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SHORT COMMUNICATION

# Artificial Intelligence in Nursing: applications, challenges and future directions

## Inteligencia Artificial en Enfermería: aplicaciones, retos y direcciones futuras

Luís Sousa[1,2,3], Maria Leonor Carvalho[1], Ricardo Mestre[1], João Tomás[1,3,4], Sandy Severino[1,5], Helena José [1,3,6]

[1]Atlântica School of Health (ESSATLA), Atlantic University, Oeiras, Portugal.
[2]Comprehensive Health Research Centre (CHRC), Évora, Portugal.
[3]RISE-Health, Porto University, Porto, Portugal
[4]Life Quality Research Center (CIEQV). Santarém, Portugal.
[5]Escola Superior de enfermagem de Lisboa (ESEL), Centro de Investigação, Inovação e Desenvolvimento em Enfermagem de Lisboa (CIDNUR). Lisboa, Portugal.
[6]Health Sciences Research Unit: Nursing, Coimbra Nursing School. Coimbra, Portugal.

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**Corresponding author:** Luís Sousa

## ABSTRACT

**Introduction:** the digital transformation, which is happening at great speed, has had an impact on all sectors of society and requires nursing to rethink its professional practices, value ongoing training and actively participate in the ethical and contextualized development of these technologies.
**Objective:** to analyze the influence of Artificial Intelligence in Nursing, highlighting its transformative potential in the fields of education, practice and care management.
**Method:** a search was carried out in databases and a critical-reflective analysis of the articles found was performed.
**Results:** artificial Intelligence enables the automation of tasks, predictive data analysis and clinical decision support, contributing to more efficient and person-centered care. However, its integration raises ethical, legal and training challenges, requiring digital literacy and critical reflection. The importance of nurses' active participation in the development, implementation and evaluation of these technologies is highlighted, as well as the need for curricular reform in higher education. The creation of specific training platforms could support the continuous training of professionals.
**Conclusion:** the healthcare institutions must define clear guidelines for the use of Artificial Intelligence, recognizing it as a complementary tool to human work. The critical discernment of nurses is essential to ensure ethical and person-centered use.

**Keywords:** Artificial Intelligence; Nursing; Telemedicine; Virtual Reality; Augmented Reality.

## RESUMEN

**Introducción:** la transformación digital, que se produce a gran velocidad, ha impactado en todos los sectores de la sociedad y exige a la enfermería repensar sus prácticas profesionales, valorar la formación continua y participar activamente en el desarrollo ético y contextualizado de estas tecnologías.
**Objetivo:** analizar la influencia de la Inteligencia Artificial en Enfermería, destacando su potencial transformador en los ámbitos de la educación, la práctica y la gestión de cuidados.
**Método:** se realizó una búsqueda en bases de datos y un análisis crítico-reflexivo de los artículos encontrados.

**Resultados:** la Inteligencia Artificial permite la automatización de tareas, el análisis predictivo de datos y el apoyo a la toma de decisiones clínicas, contribuyendo a una atención más eficiente y centrada en la persona. Sin embargo, su integración plantea retos éticos, legales y formativos, que requieren alfabetización digital y reflexión crítica. Se destaca la importancia de la participación activa de las enfermeras en el desarrollo, la implementación y la evaluación de estas tecnologías, así como la necesidad de una reforma curricular en la educación superior. La creación de plataformas de formación específicas podría apoyar la formación continua de los profesionales.
**Conclusión:** las instituciones sanitarias deben definir directrices claras para el uso de la Inteligencia Artificial, reconociéndola como una herramienta complementaria al trabajo humano. El discernimiento crítico de las enfermeras es esencial para garantizar un uso ético y centrado en la persona.

