasoning processes related to clinical judgment. The final review will be reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines.
Conclusion: The proposed scoping review will systematically map and synthesize evidence on how artificial intelligence supports clinical judgment in nursing. It will analyze the types of artificial intelligence technologies used, the cognitive processes targeted, and the contexts of application. By identifying key findings and gaps, this review aims to clarify the potential of artificial intelligence to enhance nurses' reasoning and decision-making, informing future research and practice.

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INFORMAÇÃO DO ARTIGO

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RESUMO

Introdução: À medida que a inteligência artificial é cada vez mais explorada nos cuidados de saúde, o seu potencial para influenciar os processos cognitivos dos enfermeiros — incluindo a avaliação, o raciocínio e a tomada de decisão — tem suscitado uma atenção crescente. No entanto, a medida em que estas tecnologias apoiam efetivamente o juízo clínico em enfermagem permanece insuficientemente compreendida, particularmente no que diz respeito ao alinhamento epistemológico, à implementação prática e aos resultados documentados.
Objetivos: Mapear e caracterizar a literatura existente sobre o desenvolvimento, implementação ou avaliação de tecnologias de inteligência artificial no apoio ao juízo clínico em enfermagem.
Metodologia: Esta revisão de escopo segue as diretrizes do Joanna Briggs Institute e aborda a questão: De que forma a inteligência artificial tem sido utilizada para apoiar o juízo clínico na enfermagem? A pesquisa incluirá várias bases de dados internacionais e literatura cinzenta, sem restrições de idioma, abrangendo estudos publicados entre janeiro de 2015 e junho de 2025. A seleção seguirá critérios predefinidos alinhados com a metodologia Joanna Briggs Institute, incluindo estudos com enfermeiros ou estudantes de enfermagem em que a inteligência artificial apoie processos cognitivos ou de raciocínio. A revisão final será reportada conforme as diretrizes do *Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews*.
Conclusões: Esta revisão irá mapear e sintetizar a evidência sobre como a inteligência artificial apoia o juízo clínico em enfermagem, analisando tecnologias utilizadas, processos cognitivos visados e contextos de aplicação. Ao identificar resultados e lacunas, pretende clarificar o potencial da inteligência artificial para reforçar o raciocínio e a tomada de decisão dos enfermeiros, orientando futuras investigações e práticas.

Introduction

The promise that artificial intelligence (AI) will revolutionise healthcare has captured imaginations, commanded headlines, and mobilized unprecedented investments.[1,2] Yet for nursing—a profession whose essence lies in the nuanced interpretation of human experience within complex care contexts—this technological revolution presents a profound paradox.[3] While AI excels in pattern recognition and algorithmic processing, the cornerstone competency of clinical judgement in nursing relies on interpretative, relational, and context-sensitive cognitive processes that appear fundamentally at odds with computational logic.[4] This tension raises a critical question: Can AI meaningfully support clinical judgment without fundamentally altering its nature?

Recent evidence indicates that deficits in clinical judgment are a critical contributor to adverse patient outcomes and persistent safety challenges. It has been reported that fewer than 10% of new graduate nurses achieve an acceptable level of clinical judgment upon entering practice, highlighting an important educational gap,[5] and widespread deficits in recognizing and interpreting salient patient data continue to be reported.[6,7] Errors related to medication administration, failure to rescue, and missed care are closely linked to inadequate clinical judgment, resulting in preventable patient harm and increased healthcare costs.[8–10] Moreover, the increasing complexity of patient care, driven by multimorbidity and rapid healthcare knowledge expansion, exacerbates these risks and challenges nurses' capacity to make timely, accurate decisions.[11,12] Addressing these critical gaps requires novel strategies to support clinical reasoning and judgment, including the integration of innovative technologies such as AI.

Clinical judgment in nursing represents far more than decision-making or problem-solving. It constitutes what Tanner describes as "*an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response*"[4](p204). Building upon Benner's[13] foundational work on expertise development, contemporary scholars have refined this understanding through rigorous concept analysis. Connor et al., employing Rodgers' evolutionary method, propose that clinical judgment is "*a reflective and reasoning process that draws upon all available data, is informed by an extensive knowledge base and results in the formation of a clinical conclusion*"[14](p3336). This definition emphasises the

integrative nature of the process, while Uppor et al., using Walker and Avant's framework, identify core attributes including observation, interpretation, prioritisation, response, and reflection.[15]

However, this apparent conceptual clarity masks persistent theoretical confusion. Simmons' seminal analysis revealed troubling inconsistencies in how clinical reasoning, clinical judgment, decision-making, and critical thinking are defined and operationalised across nursing literature.[16] Mohammadi-Shahboulaghi et al. provide a more complex view of clinical reasoning by presenting it as a holistic, recursive activity shaped by both intuitive and analytical processes.[17] The interpretative complexity deepens considering Nagels' conceptualisation of clinical judgment as a cognitive schema that combines data interpretation, rational decision-making, metacognitive control, and evaluation—processes that resist algorithmic reduction.[18]

The stakes of this conceptual ambiguity become particularly acute in high-acuity environments such as intensive care units, where clinical judgment demands rapid synthesis of complex, often contradictory data, timely interventions, and dynamic adaptation to volatile patient conditions.[19] In these contexts, the embodied knowledge and tacit understanding that Robert et al.[20] and Benner[13] identify as central to expert practice become not merely advantageous but essential for patient survival.

