

INNOVATION

IN NURSING PRACTICE: NEW TECHNOLOGIES FOR PATIENT CARE

INNOVACIÓN EN LA PRÁCTICA DE ENFERMERÍA: NUEVAS TECNOLOGÍAS PARA LA ATENCIÓN AL PACIENTE

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ABSTRACT

The adoption of innovative technologies has renewed nursing practice, increasing both the effectiveness and quality of patient care. Telenursing has enabled remote care, optimizing resources and increasing user satisfaction. Meanwhile, portable devices such as heart rate and glucose monitors allow for constant monitoring, which favors earlier and more tailored interventions for each case. Likewise, artificial intelligence has contributed to improving diagnostic accuracy and supporting clinical decision-making, as demonstrated by various health programs for mammogram interpretation. Digital skills training has become a pillar for nurses to keep up with these advances. However, the incorporation of these tools poses ethical challenges, especially regarding confidentiality and the protection of patient data. It is essential to implement robust protocols to safeguard sensitive information and promote an environment of continuous improvement and innovation in the nursing field. Ultimately, the integration of these technologies has enhanced patient care, although it requires constant adaptation and a rigorous ethical approach to ensure its benefits.

Keywords:

Telenursing, wearable devices, artificial intelligence, continuous monitoring, data confidentiality, and digital training.

RESUMEN

La adopción de tecnologías innovadoras ha renovado la labor de enfermería, elevando tanto la eficacia como la calidad del servicio al paciente. La tele enfermería ha posibilitado la atención remota, optimizando recursos y aumentando el grado de satisfacción de los usuarios. Por su parte, los dispositivos portátiles como los medidores de frecuencia cardíaca y glucosa permiten un monitoreo constante, lo que favorece una intervención más temprana y adaptada a cada caso. Asimismo, la inteligencia artificial ha contribuido a perfeccionar la exactitud diagnóstica y a respaldar la toma de decisiones clínicas, tal como demuestran distintos programas de Salud para la interpretación de mamografías. La capacitación en habilidades digitales se ha convertido en un pilar para que las enfermeras se mantengan al día con estos avances. No obstante, la incorporación de estas herramientas plantea retos éticos, especialmente en lo referente a la confidencialidad y la protección de los datos del paciente. Es fundamental implementar protocolos sólidos que resguarden la información sensible y promover un entorno de mejora continua e innovación en el ámbito de la enfermería. En definitiva, la integración de estas tecnologías ha potenciado la atención al paciente, aunque exige una constante adaptación y un riguroso enfoque ético para asegurar sus beneficios.

Palabras clave:

Tele enfermería, dispositivos portátiles, inteligencia artificial, monitoreo continuo, confidencialidad de datos y capacitación digital.



INTRODUCTION

In recent decades, the healthcare sector has undergone a significant transformation thanks to the incorporation of emerging technologies. Tools such as artificial intelligence (AI), telemedicine, electronic health records, and wearable monitoring devices have redefined the way healthcare is delivered, improving the efficiency, accuracy, and accessibility of healthcare services.

Nursing, as a fundamental pillar of patient care, has not been immune to these changes. Nursing professionals have adopted new technologies to optimize data management, improve communication with patients and other members of the healthcare team, and provide more personalized and effective care. Furthermore, ongoing training in digital skills has become essential for nurses to adapt and lead in this constantly evolving environment (Gonzales Santana et al., 2024).

Rapid technological evolution in healthcare poses challenges and opportunities for nursing practice. It is crucial to analyze how these innovations affect the quality of care, patient safety, and equity in access to health services. Furthermore, understanding the impact of technology on the nurse-patient relationship and on professional ethics is essential to ensuring person-centered care.

This work aims to explore the main emerging technologies that are transforming nursing practice, analyze the impact of these technologies on the quality and efficiency of patient care, identify the ethical and professional challenges associated with them, and identify the potential impact of these technologies on the quality and efficiency of patient care with the integration of new technologies in nursing, and propose strategies for the training and adaptation of nursing staff in the current technological context (Guerrero-Menéndez et al., 2024).

