

Authors

Lester Lora
MClNursing, RN, MACN

Dr Paula Foran
PhD, RN, FACORN, FACPAN, MACN

Nurses' perceptions of artificial intelligence (AI) integration into practice: An integrative review

Abstract

Introduction: The integration of artificial intelligence (AI) technologies into health care is revolutionising nursing practice, substantially impacting patient care, clinical decision-making and health system efficiency. This integrative literature review explores the perceptions, attitudes and concerns of nurses regarding the use of AI use in clinical settings.

Review methods: A comprehensive literature search was undertaken using Health Source: Nursing/Academic Edition, EBSCO: MEDLINE Complete, CINAHL and Scopus. Search terms included 'artificial intelligence', 'AI', 'A.I.', 'machine learning', 'nurse' and 'nursing practice, and 'opinion', 'idea', 'insight', 'perspective', 'concern' and 'perception'. The terms were combined using Boolean operators (AND, OR) to refine the search. 'Citing forward' was also used in Scopus to search for newer literature that was relevant to the topic.

Discussion: Findings reveal that AI technology capabilities, such as predictive analytics and robotic automation, are viewed positively for their potential to enhance workflow efficiency and improve patient outcomes. However, nurses show concerns about ethical implications for data privacy, and the potential deskilling of human expertise. The review emphasises the need for comprehensive training programs, strong organisational support and an innovative culture to facilitate the successful use of AI in nursing practice.

Conclusion: Future directions stress the significance of AI competency, collaboration and continuous education to prepare nurses for their progressing practice in a technologically advanced health care environment. Appreciating the importance of these factors is vital for promoting a collaborative and innovative atmosphere, enabling nurses to effectively and efficiently utilise AI to improve patient care and advance the nursing profession.

Keywords: artificial intelligence, machine learning, deep learning, perspective, nursing practice

Introduction

The integration of artificial intelligence (AI) technologies into different workplace disciplines has helped improve systems, decision-making and outcomes¹. Health care workers, one of the important workforces of today, stand poised for significant evolution with the use of AI technologies². Nurses, as the frontline of health care, play a significant role in delivering

effective and quality patient care, and are vital to the successful implementation and use of AI technologies in clinical settings. According to Sarker³, AI has a spectrum of technologies, including predictive analytics, machine and deep learning, natural language processing and robotics. In the context of health care, Lindroth et al.⁴ suggest that these technologies have vast potential to support clinical decision-making, boost

efficiency and improve patient outcomes. From predictive analytics to robotics, AI systems hold the potential to streamline workflows, reduce errors and personalise patient care.

Understanding nurses' perspectives of AI adoption is vital because this will facilitate successful implementation of these technologies. This integrative literature review, including qualitative, quantitative and mixed methods research, sought to unravel and analyse existing research on nurses' perspectives of AI integration, with a focus on recognising their perceptions, concerns and attitudes towards integrating AI systems into practice. By investigating the present-day status of AI adoption in health care, identifying common themes and concerns among nurses, this review aims to deliver valuable information for health care leaders, policymakers, educators and researchers.

Review methods

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Literature that discussed nurses' perceptions, concerns and attitudes towards AI use were eligible for inclusion in this review. Studies of AI in the context of allied health and other medical professionals not directly related to nursing practice were excluded. Only peer reviewed articles that were published in English from 2019 to 2024 were

included. Systematic reviews, literature reviews, study protocols, scoping reviews and grey literature were excluded in this review.

Quality appraisal

Primary research studies were appraised using the EQUATOR Network. Research was assessed using the appropriate methodological tool. For example, GRAMMS for mixed-method study designs, TREND for quasi-experimental studies, CONSORT for randomised clinical trials, STROBE for observational studies and SRQR for qualitative studies.

Results

A total of 202 studies were initially retrieved. Following review of titles and abstracts, articles that did not meet the inclusion criteria were removed, as were duplicate papers. A total of 22 articles were included in the review – six observational studies, nine qualitative studies, two mixed-method studies, three quasi-experimental studies and two randomised control trials. Research papers originated from the United States of America (5), the United Kingdom (4), Singapore (4), Turkey (4), China (1), Denmark (1), South Korea (1), the Philippines (1) and Taiwan (1). One Australian editorial piece was also used to provide Australian and perioperative-specific content.