Educational institutions have struggled to address these complexities. Despite decades of research and development, nurse educators continue to grapple with fundamental questions about how to teach and assess clinical judgment effectively.[7] Studies by Kerns et al. reveal persistent barriers in faculty preparation, curriculum design, and evaluation methods.[21] Although tools such as the Lasater Clinical Judgment Rubric[22] and simulation-based approaches guided by Tanner's framework have shown promise, the integration of clinical judgment development across nursing curricula remains fragmented and inconsistent.[23,24]

Into this landscape of conceptual uncertainty and pedagogical challenge, AI technologies have entered with remarkable speed and ambitious claims. Contemporary AI systems—encompassing machine learning classifiers, deep learning networks, natural language processing (NLP) algorithms, and large language models (LLMs)—demonstrate unprecedented capabilities in pattern recognition, data processing, and prediction generation.[25,26] These technologies have already found applications in nursing through documentation automation, workflow optimisation, and structured clinical decision support.[27–29]

Yet a fundamental epistemological gulf separates what AI does well—prediction and algorithmic processing—from what clinical judgment requires—interpretative reasoning within relational contexts. This distinction demands careful articulation. Prediction involves estimating outcomes based on data patterns, a task at which contemporary AI excels through statistical analysis of vast datasets. Decision-making typically involves selecting among predefined options based on explicit criteria. Clinical judgment, by contrast, encompasses what Manetti[30] describes as a non-algorithmic, interpretative process in which nurses integrate evidence, contextual knowledge, ethical reasoning, tacit understanding, and relational awareness to determine appropriate actions within unique situational contexts.

This distinction is not merely academic—it carries profound implications for patient safety and professional practice. Without the interpretative work of clinical judgment, AI-generated predictions and recommendations remain what might be termed "epistemically inert"—potentially useful data points that require human cognitive processing to become clinically meaningful and ethically actionable within person-centred care.[31] The challenge lies not in whether AI can generate accurate predictions, but in how these predictions can be meaningfully integrated into the complex cognitive processes that constitute clinical judgment.

Emerging research suggests that certain AI applications—particularly LLMs and NLP systems—may offer novel approaches to supporting components of clinical reasoning, including hypothesis generation, diagnostic clarification, and reflective practice.[32,33] However, significant concerns persist regarding transparency, reliability, and ethical implications of AI integration in clinical judgment processes.[34,35] The potential for AI systems to either mitigate or exacerbate cognitive biases in nursing practice represents a particularly pressing area requiring investigation.[36,37]

From an educational perspective, AI-enabled tools present both unprecedented opportunities and significant risks. While these technologies may enhance clinical judgment, particularly through sophisticated simulation and personalised feedback mechanisms,[38–40] they also raise concerns about professional deskilling, over-reliance on technological support, and the potential erosion of the cognitive capacities that underpin autonomous practice. International professional bodies have begun to articulate such concerns, emphasising that, in the absence of conceptual clarity and theoretical grounding, the uncritical adoption of AI risks undermining core nursing competencies, potentially compromising patient safety and professional standards.[41]

Despite this growing recognition of AI's complex relationship with clinical judgment, existing research synthesis remains inadequate. Preliminary searches conducted in June 2025 across major databases such as MEDLINE (via Pubmed), CINAHL (via EBSCOhost), Scopus (Elsevier), and Web of Science (Clarivate) revealed that, while numerous reviews explore AI applications in nursing education, workflow optimisation, and task automation, none specifically address the interaction between these technologies and the interpretative, reflective, and relational dimensions of clinical judgment. Recent scoping reviews by our team[42] and systematic

reviews by Ruksakulpiwat et al.[28] have identified that existing research focuses primarily on operational applications of AI in nursing practice, revealing an unexplored gap regarding how AI might support—or potentially undermine—the cognitive processes central to professional nursing practice.

Furthermore, searches were also conducted in the PROSPERO and the Open Science Framework (OSF) registries, and no protocols or ongoing reviews were identified addressing this topic. While Fernandes et al.[43] proposed a scoping review on the contributions of AI to decision making in nursing, their focus is broader and operational, primarily addressing general decision support and workflow optimization, without exploring the theoretical, cognitive, and relational aspects of clinical judgment processes.

This gap represents more than a simple oversight; it reflects a critical failure to engage with the theoretical and practical complexities at the intersection of AI and human clinical reasoning. Without a comprehensive understanding of how AI technologies interact with clinical judgment processes, the nursing profession risks either uncritical adoption of potentially problematic technologies or reflexive rejection of genuinely beneficial innovations.