The incorporation of new digital technologies is revolutionizing care delivery methods, communication between professionals and patients, and administrative management. This change is especially necessary to improve the quality of care and ensure that healthcare professionals are prepared for the challenges of the future.

Innovation in nursing also involves a shift in care delivery models toward a more patient-centered approach. Patient-centered care focuses not only on the disease itself, but on the person as a whole. This holistic approach incorporates patient participation in decision-making, education on health management, and the promotion of healthy lifestyles. Innovation in this regard involves creating a care environment that respects individual preferences and fosters effective collaboration between the patient and the nursing team (Andrade-Pizarro et al., 2023).

Telenursing refers to the use of telecommunications and information technology to provide nursing services in healthcare, whenever there is a large physical distance between the patient and the nurse, or between different nursing professionals. As a field, it is part of telehealth and has many points of contact with other medical and non-medical uses, such as telediagnosis, teleconsultation, and telemonitoring.

Telenursing is experiencing significant growth in many countries due to several factors: the concern to reduce healthcare costs, an increase in the number of elderly or chronically ill people, and the increased healthcare coverage in remote regions, whether rural, small, or sparsely populated. Among its many advantages, telenursing can help address the growing shortage of nurses; reduce distances and save travel time; and decrease patient hospitalizations (Ponce & Díaz, 2024).

One of the most common uses of telenursing is caring for patients at home. For example, patients who have mobility issues or who live in remote or hard-to-reach locations, patients with chronic conditions such as chronic obstructive pulmonary disease, diabetes, congestive heart failure, degenerative nerve diseases (Parkinson's disease, Alzheimer's disease, lateral sclerosis), etc., can stay at home and be regularly "visited" and assisted by a nurse via videoconference, the internet, and videophone (Gomez et al., 2020).

Other uses of home care include immediate post-surgical care, wound care, ostomy care, care for disabled individuals, etc. In normal home health care, a nurse is able to visit up to 5-7 patients per day. Using telenursing, a nurse can "visit" 12-16 patients in the same amount of time.

A common use of telenursing is also found in call centers run by healthcare organizations, which provide information and advice as a means of regulating patient access and reducing emergency room use. Telenursing can also involve other activities such as patient education, reviewing medical test and exam results, and assisting physicians in implementing medical treatment protocols.

Telemedicine encompasses prevention, diagnosis, treatment, and rehabilitation, as well as medical education. It is a technological resource that enables the optimization of healthcare services, saving time and money and facilitating access to remote areas for specialist care. Another benefit of using medical data transmission over appropriate networks is education, where medical and nursing students can learn semiology remotely, supported by their instructor and in the presence of the patient (Vilar Pont et al., 2021).

The following services provided by telemedicine are: complementary and instant services to specialist care (obtaining a second medical opinion), immediate diagnoses by a physician specialized in a specific area, remote education for nursing and medical

school students, digital archiving of radiology exams, ultrasounds, and other tests, and live support from a specialist. All of this reduces the time between test administration and results, or between care and diagnosis by a specialist, who does not require the patient to travel or travel for examinations, thereby reducing time and money costs.

The use of AI in general healthcare opens up a world of diverse opportunities to improve aspects related to social justice, equity, coverage, and access. However, before delving into the possibilities of AI, it is necessary to review the ethical aspects that its use could entail.

First and foremost, data privacy and security must be considered. Most countries around the world have regulations regarding access to and use of each patient's personal information. With artificial intelligence, this becomes even more necessary, as it can be used to predict health conditions and, thus, limit access to insurance of this type (Ramírez-Pereira et al., 2023).

Another interesting aspect concerns biases in data input during AI training. This can lead to diagnostic and treatment errors in underrepresented populations, as well as discrimination against other minority groups. These biases need to be addressed and equity in access to and quality of AI-powered healthcare must be ensured.

