

Artificial intelligence and nursing: challenges and perspectives in the art of caring

Inteligência artificial e a enfermagem: desafios e perspectivas na arte de cuidar

Inteligencia artificial y la enfermería: desafíos y perspectivas en el arte de cuidar

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RESUMO

Objetivo: A Inteligência artificial refere-se ao conjunto de técnicas e algoritmos que permitem a máquinas e sistemas computacionais realizarem tarefas que, de outra forma, demandariam inteligência humana. O presente estudo é de âmbito teórico-reflexivo, cujo objetivo foi realizar uma análise reflexiva sobre os desafios e as perspectivas da enfermagem com o uso da inteligência artificial nas atividades assistenciais. A busca dos artigos/textos foi realizada em bases e bancos de dados e, após a seleção dos textos publicados, procedeu-se à construção do artigo. Emergiram quatro pontos norteadores: a Inteligência Artificial em enfermagem; as contribuições da Inteligência Artificial para a tomada de decisões em enfermagem; Inteligência Artificial na prática e pesquisa em enfermagem; e a Inteligência Artificial no ensino de enfermagem. A Inteligência Artificial e as inovações tecnológicas visam contribuir para a melhoria das práticas profissionais em saúde. Assim, os enfermeiros devem reconhecer seu papel de coordenadores das tecnologias, garantindo um cuidado seguro, efetivo e centrado no cliente.

Descritores: Inteligência artificial; Enfermagem; Cuidados de enfermagem.

ABSTRACT

Objective: Artificial Intelligence refers to the set of techniques and algorithms that enable machines and computational systems to perform tasks that would otherwise require human intelligence. This is a theoretical-reflective study aimed at conducting a reflective analysis of the challenges and prospects of nursing with the use of artificial intelligence in care activities. The search for articles/texts was conducted in databases and repositories, and after selecting the published texts, the article was constructed. Four guiding points emerged: Artificial Intelligence in nursing; the contributions of Artificial Intelligence to decision-making in nursing; Artificial Intelligence in nursing practice and research; and Artificial Intelligence in nursing education. Artificial Intelligence and technological innovations aim to contribute to the improvement of professional health practices. Thus, nurses must recognize their role as coordinators of technologies, ensuring safe, effective, and client-centered care.

Descriptors: Artificial intelligence; Nursing; Nursing care.

RESUMEN

Objetivo: La inteligencia artificial se refiere al conjunto de técnicas y algoritmos que permiten a las máquinas y sistemas computacionales realizar tareas que, de otro modo, requerirían inteligencia humana. El presente estudio es de carácter teórico-reflexivo y tuvo como objetivo realizar un análisis reflexivo sobre los desafíos y perspectivas de la enfermería con el uso de la inteligencia artificial en las actividades asistenciales. La búsqueda de artículos/textos se llevó a cabo en bases de datos y bancos de información, y tras la selección de los textos publicados, se procedió a la elaboración del artículo. Surgieron cuatro ejes orientadores: la inteligencia artificial en enfermería; las contribuciones de la inteligencia artificial para la toma de decisiones en enfermería; la inteligencia artificial en la práctica y la investigación en enfermería; y la inteligencia artificial en la enseñanza de enfermería. La inteligencia artificial y las innovaciones tecnológicas buscan contribuir a la mejora de las prácticas profesionales en salud. Así, los enfermeros deben reconocer su papel como coordinadores de las tecnologías, garantizando una atención segura, efectiva y centrada en el cliente.

Descritores: Inteligencia artificial; Enfermería; Cuidados de enfermería.

Introduction

The growing technological evolution has brought significant transformations across various sectors of society, including the health field, in which Artificial Intelligence (AI) emerges as a promising tool for improving the quality of care delivered to clients. Nursing, as an essential component of the healthcare system, has been strongly impacted by this technological revolution, enabling the implementation of innovative solutions and enhancing its practices in the art of caring.

In the context of this study, AI refers to a set of techniques and algorithms that allow machines and computational systems to perform tasks that would otherwise require human intelligence. It involves the ability to process data, analyze, learn, and make decisions using models and statistical methods, machine learning, neural networks, and other approaches.¹

It is a broad term encompassing a set of techniques used to teach computers to mimic human-like cognitive functions, such as reasoning, communication, learning, and decision-making.² AI consists of a software system (and possibly hardware as well), designed by humans, that operates in physical or digital dimensions by perceiving its environment, receiving data, interpreting them, reasoning based on the knowledge derived from these data, and deciding the best actions to achieve an objective.³ It is composed of algorithms that enable learning from datasets to achieve intelligent, goal-oriented actions.⁴