A scoping review is the most appropriate approach to address this complex and emerging field. Following Arksey & O'Malley's framework,[44] refined by Levac et al.[45] and aligned with Joanna Briggs Institute (JBI) guidelines,[46] scoping reviews are designed to map existing knowledge, identify key concepts and gaps, and clarify complex phenomena. Given the nascent state of research at the intersection of AI and clinical judgment, and the need to synthesise evidence across practice, education, and technology, this method represents the optimal choice. The insights generated will inform future theoretical work to advance an epistemologically robust and practice-relevant understanding of AI-supported clinical judgment in nursing.

This scoping review aims to systematically map and synthesize existing knowledge regarding the application of AI technologies to support clinical judgment in nursing practice.

Specifically, this review will:

- Map the landscape of AI technologies that have been applied to support clinical judgment in nursing;
- Identify and categorize the cognitive components of clinical judgment that AI applications target;
- Synthesize evidence regarding outcomes, effectiveness, and challenges of AI-supported clinical judgment;
- Examine contextual factors influencing AI integration across different practice settings;
- Identify knowledge gaps and propose directions for future research and theory development.

By providing this comprehensive mapping, we aim to establish a robust foundation for evidence-informed policy development, educational innovation, and ethical integration of AI technologies in nursing practice. This work will contribute to the emerging theoretical understanding of AI-augmented clinical judgment—a paradigm where technology enhances rather than replaces the cognitive, ethical, and relational dimensions that define professional nursing practice.

The urgency of this synthesis cannot be overstated. As AI technologies continue their rapid proliferation across healthcare settings, the nursing profession faces a critical juncture. The choices made today regarding how these tools integrate with clinical judgment processes will shape the future of nursing practice, education, and professional identity. This review seeks to ensure these choices are informed by rigorous evidence rather than technological enthusiasm or uninformed resistance.

Methodology

The proposed scoping review will be conducted following the latest JBI methodology for scoping reviews.[44,47–49]

This review protocol has been prospectively registered on the Open Science Framework (OSF) under the title "*Artificial Intelligence to Support Clinical Judgement in Nursing: A Scoping Review*" (Registration DOI: https://doi.org/10.17605 /OSF.IO/UH7RA).

The scope of data extraction and synthesis has been designed to provide conceptual insights that will contribute to further theory development.

Review Question

To address the objetive of this review, and using the Population, Concept, Context (PCC) framework recommended by JBI[46], our research question is:

- What AI technologies have been developed, implemented, or evaluated to support clinical judgment processes (Concept) among nurses (Population) in clinical practice and educational settings (Context)?

In addition, the review will explore the following sub-questions:

- In which nursing populations (e.g., registered nurse, advanced practice registered nurse) has AI been applied to support clinical judgment?
- What types of AI systems (e.g., machine learning, rule-based algorithms, LLMs) have been used to support the process of clinical judgment?
- In which clinical settings (e.g., hospitals, ICUs, community care, educational environments) has AI been implemented for this purpose?
- How is "clinical judgment" defined or operationalised in the included studies?
- What components of clinical judgment (e.g., assessment, interpretation, inference, reflection) are targeted by the AI tools?

- What are the reported outcomes, benefits, risks, or challenges associated with AI-supported clinical judgment in nursing?
- What conceptual definitions, attributes, antecedents, and consequences of AI-supported clinical judgment are described in the literature?

Inclusion Criteria

The Participants, Concept, and Context (PCC) mnemonic defines the key criteria that reviewers will use to determine the eligibility of studies for inclusion in this scoping review.[46]

Participants

This review will include studies involving nurses from any field of practice (e.g., general care, critical care, community health, long-term care, or education). Studies involving nursing students may also be included if the intervention or application of AI is explicitly aimed at supporting the development or simulation of clinical judgment. Studies focusing exclusively on other healthcare professionals (e.g., physicians, physiotherapists) will be excluded unless findings related to nurses are clearly reported and distinguishable.

Concept

The core concept under investigation is the use of AI to support clinical judgment in nursing. This includes any form of AI—such as machine learning models, rule-based systems, decision trees, NLP, or LLMs—that is designed or used to assist nurses in interpreting clinical situations, reasoning, prioritizing, anticipating complications, or reflecting on actions. For this review, clinical judgment is defined as the interpretative, evaluative, and reflective process through which nurses assess, analyze, and respond to complex patient conditions.[4,14] Studies that focus exclusively on automated decision-making, task automation, or workflow optimization without reference to cognitive processes, reasoning, or judgment will be excluded.

Context

This review will consider studies conducted in any healthcare setting, including acute care, intensive care units, emergency departments, primary care, community health, long-term care, and nursing education environments. No restrictions will be placed on geographic location, cultural setting, or population subgroup. However, studies that do not clearly describe the nursing context or that present data in a way that prevents the identification of nursing-specific findings will be excluded.