Discussion

The included research papers were read and reread until no further themes could be identified. Five themes were highlighted through thematic analysis – 'current landscape of AI adoption in health care', 'nurses' perceptions of AI', 'concerns about and barriers to AI adoption', 'implications for all nurses including the perioperative workforce' and 'future directions and implications'. Robust information was used to support these themes in

relation to the perspective of nurses on the integration of AI in nursing practice. This discussion will be presented in sections corresponding to the five detected themes.

Current landscape of AI adoption in health care

The adaptation of AI into health care systems has dynamically evolved, offering a wide option of applications aimed at improving operational efficiency, clinical decision-making and, most importantly, patient outcomes¹. Lee and Yoon⁵ affirm that AI technologies are being used to mitigate diverse challenges and provide opportunities in a range of health care settings, from diagnosis and treatment to administrative works and health management.

One promising capability of AI is clinical decision support systems (CDSS). In their qualitative study, Sandhu et al.⁶ found that physicians and nurses were positive about the value of a machine learning early warning system for sepsis, and that CDSS helped nurses to make data-driven decisions regarding diagnosis, treatment plans, medication management and risk stratification related to sepsis. Yahagi et al. conducted a randomised control trial (n=100) that compared the effect of an AI chatbot (ChatGPT) with standard information from anaesthesia nurses on surgical patients' pre-operative anxiety. Participants in the experimental group interacted with ChatGPT which personalised patient education based on the patient's response. The researchers reported statistically significant (p=0.001) reduction in pre-operative anxiety in the Chat GPT group compared to the control group⁷.

Robotic process automation (RPA) is another technology increasingly being applied in many sectors, including health care⁸. Health

care providers use RPA to perform multiple repetitive administrative operations and duties, ranging from scheduling appointments to processing bills and entering data. A quasi-experimental study of paediatric nurses (n=43) by Karaarslan et al.⁹ reported a positive attitude towards robotic automation, and that nurses perceived that AI integration would have the potential to reduce the general administrative burden on staff, allowing them to devote more time to direct patient care, enhancing health care professional efficiency and satisfaction.

Nurses' perceptions of AI

A study by Castagno and Khalifa¹⁰, emphasised that understanding nurses' perceptions of AI is important to the success of AI technologies and their adoption in nursing practice. Nurses are considered the first line of health care workers who provide patient care; therefore, their understanding of the practical implications and the benefits and challenges of adopting technology will be valuable¹¹. So far, research into nurses' perception of AI technologies has identified a spectrum of attitudes and viewpoints¹⁰. Ergin et al.¹² reported that while some nurses are excited by the potential AI offers –improving clinical decision-making and enhancing workflow efficiency leading to better patient outcomes – others appear to have reservations or even be sceptical about the advancement of AI in nursing practice and patient care.

One of the perceived uses of AI technologies is supporting nurses to complete tasks and help with delivery of care. A mixed-method study by Jauk et al.¹³ found an overall positive perception of the potential for predictive analytic models to identify delirium, anticipate

clinical deterioration and prioritise interventions for an increase in patient safety and quality care. The nurses who participated in the study acknowledged the usefulness of support systems powered by AI to provide timely evidence-based recommendations pertaining to diagnosis, planning of treatment and medication management.¹³

Another factor contributing to nurses' perception of the adoption of AI is ease of use and user experience.¹⁴ According to Yoo et al.¹⁴, it is accepted that AI systems are easy to use if they can be integrated easily into the workflow, are intuitive to use and require manageable training to incorporate in practice. Providing necessary feedback by user interfaces in real time, as well as self-customisation, will foster the use and adoption of AI-driven solutions in the clinical practice of nurses.

A qualitative study by Petitgand et al.¹⁵ suggested that apprehension from nurses may also be focused on the possibility that these AI technologies may take over or reduce human expertise and intuition in nursing practice, thereby interfering with the proper balance between automation and the human touch in the delivery of patient care. Therefore, appreciation of organisational factors, such as leadership support, resource allocation and workplace culture, is essential in influencing nurses' attitudes toward AI adoption.