AI is the ability of a machine to emulate intelligent human behavior and represents an umbrella term for machine-learning technologies, computer vision, and natural language processing. Each of these can be used either individually or in combination to add intelligence to applications.⁵

In essence, the “thinking/reasoning” of AI can be approximated to that of a human, owing to its learning capability. AI focuses on learning from data and imitating human thought processes, potentially enhancing learning capacity and providing decision-support systems on scales that are transforming the future of healthcare.⁶

Machine learning—meaning the ability of machines to learn—refers to a frequently used technology in which computers act intelligently in a specific task or problem without being explicitly programmed. Algorithms are used to derive knowledge from data, enabling systems to interpret data autonomously. As more data are fed into the system, these machines learn from them and refine their outputs.⁷

The use of AI in nursing care has proven to be a promising alternative to enhance the efficiency and effectiveness of professional practices. The collection and analysis of large volumes of medical data—such as electronic health records and laboratory tests—enable the identification of patterns and trends, helping nurses make more informed clinical decisions. The automation of routine and repetitive tasks also frees time for professionals to dedicate themselves to more complex and human-centered activities with clients.⁸

However, the implementation of AI in nursing is not without challenges. Ethical issues such as privacy and security of client data, as well as accountability regarding decisions made by algorithms, stand out as central concerns. It is essential that AI use be guided by ethical principles and compliant with legal regulations.¹

Furthermore, the training and professional development of nurses to work collaboratively with AI are crucial. Adapting to these systems requires the acquisition of specific skills to interpret and appropriately use the information generated by algorithms, ensuring that client care remains centered on the human being.⁹

It is assumed that when applied ethically and soundly, AI can be a valuable tool for nursing professionals, contributing to more accurate, humanized, and efficient care, with the potential to positively transform healthcare quality and patient well-being. Thus, exploring this new landscape becomes essential, as it may reshape nursing care practices previously carried out exclusively by humans. In this sense, the following guiding question emerged: What are the challenges and perspectives for nursing regarding the use of artificial intelligence in care activities? This article aims to conduct a reflective analysis of these challenges and perspectives.

Method

This is a theoretical-reflective essay addressing aspects related to artificial intelligence and the challenges and perspectives for nursing care. Given the characteristics of the study, evaluation by a Research Ethics Committee was deemed unnecessary.

Data collection was carried out in a non-systematic manner, although the authors selected studies based on the arguments and reflections they intended to submit for public consideration. The search for articles/texts included publications in Portuguese, English, and Spanish, from 2018 to 2023, corresponding to the last five years.

The Health Sciences Descriptors (DeCS) and the *Medical Subject Headings* (MeSH)—artificial intelligence, nursing care, technological development, and nursing—supported the search in the following databases and data sources: *Medical Literature Analysis and Retrieval System Online* (Medline), via *Public Medline or Publisher Medline* (PubMed), *Science Direct*, *Scientific Electronic Library Online* (SciELO), CINAHL, SciVerse Scopus, the Nursing Database (BDENF), and *Google Scholar*.

Regarding the use of *Google Scholar*, it is known that although its coverage and accuracy are acceptable, it should not be used as the sole source in literature searches for reviews.¹⁰ Another study emphasized that ideal review searches should include, at minimum, two or three databases, as well as *Google Scholar*, as a baseline requirement to ensure adequate and efficient coverage.¹¹ Abstracts published in conference proceedings, letters to the editors, review papers, and book chapters were excluded in the preparation of this article.

After defining the eligible empirical materials, the authors engaged in an immersion in the studies through careful reading, aiming to identify excerpts and content consistent with the attributes and theoretical assumptions pertinent to the topic under discussion. The theoretical references consisted of national and international literature, given that the phenomenon under reflection has global relevance. Thus, with the purpose of organizing and presenting the data analysis, four categories emerged to support the theoretical-reflective content of this article.

Results and Discussion

In this theoretical reflection, the directions derived from the evaluation of the selected articles encompassed the following themes: Artificial Intelligence in nursing; contributions of Artificial Intelligence to clinical decision-making in nursing; Artificial Intelligence in nursing practice and research; and Artificial Intelligence in nursing education.