Types of Sources

This scoping review will include a broad range of study designs to comprehensively capture the existing evidence on the use of AI to support clinical judgment in nursing. Eligible sources will encompass experimental and quasi-experimental designs, such as randomized controlled trials, non-randomized controlled trials, pre-post intervention studies, and interrupted time-series analyses. Analytical observational studies, including prospective and retrospective cohort studies, case-control studies, and analytical cross-sectional studies, will also be considered. Descriptive observational designs, such as case series, case reports, and descriptive cross-sectional studies, will be included when relevant.

Qualitative studies will be eligible if they explore nurses' experiences, perceptions, or reasoning processes about AI and clinical judgment. These may include, but are not limited to, research grounded in phenomenology, grounded theory, ethnography, qualitative description, or action research.

In addition, systematic reviews that align with the inclusion criteria and contribute to the review objective will be considered. Theoretical articles, expert opinions, and discussion papers will also be included if they provide relevant conceptual insights into how AI may influence, support, or interact with clinical judgment in nursing contexts.

All sources must explicitly pertain to nursing practice or education and address the cognitive, interpretative, or reasoning dimensions of clinical judgment supported by AI.

Search Strategy

The search strategy will aim to identify both published and unpublished literature relevant to the use of AI to support clinical judgment in nursing. A three-step search strategy will be employed in accordance with the JBI methodology.

First, an initial limited search of MEDLINE (via PubMed) and CINAHL (via EBSCOhost) was conducted to identify relevant articles on the topic. The text words contained in the titles and abstracts of retrieved articles, as well as the index terms used to describe them, were analyzed to inform the development of a comprehensive search strategy. This full strategy will be tailored for use across the following databases and sources of evidence: MEDLINE (PubMed), CINAHL (EBSCO), Scopus (Elsevier), Web of Science (Clarivate), and IEEE Xplore (for technological literature).

The final search strategy, including all keywords and index terms, will be adapted to each information source. Reference lists of all included sources of evidence will be screened to identify additional studies. In particular, the reference lists of included primary studies and relevant systematic reviews will be examined. Where appropriate, citation tracking tools and snowballing techniques will be employed to ensure literature saturation.

The search will include studies published in any language from January 2015 onwards, a timeframe selected to capture contemporary developments in AI driven by advances in deep learning and large language models (LLMs); the review team is proficient in English, Spanish, and Portuguese, enabling direct assessment of articles in these languages, while translations will be sought as needed for other languages to ensure comprehensive coverage.

Sources of unpublished studies and grey literature to be included in the search are: OpenGrey; ProQuest Dissertations & Theses Global; Preprint servers such as medRxiv and arXiv; and Organisational websites such as those of the World Health Organization (WHO) and International Council of Nurses (ICN).

Additionally, expert consultation and contact with corresponding authors of key studies may be undertaken to identify relevant unpublished or ongoing work.

Study/Source of evidence selection

An example of a complete search strategy is documented in detail in Appendix 1, and all procedures will follow best practices in search transparency. If feasible, the strategy will be peer-reviewed using the PRESS checklist (Peer Review of Electronic Search Strategies).[50] Following the search, all identified citations will be imported into Rayyan QCRI, a web-based platform developed to assist with screening in systematic and scoping reviews.[51] Duplicate entries will be automatically identified and removed within Rayyan. Subsequently, two independent reviewers will screen the titles and abstracts against the pre-established inclusion criteria, following a calibration phase through pilot testing.

Full-text articles of potentially relevant studies will then be retrieved and managed using Zotero (Version 7.0.15, Corporation for Digital Scholarship, VA, USA).[52] These full texts will be assessed in detail by two independent reviewers to determine eligibility. Any disagreements arising at any stage of the selection process will be resolved through discussion or with the involvement of a third reviewer. Reasons for exclusion at the full-text stage will be recorded and reported in the final review.

The search and selection process will be documented in full and presented in the final scoping review using a flow diagram, as recommended by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).[53,54]

Data extraction

Data will be extracted by two independent reviewers using a structured data extraction tool developed specifically for this review, based on the JBI data extraction template for scoping reviews. The tool will be pilot-tested on a small sample of included studies (n = 3 to 5) to ensure consistency, clarity, and relevance to the review objectives. Any necessary adjustments will be made to the form following this pilot phase, and the final version will be appended to the full review. If substantial changes are made to the data extraction tool following piloting, these will be transparently reported in the final review. The final version of the extraction form will be included as an appendix.

A draft data extraction form is provided (see Appendix 2). The data extraction tool will be iteratively modified and refined, if necessary, during the data extraction process for each included source of evidence. Any modifications made to the tool will be documented and described in the final scoping review to ensure transparency. Data extraction will be conducted independently by two reviewers. Any discrepancies will be resolved through discussion or, if needed, adjudicated by a third reviewer. When necessary, authors of included studies may be contacted to clarify or provide missing data relevant to the review questions.