Consequently, according to Ali Mohamad et al.¹⁶ health care organisations that value innovation, invest in training and education, or have a culture of collaboration and empowerment will find nurses in their workforce positively disposed to AI. A mixed-method study by Liaw et al.¹⁷ reported positive responses from participants who

underwent nurse education using AI-enabled simulation indicating the potential value of educational interventions and training programs that promote corrective strategies for the existing knowledge gaps, misconceptions and concerns among nurses regarding the integration of AI. Such interventions will provide an opportunity for gaining practical experience and acquiring skills and experience in interdisciplinary collaboration that will empower nurses to harness all potentials of AI technologies in practice and contribute toward the present quality improvement effort.

Concerns about and barriers to AI adoption

There is significant potential to improve the delivery of health care and patient outcomes with AI¹¹; however, many concerns about and barriers to integrating the technology into nursing practice exist. It is important to identify and understand those challenges to address the risks and ensure responsible implementation of AI technologies in nursing workflows in the most effective manner.

Maintaining privacy and security is vital to how AI is used in health care. Uymaz et al.¹⁸ found that nurses were positive about using AI nurses with outpatients with chronic diseases. However, the researchers also noted that 'apprehensions regarding the privacy of personal data and information are widespread'^{18 p.16}. Data breaches, unauthorised access and inappropriate use of sensitive health information point to the need for strong safeguards and encryption protocols adhering to regulatory standards.

Nurses are also concerned about how AI is developed and utilised. A qualitative study by van der Gaag et al.¹⁹ explored nursing regulators'

perceptions of AI and reported that nurses have ethical concerns about algorithmic bias, fairness and transparency when AI-driven decision support systems influence clinical decision-making and, as a result, patient care outcomes. The unintended consequences of AI include risks of harm, discrimination and erosion of human autonomy and accountability, which underscore the need for ethical frameworks, guidelines and oversight mechanisms to ensure the responsible development and deployment of AI in health care settings¹⁹.

Furthermore, the preparedness of nurses regarding AI technologies will be based on their competency, confidence and familiarity with the use of these tools. Zhang et al.²⁰ conducted a qualitative study of AI use in the mental health sphere and suggested that limited familiarity with AI concepts, coupled with few opportunities for training and educational resources, may inhibit nurses from optimally using and integrating AI, especially for mental health care. It is therefore necessary to have robust training programs that offer continuing education initiatives and hands-on workshops to prepare nurses with the required knowledge and skills to use AI in nursing practice.

Organisational culture and leadership support are also important factors in the adoption of AI technologies within nursing practice. Quantitative research (n=288) by Huo et al.²¹ found that participation of medical staff significantly influenced acceptance of medical AI. In addition, the researchers strongly suggested that an organisation with a culture of innovation, collaboration and learning would be best placed to

transcend the current resistance to change, encouraging AI adoption by nursing staff²¹. A study by Haugsten et al.²² highlighted that a strong leadership commitment, along with the need for effective and clear communication and strategic alignment of AI initiatives with organisational goals, is required to drive a cultural transformation toward a shared vision in health care delivery using AI.

Implications for all nurses including the perioperative workforce

AI technologies can influence nursing practice through various aspects of health care delivery, such as patient care delivery, clinical decision support and optimisation of workflow^{18,19}. From support with clinical decisions to predictive analytics and robotic assistance, AI-driven innovations are changing the landscape of nursing practice within perioperative settings. AI-enhanced applications empower nurses with real-time recommendations based on evidence and alerts for making informed decisions at the point of care. Sandhu et al.⁶ state that, through analysis of patient data, medical literature and best practice guidelines, support tools will help to identify prospective risks, optimise treatment regimens and predict adverse events, thus improving patient safety, quality of care and clinical outcomes.

Predictive analytic models can help nurses tailor the care plan and intervention for the patient, considering their risk profile, preferences and needs¹⁹. In a retrospective observational study conducted by Chen et al.²³ data from medical records was used to develop an AI model to predict

sepsis or septic shock, respiratory failure and mortality in patients with pneumonia; the researchers then tested the model. The model was based on predictive analytics algorithms which could analyse electronic records, such as medical histories and other sources of health data, and recommend evidence-based care planning, disease management and strategies for health management. Such information may help a nurse shape intervention, monitor change and empower the patient with self-care.