**Palabras clave:** Inteligencia Artificial; Enfermería; Telemedicina; Realidad Virtual; Realidad Aumentada.

## INTRODUCTION

The development of new computational methods in the fields of data science and data analysis has made it possible to identify patterns in large sets of complex data (big data) that were previously inaccessible to traditional analysis. Combining these methods with the growing power of computer processing, it has become possible for machines to autonomously learn the structure of data, giving rise to what is known as artificial intelligence (AI).[1]

AI is an umbrella term for techniques used to teach computers to mimic human-like cognitive functions, such as reasoning, communication, learning and decision-making.[2] In healthcare, AI has been progressively adopted as a tool to help healthcare professionals provide high-quality care more efficiently and equitably.[3]

It is estimated that AI will profoundly transform nursing in all its dimensions - clinical, educational, organizational, political and research - opening up new possibilities for innovation and strengthening the quality of care.[4] However, significant gaps remain in the understanding of its principles and in the technical mastery necessary for its ethical and safe use by nurses. This reality calls for consistent investment in training and capacity building, as well as curriculum updating in higher education institutions.

Faced with the current scenario of a shortage of human and material resources, coupled with increased care requirements, emerging technologies such as mobile health (mHealth), telemedicine and sensor-based systems have proved to be promising strategies for expanding the scope and effectiveness of nurses' work.[5] In addition, recent global challenges, particularly the COVID-19 pandemic, have highlighted the weaknesses of healthcare systems and accelerated the adoption of digital solutions, including AI, as a response to the growing complexity and pressure on healthcare.

This digital transformation, marked by great speed and impact, requires nursing to rethink its professional practices, to value continuous training and to actively participate in the ethical and contextualized development of these technologies.

In this context, a central question arises: how can Nursing integrate Artificial Intelligence ethically, critically and effectively, ensuring person-centered care?

Based on this reflection, this article aims to critically analyze the role of AI in Nursing, identifying its main applications, the expected benefits, the ethical and training challenges it poses, as well as the prospects for its safe, informed and responsible integration into professional practice.

## DEVELOPMENT

AI can be defined as a computer system, based on hardware and/or software, with the ability to perform physical tasks and cognitive functions, solve problems and make decisions without the need for explicit instructions, imitating human intellectual processes such as reasoning, learning and generalizing from experience.[7,8] Among the various AI methods, machine learning (ML) stands out, a branch of AI that uses teaching algorithms to complete tasks using data to understand patterns and characteristics. Deep learning (DL), in turn, is a sub-area of ML, characterized by the use of artificial neural networks made up of multiple layers, capable of processing complex data and generating highly sophisticated responses.[3,5]

In the health sector, AI has taken on a central role in improving the effectiveness of care, making it possible to identify individual health patterns, predict clinical risks and personalize interventions. By providing continuous decision support, evidence-based guidance and responses tailored to people's needs, AI promotes a more person-centered approach and contributes to improving their quality of life.[9]

In nursing, AI-based computational approaches have proven to be transformative, with a high potential to raise the quality of care provided, optimize care processes, improve resource management and increase user satisfaction in the various care settings.[7,10,11,12,13] Scientific literature has highlighted the applicability of AI in

multiple areas of nursing practice, including triage, remote monitoring of patients, medication management, care planning and coordination, clinical records management, education, data analysis, clinical decision-making support and assistance in procedures.[8,13,14,15]

As a discipline oriented towards the comprehensive and holistic care of the person, Nursing benefits substantially from the integration of AI technologies, which contribute to improving the precision of care, informed decision-making and optimizing the management of professionals' time.[16,17] At the same time, nurses must also integrate the teams that build AI tools, making them more responsive and adapted to real care.