Following JBI guidance for scoping reviews, no formal critical appraisal of individual sources of evidence will be undertaken. This review aims to map the existing literature and identify key concepts and research gaps, rather than to assess the methodological quality of included studies.

Data analysis and presentation

The data extracted will be analyzed descriptively and systematically mapped to directly address the objectives and research questions of the review. Results will be presented using a combination of narrative synthesis, tabulated summaries, and graphical representations (e.g., charts or concept maps) to illustrate key characteristics of the included studies, the types of AI tools, the cognitive components targeted, and the reported outcomes. When appropriate, a basic qualitative content analysis will be employed to categorize and synthesize thematic elements related to clinical judgment definitions, conceptual attributes, and contextual factors. This approach aligns with the JBI methodology, ensuring a comprehensive and transparent evidence mapping process.[46,47,49]

A narrative summary will accompany all tabulated and charted results. This summary will synthesise the findings and describe how the evidence relates to the review's objective and questions, identifying patterns, gaps, and implications for nursing practice, education, and future research.

Furthermore, elements of framework synthesis and narrative conceptual synthesis will be employed to facilitate the integration of theoretical and empirical insights. This approach will support the development of subsequent concept analysis and theory synthesis, following the methodological principles outlined by Walker and Avant.[55] Such

integration aims to advance a deeper theoretical understanding of how AI supports clinical judgment in nursing.

Conclusion

This scoping review protocol addresses a critical knowledge gap at the intersection of AI and clinical judgment in nursing. By employing rigorous JBI methodology and focusing specifically on cognitive, interpretative, and reasoning processes rather than operational applications, to our knowledge this review will provide the first systematic synthesis of evidence examining how AI technologies support the core competencies that define professional nursing practice.

The comprehensive search strategy and broad inclusion criteria position this work to generate solid insights into an emerging field characterized by rapid technological advancement and persistent challenges in clinical judgment competency. The expected outcomes will establish a foundational taxonomy of AI applications, identify key research gaps, and provide evidence-informed guidance for technology integration that preserves nursing's humanistic values while leveraging computational capabilities.

The findings of this review have the potential to inform curriculum development, professional competency standards, and implementation policies, establishing a research agenda that engages with fundamental questions about human–machine collaboration in clinical reasoning. The knowledge generated may also guide the development of AI-enhanced tools and frameworks that support, rather than replace, the interpretative wisdom central to nursing practice, thereby advancing both theoretical understanding and practical applications in contemporary healthcare environments.

