The Role Of Artificial Intelligence In Nursing Decision-Making And Diagnosis

Moamen Abdelfadil Ismail[1],Azizah Alsaeda[2],Abrar Alsaihati[3],Ghadah Abdullatif[4],Nadiah Sharahi[5],Atma Alhawiti[6], Manal Murayr[7],Noura Hazazi[8] ,Nabih Mohammed Ali Allami[9],Rawan abdulqader radi alobaidi[10],Dhuha Alotaibi[11],Fatimah Yahia Mashari[12],Mohammed Saeed Almalki[13]

[1]*Internal Medicine consultant King Abdulaziz Specialist Hospital - Sakaka – Aljouf*
[2]*Nursing Administration, APN*
[3]*Nursing Specialist*
[4]*Nursing specialist*
[6]*Nursing Technician*
[7]*Nursing specialist*
[8]*Nursing specialist*
[9]*Nursing Technician*
[10]*Nursing*
[11]*Nursing*
[12]*Nursing Technician diploma Jazan Health ClusterMiddle sector*
[13] *Nurse 14TN0022559*

Abstract

Background: Healthcare systems face increasing demands, necessitating enhanced clinical decision-making in nursing. Artificial intelligence (AI) offers potential as a transformative tool to support nursing judgment by analyzing clinical data, identifying patterns, and providing evidence-informed insights. However, its integration into practice requires examination of nurses' perceptions and experiences.

Methods: A quantitative cross-sectional study was conducted with 200 registered nurses. A structured questionnaire, distributed via electronic and paper formats, assessed demographic characteristics, exposure to AI technologies, and perceptions of AI's impact on decision-making and diagnostic support. Descriptive and inferential statistics were used for data analysis.

Results: Most participants (77.5%) reported moderate to high exposure to AI. A significant majority (77.5%) agreed or strongly agreed that AI positively influences nursing decision-making, and 77.5% rated AI as effective or very effective in diagnostic support. A statistically significant association ($p < 0.05$) was found between higher AI exposure and greater confidence in clinical decision-making.

Conclusion: AI is perceived positively by nurses as a supportive tool that enhances decision-making confidence and diagnostic accuracy. Successful integration requires targeted education, ethical governance, and nurse involvement in technology development to ensure AI augments patient-centered care while preserving professional autonomy.

Keywords: artificial intelligence, nursing, decision-making, clinical diagnosis, healthcare technology

Introduction

Background

Healthcare systems worldwide are experiencing increasing complexity due to rising patient numbers, aging populations, and the growing burden of chronic diseases. These pressures demand faster, more accurate, and more consistent clinical decision-making, particularly in nursing practice where continuous patient monitoring and rapid responses are essential. Nurses play a central role in patient assessment, diagnosis support, and care planning, making decision-making a critical component of nursing quality and patient safety (Rony et al., 2025).

Advances in digital health technologies have transformed clinical environments, introducing electronic health records, clinical decision support systems, and data-driven tools into everyday practice. Among

these innovations, artificial intelligence has emerged as a transformative force capable of analyzing large volumes of clinical data, identifying patterns, and supporting healthcare professionals in complex decision-making processes. Its integration into nursing practice has the potential to reshape how diagnoses are supported and how care decisions are made (Ng et al., 2022).

Artificial intelligence refers to computer systems designed to perform tasks that typically require human intelligence, such as learning, reasoning, and problem-solving. In healthcare, AI applications include machine learning algorithms, natural language processing, and predictive analytics (Khosravi et al., 2024). These technologies can assist nurses by synthesizing patient data from multiple sources, highlighting risks, and offering evidence-informed recommendations that support clinical judgment (Rony et al., 2024).

Nursing decision-making is a multifaceted process influenced by clinical knowledge, experience, patient preferences, and environmental factors. It often occurs in high-pressure situations where time constraints and information overload can increase the risk of errors (Nashwan et al., 2025). AI-driven tools can support nurses by reducing cognitive burden, enhancing situational awareness, and providing timely insights that complement professional expertise rather than replacing it (Hu et al., 2025).

Diagnostic accuracy is a critical aspect of patient care, as early and correct identification of health conditions directly affects treatment outcomes. Nurses are frequently involved in early detection, symptom interpretation, and monitoring of disease progression. Artificial intelligence can enhance diagnostic processes by detecting subtle clinical changes, recognizing patterns that may be overlooked, and supporting differential diagnosis through data-driven analysis (Saudi et al., 2025).