In the field of nursing education, various AI applications have been explored, such as virtual avatars, smart homes, predictive analysis tools, virtual or augmented reality and robotics.[4,13] A scoping review identified two major areas of influence of AI: (1) in academic nursing education and (2) in practical training in clinical settings.[4]

Despite the advancement of these technologies, the evidence regarding their direct effects on clinical and organizational outcomes is still limited. The main applications reported include image and signal processing, monitoring and classification of health activities, communication and coordination of care, and early detection of falls. However, relevant concerns remain, especially regarding security, data privacy and the acceptance of technologies by professionals.[18]

AI has emerged as an innovative and strategic tool for nursing. It can promote more efficient management of services by automating operational tasks, creating procedures tailored to the needs of the population and continuously improving the quality of care. In addition, it can foster data-based management practices, reinforce the safety of care and boost international research collaborations.[15,19,20]

The use of AI in areas such as telemedicine, robotics and remote monitoring has contributed to widening access to healthcare. These technologies make interventions faster and more effective, with positive impacts on the quality of care and the coverage of nursing services.[6] AI therefore not only optimizes resource management and the quality of scientific research, but also pushes the boundaries of nursing practice, transforming it and making it more accessible, efficient and personalized. However, the implementation of AI in nursing faces a number of challenges. Among the most relevant are ethical issues, privacy concerns and the need for specialized professional training to ensure the appropriate use of this technology in different contexts.[17,21,22]

It is important to stress that AI should not be seen as a substitute for nurses, but as a support tool that can take on administrative or repetitive tasks, freeing professionals for activities that require critical thinking and human interaction.[2]

Considering the scarcity of evidence on the effectiveness of AI in real clinical practice contexts, it is imperative to promote rigorous, interdisciplinary research that evaluates its applicability, benefits and limitations. This research should also consider the ethical, legal and social implications of using AI in the provision of care.[18,23]

It is therefore essential that healthcare institutions establish clear policies on the use of AI, safeguarding ethical principles and the safety of the practice.[6] It is also essential that nurses receive adequate training to understand and supervise AI operations, ensuring a smooth and safe integration of this technology into practice, recognizing that AI does not completely replace human intervention, and critical thinking is fundamental to its effective implementation.[12,17]

Beyond the challenges mentioned, some authors propose clear guidelines to guide the integration of AI in Nursing: (a) nurses must understand the relationship between the data they collect and the AI technologies they use; (b) nurses need to be meaningfully involved in all stages of AI: from development to implementation; and (c) there is substantial untapped potential for nursing to contribute to the development of AI technologies for global health and humanitarian efforts.[3]

These guidelines underline the need for a more interventive positioning of nurses in the technological ecosystem, reinforcing their responsibility as co-creators of ethical and person-centered innovation.

Curricular reform is urgently needed within nursing education programs at academic institutions and in clinical practice settings to prepare nurses and nursing students to practice safely and efficiently in the AI era. In addition, nurse educators need to adopt new and evolving pedagogies that incorporate AI to better support students at all levels of education.[4]

## CONCLUSION

AI is a tool with great transformative potential in Nursing, making it possible to automate tasks, analyze data predictively and support clinical decision-making. Its application contributes to more effective, personalized and person-centred care, while optimizing human and organizational resources.

The informed and critical adoption of AI is an opportunity to strengthen the human dimension of care, as long as it is part of an ethical, pedagogical and technical framework that is appropriate to the needs of the population and the values of the profession. It is therefore urgent that policymakers, educational institutions and nursing professionals themselves take an active role in the regulation, training and co-construction of Artificial Intelligence technologies. The future of care depends on our collective ability to ensure that this digital transformation takes place with ethical sense, pedagogical vision and a commitment to the dignity of

the person being cared for.

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*Conceptualization:* Luís Sousa, Maria Leonor Carvalho.
*Research:* Luís Sousa, Maria Leonor Carvalho.
*Supervision:* Helena José.
*Validation:* Ricardo Mestre, João Tomás, Sandy Severino.
*Drafting - original draft:* Luís Sousa, Maria Leonor Carvalho.
*Writing - proofreading and editing:* Luís Sousa, Maria Leonor Carvalho, Ricardo Mestre, João Tomás, Sandy Severino, Helena José.