References

1. Topol EJ. High-performance medicine: the convergence of human and artificial intelligence. *Nat Med*. 2019;25(1):44-56. doi:10.1038/s41591-018-0300-7
2. Bajwa J, Munir U, Nori A, Williams B. Artificial intelligence in healthcare: transforming the practice of medicine. *Future Healthc J*. 2021;8(2):e188-e194. doi:10.7861/fhj.2021-0095
3. Morley J, Machado CCV, Burr C, et al. The ethics of AI in health care: A mapping review. *Soc Sci Med*. 2020;260:113172. doi:10.1016/j.socscimed.2020.113172
4. Tanner CA. Thinking like a nurse: a research-based model of clinical judgment in nursing. *J Nurs Educ*. 2006;45(6):204-211. doi:10.3928/01484834-20060601-04
5. Kavanagh JM, Sharpnack PA. Crisis in Competency: A Defining Moment in Nursing Education. *Online J Issues Nurs*. 2021;26(1):undefined-undefined. doi:10.3912/OJIN.Vol26No01Man02
6. Al-Moteri M, Plummer V, Cooper S, Symmons M. Clinical deterioration of ward patients in the presence of antecedents: A systematic review and narrative synthesis. *Aust Crit Care Off J Confed Aust Crit Care Nurses*. 2019;32(5):411-420. doi:10.1016/j.aucc.2018.06.004
7. Jessee MA. An Update on Clinical Judgment in Nursing and Implications for Education, Practice, and Regulation. *J Nurs Regul*. 2021;12(3):50-60. doi:10.1016/S2155-8256(21)00116-2
8. Mushta J, L Rush K, Andersen E. Failure to rescue as a nurse-sensitive indicator. *Nurs Forum (Auckl)*. 2018;53(1):84-92. doi:10.1111/nuf.12215
9. Chaboyer W, Harbeck E, Lee BO, Grealish L. Missed nursing care: An overview of reviews. *Kaohsiung J Med Sci*. 2021;37(2):82-91. doi:10.1002/kjm2.12308
10. Thomas L, Donohue-Porter P, Stein Fishbein J. Impact of Interruptions, Distractions, and Cognitive Load on Procedure Failures and Medication Administration Errors. *J Nurs Care Qual*. 2017;32(4):309-317. doi:10.1097/NCQ.0000000000000256
11. Huber E, Kleinknecht-Dolf M, Kugler C, Spirig R. Patient-related complexity of nursing care in acute care hospitals - an updated concept. *Scand J Caring Sci*. 2021;35(1):178-195. doi:10.1111/scs.12833
12. Lane A, Landers M, Andrews T. Nebulous Intentioning - Acute hospital nurses' struggle to deliver core nursing care. *J Adv Nurs*. 2020;76(12):3537-3547. doi:10.1111/jan.14546
13. Benner P. From Novice to Expert - Excellence and Power in Clinical Nursing Practice. *AJN Am J Nurs*. 1984;84(12). https://journals.lww.com/ajnonline/fulltext/1984/12000/from_novice_to_expert_excellence_and_power_in.25.aspx
14. Connor J, Flenady T, Massey D, Dwyer T. Clinical judgement in nursing – An evolutionary concept analysis. *J Clin Nurs*. 2023;32(13-14):3328-3340. doi:10.1111/jocn.16469
15. Uppor W, Klunklin A, Viseskul N, Skulphan S. A concept analysis of clinical judgment in undergraduate nursing students. *Nurs Forum (Auckl)*. 2022;57(5):932-937. doi:10.1111/nuf.12757
16. Simmons B. Clinical reasoning: concept analysis. *J Adv Nurs*. 2010;66(5):1151-1158.
17. Mohammadi-Shahboulaghi F, Khankeh H, HosseinZadeh T. Clinical reasoning in nursing students: A concept analysis. *Nurs Forum (Auckl)*. 2021;56(4):1008-1014. doi:10.1111/nuf.12628
18. Nagels M. Le jugement clinique est un schème. Propositions conceptuelles et perspectives en formation: *Rech Soins Infirm*. 2017;N° 129(2):6-17. doi:10.3917/rsi.129.0006
19. Yee A. Clinical decision-making in the intensive care unit: A concept analysis. *Intensive Crit Care Nurs*. 2023;77:103430. doi:10.1016/j.iccn.2023.103430
20. Robert RR, Tilley DS, Petersen S. A Power in Clinical Nursing Practice: Concept Analisys on Nursing Intuiton. *Clin Pract*. 2014;23(5):343-349.
21. Kerns C, Wedgeworth M. Barriers and Facilitators Experienced by Undergraduate Nursing Faculty Teaching Clinical Judgment: A Qualitative Study. *SAGE Open Nurs*. 2024;10. doi:10.1177/23779608241274728
22. Lasater K. Clinical judgment development: Using simulation to create an assessment rubric. *J Nurs Educ*. 2007;46(11):496-503. doi:10.3928/01484834-20071101-04
23. Bussard ME. Evaluation of Clinical Judgment in Prelicensure Nursing Students. *Nurse Educ*. 2018;43(2):106-108. doi:10.1097/NNE.0000000000000432
24. Yuan HB. The objective structured clinical examination (OSCE) in high-fidelity simulations for assessing nursing students' clinical judgment. In: *ACM Int. Conf. Proc. Ser.* Association for Computing Machinery; 2019:136-139. doi:10.1145/3345120.3345127