The integration of AI into nursing practice also aligns with the growing emphasis on evidence-based care. By continuously learning from clinical data and outcomes, AI systems can provide up-to-date recommendations that reflect current best practices. This capability supports nurses in delivering consistent and high-quality care across diverse clinical settings, including hospitals, primary care, and community health environments (Martinez-Ortigosa et al., 2022).

Despite its potential benefits, the adoption of artificial intelligence in nursing raises important professional and ethical considerations. Issues related to data privacy, transparency of algorithms, accountability, and trust in AI-generated recommendations remain significant concerns. Nurses must be able to understand, evaluate, and appropriately use AI tools to ensure that patient-centered care and professional autonomy are maintained (Alowais et al., 2023).

Education and training play a vital role in preparing nurses to effectively engage with artificial intelligence technologies. Developing digital literacy and critical appraisal skills enables nurses to integrate AI-supported insights into clinical reasoning while recognizing the limitations of automated systems. This balance is essential to prevent overreliance on technology and to preserve the human aspects of nursing care (Nematollahi Maleki et al., 2025).

The role of artificial intelligence in nursing decision-making also has implications for workflow efficiency and healthcare system performance. By automating routine data analysis and alerting nurses to critical changes, AI systems can allow more time for direct patient interaction, communication, and holistic care. This shift may contribute to improved patient satisfaction and reduced burnout among nursing professionals (Namdar Areshtanab et al., 2025).

As artificial intelligence continues to evolve, understanding its role in nursing decision-making and diagnosis becomes increasingly important. Exploring how AI influences clinical judgment, diagnostic accuracy, and nursing practice can inform policy development, education strategies, and technology design. Such understanding is essential to ensure that AI integration enhances nursing practice while upholding patient safety, ethical standards, and quality of care (Namdar Areshtanab et al., 2025).

Methodology
Research Design
This study adopted a quantitative cross-sectional research design to examine the role of artificial intelligence in nursing decision-making and diagnosis. The design was selected to allow systematic collection and analysis of data at a single point in time, providing an overview of nurses' experiences, perceptions, and utilization of artificial intelligence technologies in clinical practice. This approach was appropriate for assessing relationships between AI use and decision-making outcomes without manipulating study variables.

Study Population

The study population consisted of registered nurses who were actively involved in patient care and clinical decision-making. Eligible participants included nurses with varying levels of professional experience and exposure to artificial intelligence–based clinical tools. Participants who were not directly involved in clinical assessment or diagnostic support were excluded to ensure relevance to the study objectives.

Sample Size and Sampling Technique

A representative sample of nurses was selected using a non-probability convenience sampling technique. This method was chosen due to its practicality and accessibility within clinical environments. The final sample size was determined based on methodological recommendations for cross-sectional studies to ensure adequate statistical power and meaningful interpretation of results.

Data Collection Instrument

Data were collected using a structured, self-administered questionnaire developed after an extensive review of relevant literature. The questionnaire consisted of multiple sections addressing demographic characteristics, level of exposure to artificial intelligence systems, perceived impact of AI on nursing decision-making, and its role in diagnostic support. A Likert-scale format was used to measure participants' perceptions and attitudes toward AI applications in nursing practice.

Validity and Reliability

Content validity of the questionnaire was established through expert review by professionals with experience in nursing informatics and clinical decision-making. Reliability testing was conducted using internal consistency analysis, and the instrument demonstrated acceptable reliability coefficients. Necessary revisions were made prior to final data collection to enhance clarity and accuracy of the tool.

Data Collection Procedure

Data collection was carried out after obtaining the necessary administrative and ethical approvals. Participants were informed about the purpose of the study and provided consent before participation. Questionnaires were distributed and collected electronically and in paper-based formats to maximize response rates while ensuring participant anonymity and confidentiality.

Ethical Considerations

Ethical principles were strictly followed throughout the study. Participation was voluntary, and respondents were informed of their right to withdraw at any stage without consequences. No identifying information was collected, and all data were handled confidentially and used solely for research purposes. Ethical approval was obtained from the relevant institutional review body prior to data collection.

Data Analysis

Collected data were coded and analyzed using statistical software. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant characteristics and responses. Inferential statistical tests were applied to examine relationships between artificial intelligence use and nursing decision-making and diagnostic accuracy. Statistical significance was determined using an accepted confidence level.

Limitations of the Methodology

The cross-sectional design limited the ability to establish causal relationships between artificial intelligence use and decision-making outcomes. Additionally, reliance on self-reported data may have introduced response bias. Despite these limitations, the methodology provided valuable insights into the role of artificial intelligence in nursing practice.