Artificial Intelligence in Nursing

Artificial intelligence (AI) can be viewed as a revolutionary technology that has drawn the attention of experts, students, and health professionals around the world. It is present in various aspects of daily life, used by people of different ages, health conditions, and social contexts. In the health field, AI has the potential to transform care, diagnosis, research, and information management.¹

The use of AI became particularly evident during the global pandemic caused by the SARS-CoV-2 coronavirus. Intelligent epidemiology systems, clinical prognostic models, and diagnostic tools were widely observed, providing practical applications that generated positive results in patient care. Among the methods employed, machine-assisted imaging prognosis and diagnosis, automated hospital and clinic sanitation systems, and tools for identifying potentially infected individuals stand out.¹³

In nursing, the impact of emerging AI technologies will be transformational for the current role of nurses as they become increasingly integrated into healthcare delivery. Through these technologies, the nurse-patient relationship will undergo changes, particularly regarding the time devoted to direct care. It is important to emphasize, however, that the presence of nurses will remain essential, as they hold clinical knowledge and expertise. AI will serve as a supportive tool, given that direct nursing care is irreplaceable.⁷

AI represents a unique opportunity to advance nursing practice by enhancing diagnostic accuracy, optimizing treatment protocols, and enabling the development of personalized care. The ability to predict adverse events, identify at-risk patients, and provide preventive interventions is a promising area for AI applications in nursing care.⁸

It is important to highlight that integrating AI into nursing practice still presents challenges. A critical step for its implementation involves incorporating AI-related education into undergraduate nursing curricula and continuing education programs. From a forward-looking perspective, AI can support nursing care. In this context, nursing management is an example, in which AI may contribute to evidence-based decision-making for both immediate care and long-term planning.¹³

Despite the increasing use of intelligent machines in nursing, nurses will continue to perform non-transferable functions such as caregiving, mentoring, research, and administration. AI cannot replace their sensitivity, experience, and clinical judgment.⁹ Moreover, issues surrounding AI in nursing are both recent and highly complex. As these technologies continue to evolve, healthcare institutions, together with nursing professionals, must seek knowledge and

support their implementation—promising to transform healthcare delivery and strengthen clinical decision-making.

Contributions of Artificial Intelligence to Nursing Decision-Making

AI has proven to be an extremely capable tool for assisting in the resolution of problems arising from nursing practice. Its systems have the potential to significantly improve aspects related to decision-making during patient care.⁴

The application of AI and digital technologies in clinical practice requires the development of solid digital infrastructures, placing local healthcare professionals and stakeholders at the center of the implementation process, in addition to establishing regulatory frameworks among relevant governing bodies.¹⁴

These findings align with the results of a study that highlights AI's potential to collaborate with nursing care, emphasizing the need to refine this tool more specifically and to clarify how it should be used in executing nursing responsibilities, while broadly discussing its ethical and legal implications. Such considerations allow for the engagement of all stakeholders—institutions, professionals, and patients.⁴

The use of AI can enhance the management and quality of nursing care, improve safety management and team communication, and encourage future interdisciplinary collaboration.¹⁴

Given the high volume of daily patient encounters and the need for nursing assessment to manage risks, as well as to recognize and classify patients with greater clinical complexity, AI has been regarded as an important decision-support tool, contributing to the improvement of task execution and professional practice in routine care.⁴

However, one study contrasts the real application of AI in nursing decision-making, as evidence suggests a predominant focus on screening, patient monitoring, and activity classification, with limited emphasis on addressing specific issues related to nursing care management.¹⁴

From this perspective, a study examined the stages of the emergency nursing care process using AI through a mobile application. The results indicated that there is a lack of effective means for nurses to rapidly access available data in emergency situations, revealing the need for the implementation of a visual nursing system that would provide convenience and agility in clinical decision-making.¹⁵

In this context, it is essential for the information technology (IT) team to work collaboratively with the nursing team to develop appropriate software using a shared language, thereby improving and optimizing communication processes and the use of AI.¹⁵

It is worth noting that the application of AI in nursing decision-making must be grounded in ethical awareness, and nursing activities will not be threatened by these emerging technologies. Instead, AI represents an excellent opportunity to ensure greater efficiency and quality in nursing care.¹⁶ However, the context of providing ethical and transparent nursing care remains somewhat uncertain, particularly regarding the validity of evidence, fairness of outcomes, and the traceability of potential harm caused by algorithmic activity.⁵

Artificial Intelligence in Nursing Practice and Research

Research on AI-based technologies in healthcare has grown considerably, with promising applications for nursing. However, its introduction raises concerns regarding data bias and the lack of robust evidence about its use and its impact on practical implementation.¹⁷

There is a consensus on the potential of AI-powered health technologies to enhance nursing practice,⁵ as well as broad agreement on their applicability across different professional settings.⁴

AI has the potential to transform Primary Health Care by improving risk prediction, supporting clinical decision-making, optimizing diagnoses, facilitating the review of medical records, and enabling more efficient allocation of resources.¹⁸