25. Shortliffe EH, Sepúlveda MJ. Clinical Decision Support in the Era of Artificial Intelligence. *JAMA*. 2018;320(21):2199-2200. doi:10.1001/jama.2018.17163
26. Topol EJ. *Deep Medicine : How Artificial Intelligence Can Make Healthcare Human Again*. First edition. Basic Books; 2019.
27. Hu M, Wang Y, Liu Y, et al. Artificial Intelligence in Nursing Decision-Making: A Bibliometric Analysis of Trends and Impacts. *Nurs Rep*. 2025;15(6):198. doi:10.3390/nursrep15060198
28. Ruksakulpiwat S, Thorngthip S, Niyomyart A, et al. A Systematic Review of the Application of Artificial Intelligence in Nursing Care: Where are We, and What's Next? *J Multidiscip Healthc*. 2024;Volume 17:1603-1616. doi:10.2147/JMDH.S459946
29. Ventura-Silva J, Martins MM, Trindade L de L, et al. Artificial Intelligence in the Organization of Nursing Care: A Scoping Review. *Nurs Rep*. 2024;14(4):2733-2745. doi:10.3390/nursrep14040202
30. Manetti W. Sound clinical judgment in nursing: A concept analysis. *Nurs Forum (Auckl)*. 2019;54(1):102-110. doi:10.1111/nuf.12303
31. Chin-Yee B, Upshur R. The Impact of Artificial Intelligence on Clinical Judgment: A Briefing Document. *Tor AMS Healthc*. Published online 2019.
32. Dos Santos ML, Victória VNG. Critical evaluation of applications of artificial intelligence based linguistic models in Occupational Health. *Rev Bras Med Trab Publicacao Of Assoc Nac Med Trab-ANAMT*. 2024;22(1):e20231241. doi:10.47626/1679-4435-2023-1241
33. Rodrigues D, Cruz-Correia R. Large Language Models in Nursing Education: State-of-the-Art. *Stud Health Technol Inform*. 2024;316:1024-1028. doi:10.3233/SHTI240584
34. Comeau DS, Bitterman DS, Celi LA. Preventing unrestricted and unmonitored AI experimentation in healthcare through transparency and accountability. *Npj Digit Med*. 2025;8(1):1-7. doi:10.1038/s41746-025-01443-2
35. Seo J, Choi D, Kim T, et al. Evaluation Framework of Large Language Models in Medical Documentation: Development and Usability Study. *J Med Internet Res*. 2024;26(1):e58329. doi:10.2196/58329
36. Blease C, Kaptchuk TJ, Bernstein MH, Mandl KD, Halamka JD, DesRoches CM. Artificial Intelligence and the Future of Primary Care: Exploratory Qualitative Study of UK General Practitioners' Views. *J Med Internet Res*. 2019;21(3):e12802. doi:10.2196/12802
37. Thirsk LM, Panchuk JT, Stahlke S, Hagtvedt R. Cognitive and implicit biases in nurses' judgment and decision-making: A scoping review. *Int J Nurs Stud*. 2022;133. doi:10.1016/j.ijnurstu.2022.104284
38. Labrague LJ, AL Sabei S, AL Yahyaei A. Artificial intelligence in nursing education: A review of AI-based teaching pedagogies. *Teach Learn Nurs*. 2025;20(3):210-221. doi:10.1016/j.teln.2025.01.019
39. Labrague LJ, Sabei SA. Integration of AI-Powered Chatbots in Nursing Education: A Scoping Review of Their Utilization, Outcomes, and Challenges. *Teach Learn Nurs*. 2025;20(1):e285-e293. doi:10.1016/j.teln.2024.11.010
40. Ramírez-Baraldes E, García-Gutiérrez D, García-Salido C. Artificial Intelligence in Nursing: New Opportunities and Challenges. *Eur J Educ*. 2025;60(1):e70033. doi:10.1111/ejed.70033
41. American Nurses Association. *The Ethical Use of Artificial Intelligence in Nursing Practice: Position Statement*. ANA Center for Ethics and Human Rights; 2022. Accessed June 20, 2025. https://www.nursingworld.org/globalassets/practiceandpolicy/nursing-excellence/ana-position-statements/the-ethical-use-of-artificial-intelligence-in-nursing-practice_bod-approved-12_20_22.pdf
42. Alves J, Azevedo R, Marques A, Encarnação R, Alves P. Pressure Injury Prediction in Intensive Care Units Using Artificial Intelligence: A Scoping Review. *Nurs Rep*. 2025;15(4):126. doi:10.3390/nursrep15040126
43. Fernandes F, Santos P, Sá L, Neves J. Contributions of Artificial Intelligence to Decision Making in Nursing: A Scoping Review Protocol. *Nurs Rep*. 2023;13(1):67-72. doi:10.3390/nursrep13010007
44. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. 2005;8(1):19-32. doi:10.1080/1364557032000119616
45. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implement Sci*. 2010;5(1):69. doi:10.1186/1748-5908-5-69
46. Peters M, Marnie C, Tricco AC, et al. Updated methodological guidance for the conduct of scoping reviews. *JBI Evid Synth*. 2020;18(10):2119-2126. doi:10.11124/JBIES-20-00167
47. Peters MDJ, Godfrey C, McInerney P, et al. Best practice guidance and reporting items for the development of scoping review protocols. *JBI Evid Synth*. 2022;20(4):953. doi:10.11124/JBIES-21-00242
48. Peters MD, Godfrey C, McInerney P, Munn Z, Tricco AC, Khalil H. Scoping reviews. In: Aromataris E, Lockwood C, Porritt K, Pilla B, Jordan Z, eds. *JBI Manual for Evidence Synthesis*. JBI; 2024. doi:10.46658/JBIMES-24-09
49. Pollock D, Peters MDJ, Khalil H, et al. Recommendations for the extraction, analysis, and presentation of results in scoping reviews. *JBI Evid Synth*. 2023;21(3):520. doi:10.11124/JBIES-22-00123
50. McGowan J, Sampson M, Salzwedel DM, Cogo E, Foerster V, Lefebvre C. PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *J Clin Epidemiol*. 2016;75:40-46. doi:10.1016/j.jclinepi.2016.01.021
51. Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan—a web and mobile app for systematic reviews. *Syst Rev*. 2016;5(1). doi:10.1186/s13643-016-0384-4
52. Takats S, Stillman D, Cheslack-Postava F, et al. Zotero, version 7.0.18; Corporation for Digital Scholarship; Vienna, VA USA, URL: https://www.zotero.org/. https://www.zotero.org/
53. Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med*. 2018;169(7):467-473. doi:10.7326/M18-0850
54. Page MJ, Mckenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*. 2021;372(n71):1-9. doi:10.1136/bmj.n71
55. Walker LO, Avant KC. *Strategies for Theory Construction in Nursing*. Sixth edition. Pearson; 2019.