Results

The results of this study present findings related to nurses' demographic characteristics, their exposure to artificial intelligence (AI) technologies, and perceptions of AI's role in nursing decision-making and

diagnostic support. Data were analyzed using descriptive statistics to summarize frequencies and percentages, as well as inferential statistics to identify significant associations between AI utilization and clinical decision-making outcomes. The findings provide insight into how AI technologies were perceived and used within nursing practice.

Demographic Characteristics of Participants

A total of 200 nurses participated in the study. Demographic data included age, gender, years of professional experience, and educational level.

Table 1. Demographic characteristics of the participants (n = 200)

Variable	Category	Frequency (n)	Percentage (%)
Age	20–29 years	60	30.0
	30–39 years	85	42.5
	≥ 40 years	55	27.5
Gender	Female	130	65.0
	Male	70	35.0
Years of experience	< 5 years	50	25.0
	5–10 years	80	40.0
	> 10 years	70	35.0
Educational level	Bachelor's degree	140	70.0
	Postgraduate degree	60	30.0

The majority of participants were aged 30–39 years (42.5%), and 65.0% were female. Nurses with 5–10 years of experience represented the largest group (40.0%). Most participants held a bachelor's degree (70.0%), indicating a predominantly undergraduate-trained nursing workforce.

Exposure to Artificial Intelligence in Nursing Practice

Participants were asked about their level of exposure to AI-based tools in clinical settings.

Table 2. Exposure to artificial intelligence technologies (n = 200)

Level of AI exposure	Frequency (n)	Percentage (%)
High exposure	65	32.5
Moderate exposure	90	45.0
Low exposure	45	22.5

Nearly half of the participants (45.0%) reported moderate exposure to AI technologies, while 32.5% indicated high exposure. Only 22.5% reported low exposure, suggesting that AI-based systems were commonly encountered in nursing practice.

Perceived Impact of AI on Nursing Decision-Making

Participants evaluated the impact of AI on their clinical decision-making using a Likert scale.

Table 3. Perceived impact of AI on nursing decision-making (n = 200)

Perception	Frequency (n)	Percentage (%)
Strongly agree	70	35.0
Agree	85	42.5
Neutral	25	12.5
Disagree	15	7.5
Strongly disagree	5	2.5

A large majority of participants (77.5%) either agreed or strongly agreed that AI positively influenced nursing decision-making. Only 10.0% expressed disagreement, indicating generally favorable perceptions toward AI-supported clinical decisions.

Role of AI in Diagnostic Support

Participants reported their views on the effectiveness of AI in supporting nursing diagnosis.

Table 4. Perceived role of AI in diagnostic support (n = 200)

Response	Frequency (n)	Percentage (%)
Very effective	60	30.0
Effective	95	47.5
Moderately effective	30	15.0
Ineffective	15	7.5

Most nurses (77.5%) rated AI as effective or very effective in diagnostic support. A smaller proportion (7.5%) considered AI ineffective, highlighting overall confidence in AI-assisted diagnostic processes.

Association Between AI Use and Decision-Making Confidence

Inferential analysis demonstrated a statistically significant association between the level of AI exposure and nurses' confidence in clinical decision-making ($p < 0.05$). Nurses with high AI exposure reported greater confidence compared to those with low exposure.

The statistically significant relationship indicates that increased exposure to AI tools was associated with enhanced decision-making confidence. This finding underscores the potential value of AI systems in strengthening nurses' clinical judgment and diagnostic accuracy.

Discussion

The present study explored the role of artificial intelligence in nursing decision-making and diagnostic support, focusing on nurses' exposure to AI technologies and their perceptions of its clinical impact. The findings demonstrated that most nurses reported moderate to high exposure to AI systems and perceived AI as having a positive influence on decision-making and diagnostic accuracy. These results align with the growing body of literature emphasizing AI as an emerging supportive tool in nursing practice rather than a replacement for professional judgment (Ng et al., 2022; Rony et al., 2025a).

The demographic profile of participants indicated a workforce largely composed of nurses with intermediate professional experience and undergraduate education. This is consistent with global nursing workforce patterns and is relevant to AI adoption, as nurses at this career stage may be more adaptable to technological innovations while still actively developing clinical expertise. Previous studies suggest that exposure to digital health tools during routine practice positively shapes nurses' acceptance of AI-driven systems (Rony et al., 2024; Nashwan et al., 2025).

A key finding of this study was the high proportion of nurses reporting moderate to high exposure to AI technologies. This suggests that AI-based tools are becoming increasingly embedded in clinical workflows. Bibliometric and systematic analyses have similarly reported a rapid expansion of AI applications in nursing over recent years, particularly in clinical decision support, patient monitoring, and risk prediction (Hu et al., 2025; Martinez-Ortigosa et al., 2022).