AI will transform the nurse-patient relationship, improving quality and efficiency. While direct nursing care is irreplaceable, the impact of artificial intelligence healthcare technologies will require a rethinking of nursing practice that will include new concepts. This shift will entail the emergence of new nursing roles, virtual care delivery models, and updated workflows.

From the point of view of the application of AI, its uses can be as varied as assistance robots, humanoid robots and mobility robots, predictive analysis, clinical decision support systems, smart homes and virtual assistance chatbots (Chasi-Rea, 2024).

METHODOLOGY

An exhaustive search was carried out in recognized scientific databases, including Scopus, Web of Science, SciELO, and Google Scholar. Keywords such as "technological innovation," "nursing," "patient care," "telenursing," "artificial intelligence in health," and "care management" were combined using Boolean operators to refine the results. The search was limited to studies published between 2020 and 2024, in English and Spanish, to ensure the inclusion of recent and relevant literature.

Qualitative and quantitative studies addressing the application of innovative technologies in nursing practice in diverse settings such as hospitals, home care, and intensive care units were included. Systematic reviews, case studies, and clinical trials that provided data on strategies implemented by nursing

professionals, ethical and practical challenges in managing technologies, and their impact on the quality of care were considered. Articles not directly related to nursing or that did not present clear evidence on the application of technologies in care were excluded.

Study selection was carried out in several stages. Initially, the titles and abstracts of the articles retrieved were evaluated to exclude those that did not fit the review objective. Subsequently, the full texts of the preselected studies were reviewed, applying the inclusion and exclusion criteria mentioned above. To reduce bias, several independent reviewers carried out this selection, and in case of discrepancies, a consensus was reached through discussion among the reviewers.

The selected studies were analyzed through a narrative synthesis, which allowed for the integration and comparison of findings from qualitative and quantitative research. The data were organized into key themes related to the implementation of technologies in nursing practice, such as telenursing, the use of artificial intelligence, the digitalization of clinical records, and digital skills training. This thematic analysis facilitated the identification of common patterns and divergences in the literature, allowing for a critical interpretation of the reviewed studies.

This study did not involve the collection of primary data or the direct participation of human participants, so ethics committee approval was not required. However, rigorous ethical practices were adopted in the selection and analysis of the included studies, ensuring integrity and transparency in the interpretation of the results obtained.

One of the main limitations of this review is its reliance on previously published studies, which restricts the analysis to the quality of available research. Furthermore, the exclusion of studies in other languages may limit the generalizability of the findings, especially in non-Western contexts where the implementation of technologies in nursing may face specific challenges. Furthermore, the included studies vary in methodology and depth, which may lead to heterogeneity in the results. Despite these limitations, this literature review offers a valuable summary of the current state of knowledge on the integration of innovative technologies into nursing practice.

DEVELOPMENT

Telenursing has emerged in recent years as a fundamental tool to guarantee the continuity and quality of healthcare, particularly in areas where distance or a lack of specialized personnel make in-person access difficult. This remote care model relies on communication technologies such as video conferencing, real-time chats, phone calls, and secure messaging platforms, which allow nurses to maintain regular contact with the patient, monitor vital signs,

review wound status, and administer self-care guides. For example, a patient with a urostomy can receive step-by-step instructions on proper pouch changes, while another with a urethral catheterization can be assessed via a video system for early signs of infection. These remote exchanges not only offer peace of mind to the user, but, by facilitating rapid diagnoses of complications, significantly reduce the need for trips to health centers and avoid unnecessary hospital admissions (Vega Saucedo, 2024).