AI technologies enhance the clinical skills and expertise of nurses by accessing current medical knowledge, decision support tools and educational resources. Research by Samala and Rawas²⁴ supported this notion and suggested that virtual health assistants, chatbots and simulation-based training can help develop competency programs that support the development of skills, consolidation of knowledge and the promotion of lifelong learning in the fields of clinical assessment, diagnostic reasoning and therapeutic interventions.

AI-based technologies will empower patient engagement and satisfaction by offering personalised, responsive and available health care services. A randomised controlled trial by Liaw et al.²⁵ supported the idea that virtual health assistants, telemedicine platforms and remote monitoring solutions will provide avenues for nurses to reach patients post-operatively. It will also facilitate consistent communication and a care continuum. Therefore, a new cadre of empowered patients should be able to interact with nurses for their health management, care transition and recovery processes.

Future directions and implications

The integration of AI into nursing practice has much potential for the future, from shaping patient care to transforming nursing education and workforce development²⁶. As AI continues to grow, there will be more emphasis on AI literacy, digital fluency and interprofessional collaboration in nursing. Bobak et al.²⁷ highlighted the importance of interprofessional education programs to create a conducive environment of collaboration among the nursing graduate, data scientist, engineer and other stakeholders to prepare nursing graduates to harness the potential of AI technologies in clinical practice for value addition to an interprofessional team.

The nursing profession encourages a culture of lifelong learning, and education and training play an important role in this. A quasi-experimental study by Ergin et al.⁸ revealed that participants' knowledge about AI increased after training. Similarly, Abuzaiid et al.²⁸ concluded that nurses lack understanding of AI and education and training about AI is needed. Health care organisations need to invest in innovation hubs and research centres to ignite a sense of curiosity, experimentation and collaboration among the nursing staff. Thus, empowerment through learning, mentorship and professional development is envisaged to enable nurses to leverage technological advancements for the purpose of manoeuvring a dynamic practice environment and thriving in the digital age

Robert²⁹ argues that adoption of AI within clinical practice will redefine the role for the nurse, thereby creating new opportunities

for specialisation, collaboration and leadership. Advanced practice roles will be better armed by the increased role for data analysts and informaticians in guiding clinical decisions, driving quality improvements and affecting policy with integrated AI technologies²⁹. More effective utilisation of nurses within the capabilities of the health team can be realised through models that are team-based in shared decision-making processes and have a care-based approach to collaboration²⁸.

The future of nursing should be about accepting innovation, disruption and transformation in line with the technological trends that are emerging and the needs of society. Zhai et al.³⁰ identified barriers to and facilitators of implementation of AI in nursing and concluded that management is important for addressing user resistance, improving usability and enhancing connection between nursing and technical staff.

AI technologies have the potential to streamline perioperative workflows, transform nursing education and provide logistical and administrative support³¹. With an innovation-based mindset, nurses will lead and shape future care delivery and nursing practices.

Conclusion

The integration of AI into all nursing practice specialties presents a revolutionary shift in health care delivery, with wide implications for patient care, nursing education and workforce development. This integrative literature review traversed the multifaceted landscape of AI use in nursing practice, from nurses' perceptions and concerns to the impact on clinical practice and future directions. Nurses' perspectives

towards AI implementation reflect a complex variety of factors, including perceived usefulness, ease of use, privacy and security concerns, organisational support and improvement of patient outcomes. Nurses as the frontline of the health care profession, play an essential role in driving the responsible and effective integration of AI technologies into clinical practice.

Quality education programs supporting the introduction and ongoing use of AI will be vital, as will be strong nursing leadership in this area. By assessing and addressing different barriers, concerns and needs, health care organisations can promote a culture of collaboration, innovation and continuous learning that boosts nurses' competence to utilise AI to improve patient care and advance nursing practice.

Declaration of conflicting interests

The authors have declared no competing interests with respect to the research, authorship and publication of this article.

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