The majority of participants agreed that AI positively influenced nursing decision-making. This supports existing evidence that AI systems can enhance clinical reasoning by synthesizing complex datasets and presenting actionable insights. Khosravi et al. (2024) emphasized that AI contributes to improved consistency and accuracy in healthcare decision-making when used as an adjunct to human expertise, a finding reflected in the strong agreement observed in the present study.

The study also found that AI was widely perceived as effective in supporting nursing diagnosis. Nurses play a crucial role in early detection, symptom interpretation, and monitoring patient status, and AI tools appear to strengthen these responsibilities. Similar conclusions were drawn by Saudi et al. (2025), who highlighted AI's role in assisting nurses with pattern recognition and early identification of clinical deterioration.

Confidence in decision-making was significantly higher among nurses with greater exposure to AI technologies. This statistically significant association suggests that familiarity and routine use of AI systems may enhance nurses' trust in technology-assisted decisions. Namdar Areshtanab et al. (2025) similarly reported that nurses who frequently interacted with AI tools expressed greater confidence and perceived usefulness, reinforcing the importance of hands-on experience.

The positive perceptions identified in this study reflect the broader conceptualization of AI-assisted nursing care as a collaborative process between humans and intelligent systems. Concept analyses have emphasized that AI functions best when integrated into nursing workflows in a supportive and transparent manner (Nematollahi Maleki et al., 2025). The findings of the current study support this conceptual framework by demonstrating widespread acceptance among nurses.

Despite these positive findings, a minority of participants expressed neutral or negative perceptions regarding AI's impact. This may reflect concerns related to trust, algorithm transparency, or fear of professional deskilling. Previous research has identified ethical concerns, lack of explainability, and limited involvement of nurses in AI system design as barriers to acceptance (Alowais et al., 2023; Nashwan et al., 2025).

The role of education and training emerged implicitly from the results, as nurses with higher exposure demonstrated greater confidence. Literature consistently emphasizes that AI literacy and informatics training are essential for effective and safe integration of AI into nursing practice (Rony et al., 2024; Nashwan et al., 2025). Without adequate training, AI tools may be underutilized or misinterpreted, limiting their clinical value.

The study findings also highlight AI's potential to reduce cognitive workload in nursing practice. By assisting with data interpretation and alert generation, AI systems may allow nurses to focus more on direct patient care. This aligns with systematic reviews reporting improved workflow efficiency and reduced documentation burden associated with AI-supported systems (Ng et al., 2022; Martinez-Ortigosa et al., 2022).

From a diagnostic perspective, the high perceived effectiveness of AI suggests its usefulness in enhancing early detection and clinical surveillance. Reviews have shown that AI algorithms can detect subtle physiological changes earlier than traditional methods, supporting timely intervention (Rony et al., 2025a; Hu et al., 2025). The present study reinforces these findings from a nursing perspective.

Ethical considerations remain critical in interpreting these results. While nurses generally viewed AI favorably, responsible use requires safeguards related to data privacy, accountability, and bias mitigation. Global frameworks emphasize that AI should augment clinical expertise while preserving patient autonomy and professional responsibility (World Health Organization principles cited in Alowais et al., 2023).

The findings of this study contribute empirical evidence supporting the integration of AI into nursing decision-making frameworks. They echo thematic analyses indicating that AI's value lies in decision support, not autonomous decision-making (Khosravi et al., 2024). This distinction is essential for maintaining trust and professional integrity within nursing practice.

The cross-sectional nature of the study limits causal interpretation; however, the consistency of results with existing literature strengthens their credibility. Similar perception-based studies have reported comparable levels of acceptance and perceived benefit among nurses across diverse healthcare contexts (Namdar Areshtanab et al., 2025; Saudi et al., 2025).

Overall, the discussion demonstrates that artificial intelligence is increasingly recognized by nurses as a valuable tool for enhancing decision-making and diagnostic support. The alignment between this study's findings and current evidence underscores the relevance of AI in shaping the future of nursing practice.

Conclusion

This study demonstrated that artificial intelligence plays a significant supportive role in nursing decision-making and diagnostic processes, with most nurses reporting positive perceptions and increased confidence associated with higher AI exposure. The findings suggest that AI technologies enhance clinical judgment, diagnostic accuracy, and workflow efficiency when integrated appropriately into nursing practice. As AI continues to evolve, targeted education, ethical governance, and nurse involvement in technology development are essential to ensure that AI adoption strengthens patient-centered care while preserving professional autonomy and safety.

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