In addition to optimizing resources, telenursing strengthens patient autonomy. By actively involving patients in the management of their chronic illnesses, for example, in monitoring diabetes or high blood pressure, treatment adherence is encouraged and the perception of control over their own health is improved. Recent studies have shown that patients who participate in virtual follow-up programs have higher rates of therapeutic adherence and lower levels of anxiety, as they feel constantly supported by their nursing team. This “virtual presence” provides a human component that counteracts the supposed coldness of technology, generating bonds of trust and satisfaction.

The deployment of wearable devices has complemented this transformation. Heart rate monitors, smartwatches, glucose sensor patches, and fitness trackers allow for the continuous capture of biometric data that are integrated with electronic medical records (EMRs). This allows nurses to detect abnormal patterns, such as silent arrhythmias or nocturnal hypoglycemia, and intervene immediately, adjusting treatment guidelines or arranging a medical consultation. The ability to receive real-time alerts not only accelerates emergency response but also transforms care into a proactive process, anticipating potential complications before they develop (Fácila Rubio et al., 2024).

However, the effectiveness of these tools depends largely on the training and technological competency of nursing staff. The emergence of educational mobile applications, online simulators, and e-learning courses has allowed nurses to acquire skills in teleconsultation, data analysis, and information systems management. Despite this, the lack of formal programs and resistance to change in some clinical settings remain significant barriers. Institutions and professional associations should design structured training plans that include practical training, mentoring, and digital skills assessments, ensuring that all nurses, regardless of age or prior experience, feel confident using these tools (Fácila Rubio et al., 2024).

Another critical aspect is ensuring equity in access to telenursing. The digital divide can exclude older people, those with low educational levels, or those living in environments with precarious connectivity. To prevent the exclusion of these groups, digital literacy initiatives must be promoted, adapted devices made available, and free access points guaranteed in

vulnerable communities. Only in this way can the use of these innovations be democratized and the principle of justice in health be fulfilled.

Ultimately, telenursing and associated technologies offer enormous potential to revolutionize nursing practice: they expand the reach of services, personalize interventions, and enable continuous, life-saving monitoring. However, their long-term success will depend on the ability of healthcare systems to adequately train staff, establish robust ethical and legal frameworks, and close the digital divide. By combining innovation, training, and accountability, 21st-century nursing XXI will be able to make the most of these tools, offering more accessible, effective and humane care (Gomez et al., 2020).

CONCLUSIONS

The integration of emerging technologies into nursing practice has significantly transformed patient care. Tools such as telenursing, wearable devices, artificial intelligence, and digital training platforms have enabled more personalized, efficient, and patient-centered care.

Telenursing has proven to be an effective solution for providing remote care, optimizing healthcare system resources and improving patient autonomy and satisfaction. The use of wearable devices has facilitated constant patient monitoring, providing valuable data for the early detection of health problems. Artificial intelligence has begun to play a crucial role in healthcare, particularly in predictive analytics, enabling more proactive and efficient care. Furthermore, the digital transformation has driven the need for ongoing training in technological skills, which is essential to ensure that nursing professionals fully benefit from these advances.

The implementation of technology in nursing also presents ethical challenges, especially regarding the security and privacy of patient data. It is crucial to ensure that the technologies used comply with data protection regulations, implementing robust measures to protect sensitive information. Furthermore, it is essential to foster a culture of innovation and continuous learning in nursing to adapt to the demands of a constantly evolving healthcare environment.

Technological innovation in nursing has proven essential for improving the quality and efficiency of patient care. The adoption of digital tools has enabled more personalized and patient-centered care. However, to maximize the benefits of these technologies, it is crucial to address the associated challenges, including ongoing staff training, data privacy protection, and organizational change management. Fostering a culture of innovation and continuous learning in nursing is essential for adapting to the demands of a constantly evolving healthcare environment and ensuring quality and safe care for all patients.

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Author Contributions:

Erika Anabel Albán-Sabando: Conceptualization, data curation, formal analysis, investigation, methodology, supervision, validation, visualization, writing – original draft, and writing, review, and editing.

Conflicts of Interest:

The author declares no conflicts of interest.