Community-based Primary Health Care plays a fundamental role in healthcare delivery and can benefit from AI by identifying patterns, improving operations, and generating insights from clinical and community-level data.^{19,20}

urrent nursing research on AI largely focuses on the early stages of technological development and lacks strong evidence regarding its practical impact and implementation. Research guidelines and integrated knowledge frameworks on AI are needed.¹⁷

In oncology nursing, for example, AI shows promising potential. However, it is imperative to conduct further research and clinical trials to evaluate its effectiveness in practical application.²¹

Robots and AI systems may play important roles in nursing, but ethical issues—such as advocacy, accountability, collaboration, and caring—must be carefully considered, and the use of these technologies should be discussed openly and collaboratively.²²

AI is advancing rapidly, but its adoption in nursing must be balanced with ethical and practical considerations, aiming to improve the quality of healthcare and support the role of nurses in their daily practice.²²

Artificial Intelligence is playing an increasingly important role in nursing practice and research. It offers opportunities to enhance the quality of care, accelerate scientific production, and improve clinical decision-making. However, it is crucial for nursing professionals and researchers to engage with these technologies cautiously, considering their ethical implications and ensuring that AI is used responsibly, always for the benefit of patients.

Artificial Intelligence in Nursing Education

To enable nurses to use AI in their practical activities, it is necessary for them to acquire knowledge prior to entering the job market. Efficient, precisely operated machines are being utilized in an increasingly technological society, where hospitals and health systems are becoming progressively more dependent on technology, influencing the quality of healthcare and client satisfaction. As a result, higher levels of knowledge, intelligence, and awareness of technology and AI are required for nurses to provide quality care.²³

It is evident, therefore, that the application of AI in healthcare practice is more advanced than in health education. However, nursing educators need to have a solid understanding of AI in order to provide students with the knowledge required to meet the needs of this new technological era.¹⁴ In other words, as healthcare continues to evolve and become increasingly complex, nursing education must accompany this constantly changing landscape.²⁴ Nursing education must prepare students to become part of the future workforce.

Nursing educators in most countries have the vital task of preparing students to work in healthcare environments that incorporate technologies, including AI. Nursing curricula developed by these educators must adapt to the presence of and changes related to AI in the health sector, and nursing students must become proficient in AI applications to work effectively with clients and their families. Nursing instructors/educators should also use AI to teach critical thinking skills to their students.²⁵

AI is being applied in nursing education, preparing nurses for the digital era, requiring updated curricula and skills to evaluate and use AI-based technologies.²⁶ Integrating AI into nursing education presents a wide range of opportunities, including improved learning outcomes and greater efficiency. However, it also raises challenges related to privacy and security, ethical considerations, and resistance to adoption, with student privacy protection being a particular concern.²⁴

Nursing faculty must engage in curricular updates and develop an understanding of the critical concepts and applications of AI to equip nursing students with the technological capabilities needed to meet the demands of the AI era.²⁷

Several Brazilian studies involving AI and nursing education have addressed the development of educational software to teach cardiopulmonary resuscitation,²⁸ the applicability of hypermedia environments in the teaching-learning process,²⁹ the use of ChatGPT in nursing education,³⁰ and the evaluation of a *chatbot* system in nursing education,³¹ among others. However, greater investment in nursing and midwifery education is necessary to deepen knowledge about AI. Faculty members in these fields should design and implement new curricula that include instruction in AI, machine learning, and neurolinguistic programming, integrating these components into undergraduate and graduate programs. This will help future nurses develop the competencies required to work with AI in healthcare.³

Final Considerations

This reflection reveals that Artificial Intelligence is becoming increasingly present in our lives, including in the healthcare sector. These technological innovations have a significant impact and can contribute to improving nursing practice, supporting nurses in managing their services, enhancing research, and advancing nursing education.

However, the challenges and perspectives associated with the use of AI in nursing are diverse: from acquiring knowledge about how AI should be programmed, used, and tested to perform the required tasks, to carefully

observing the results obtained and ensuring safety, ethics, and positive outcomes in its application.

Thus, nurses must recognize their role as coordinators of these technologies in order to guarantee safe, effective, and client-centered care. They should also seek partnerships with information technology professionals who can develop systems that support nursing care, from decision-making and care planning to treatment and client follow-up.

Training and technological proficiency are essential for AI to be used effectively and ethically, enabling high-quality care and preparing professionals for future transformations in nursing practice.

To achieve this, education on AI must begin in undergraduate and graduate nursing programs, preparing nurses for the future integration of AI into their work environments.

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