Appendix 1. Complete search strategy.

A comprehensive search was conducted in MEDLINE (via PubMed) in June 2025.
The search strategy combined both index terms (MeSH) and free-text terms related to three core concepts: (1) artificial intelligence, (2)

clinical judgment, and (3) nursing. Boolean operators (AND/OR) were used to combine search blocks.
The search was limited to studies published in the last 10 years (from January 1, 2015 to June 30, 2025). No restrictions were applied to language or publication type.

Search Number	Search Query	Results
S1	("Artificial Intelligence"[Title/Abstract] OR "Machine Learning"[Title/Abstract] OR "Natural Language Processing"[Title/Abstract] OR "AI"[Title/Abstract] OR "large language model*"[Title/Abstract] OR "LLM"[Title/Abstract] OR "Natural Language Processing"[Title/Abstract] OR "deep learning"[Title/Abstract] OR Chatbot[Title/Abstract] OR "neural network"[Title/Abstract] OR "conversational AI"[Title/Abstract] OR "Artificial Intelligence"[MeSH Terms] OR "Machine Learning"[MeSH Terms] OR "Deep Learning"[MeSH Terms] OR "Natural Language Processing"[MeSH Terms] OR "Large Language Models"[MeSH Terms]) AND (2015/1/1: 2025/6/30[pdat])	377,491
S2	("Cognitive Reasoning"[Title/Abstract] OR "Diagnostic Reasoning"[Title/Abstract] OR "Clinical Judgement"[Title/Abstract] OR "Clinical Judgment"[Title/Abstract] OR "Clinical Reasoning"[Title/Abstract] OR "clinical inference"[Title/Abstract] OR "Decision Making"[Title/Abstract] OR "Clinical Reasoning"[MeSH Terms] OR "Clinical Decision-Making"[MeSH Terms]) AND (2015/1/1: 2025/6/30[pdat])	190,616
S3	(("nurs*"[Title/Abstract] OR "nursing"[MeSH Terms]) OR "Nursing Research"[MeSH Terms] OR "Nurses"[MeSH Terms]) AND (2015/1/1:2025/6/30[pdat])	242,414
S4	S1 AND S2 AND S3	283

Results:
Total records retrieved in MEDLINE (via PubMed): **283**

Appendix 2. Data extraction instrument.

Scoping Review Details	
Scoping Review title	Artificial Intelligence to Support Clinical Judgment in Nursing: a Scoping Review of Current Evidence
Review objective/s	To map and characterise how artificial intelligence has been used to support clinical judgment in nursing practice, identifying conceptual uses, defining attributes, antecedents, consequences, and reported relationships of this phenomenon.
Review question/s	Primary: How has AI been used to support clinical judgment in nursing practice? Sub-questions: What conceptual definitions, attributes, antecedents, and consequences are described in the literature?
Inclusion/Exclusion Criteria	
Population	Registered nurses, nurse specialists, and nursing students
Concept	Use of artificial intelligence to support clinical judgment (interpretative, evaluative, reflective processes) in nursing practice
Context	All healthcare and educational settings relevant to nursing
Types of evidence sources	Quantitative, qualitative, mixed methods studies; theoretical papers; discussion papers; systematic reviews; grey literature
Evidence source Details and Characteristics	
Citation details	Author(s), date, title, journal, volume, issue, pages
Country	Country of study
Context	Clinical or educational setting; healthcare environment
Participants	Nursing role (RN, specialist, student); level of experience; age/sex (if relevant); number of participants
Details/Results extracted from the source of evidence *(in relation to the concept of the scoping review)*	
Term or conceptual label used	Clinical Judgment, Decision Making, Reasoning, Cognitive Reasoning, Diagnostic Reasoning, other
Conceptual definition (if stated)	Definitions or descriptions provided by the authors
Attributes of the concept	Cognitive dimensions (assessment, interpretation, inference, reflection, etc.)
Antecedents (precursors, enabling factors)	Factors identified as influencing the emergence or use of AI-supported Clinical Judgment
Consequences (outcomes, effects)	Individual (nurse), patient, team, organisational outcomes — positive or negative
Components of Clinical Judgment targeted	Assessment, interpretation, inference, prioritisation, hypothesis generation, reflective evaluation
Type of AI used	Machine learning, rule-based systems, neural networks, LLMs, NLP, other
Purpose of AI intervention	What the AI system was designed to support (diagnosis, reasoning, reflection, risk prediction, etc.)
Interaction with cognitive processes	Description of how the AI system interacts with the nurse's cognitive work
Reported benefits	Stated benefits for nurses or patients
Reported risks or challenges	Stated risks, concerns, or limitations
Implications for practice or education	Key implications suggested by the authors
Other notes	Other relevant observations or comments