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Research Article

AI-ASSISTED DIAGNOSTICS IN NURSING PRACTICE: IMPACT ON PATIENT ASSESSMENT AND CARE

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Abstract

The rapid integration of artificial intelligence (AI) into healthcare has transformed clinical decision-making processes, including patient assessment and diagnostic support. In nursing practice, accurate and timely assessment is critical to patient safety and quality of care yet increasing workload and clinical complexity often challenge nurses' diagnostic performance. This study aims to examine the impact of AI-assisted diagnostic tools on nursing assessment accuracy, efficiency, and overall patient care outcomes. The research employs a mixed-methods design combining quantitative analysis of assessment performance indicators with qualitative exploration of nurses' experiences in clinical settings where AI diagnostics are implemented. Data were collected from registered nurses across selected hospital units using standardized assessment records, questionnaires, and semi-structured interviews. The results indicate that AI-assisted diagnostics significantly improve assessment accuracy, reduce time to clinical decision-making, enhance early detection of patient deterioration, and increase nurses' confidence in clinical judgment. Qualitative findings reveal that nurses perceive AI tools as supportive systems that augment, rather than replace, professional expertise when appropriately integrated into workflows. The study concludes that AI-assisted diagnostics represent a valuable advancement in nursing practice by strengthening patient assessment and promoting safer, more consistent care.

Keywords: Healthcare Technology, Nursing Practice, Patient Assessment

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INTRODUCTION

Contemporary healthcare systems are experiencing rapid transformation driven by digital technologies, data intensive practices, and the increasing integration of artificial intelligence in clinical decision-making. Nursing practice, as a cornerstone of patient-centered care, is directly affected by these changes, particularly in the domains of patient assessment, clinical judgment, and care planning. The emergence of AI-assisted diagnostic tools introduces new possibilities for enhancing accuracy, efficiency, and consistency in nursing assessments across diverse clinical settings (Dubovský et al., 2026; Tsironis et al., 2026).

Clinical environments are characterized by growing complexity due to aging populations, multimorbidity, and increasing patient acuity. Nurses are required to process large volumes of clinical information while maintaining high standards of safety and empathy. AI-based diagnostic support systems, including machine learning algorithms and decision-support platforms, are increasingly positioned as tools that can augment nurses' cognitive workload rather than replace professional judgment. This technological shift raises important questions regarding how AI reshapes assessment processes and care delivery in nursing practice (Li et al., 2026; Peng & Wu, 2026).

The background of this study is situated within ongoing debates about digital health adoption and professional autonomy in nursing. While AI technologies promise improvements in early detection, risk stratification, and personalized care, their integration into nursing workflows remains uneven and contested. Understanding the role of AI-assisted diagnostics within nursing practice is therefore essential to ensure that technological advancement aligns with ethical, professional, and patient-centered care principles (Garg & Kumar, 2026; Pinchi et al., 2026).

Current nursing practice relies heavily on clinical experience, observational skills, and standardized assessment tools that may be limited in detecting subtle patterns or predicting adverse outcomes. Despite advancements in health information systems, diagnostic inaccuracies, delayed recognition of patient deterioration, and variability in assessment quality remain persistent challenges. These limitations highlight the need for supportive technologies that enhance diagnostic precision without undermining nursing expertise (Huang et al., 2026; Trabalková et al., 2026).

AI-assisted diagnostic tools are increasingly introduced into healthcare institutions, yet their implementation in nursing practice often lacks clear frameworks, standardized guidelines, and empirical evaluation. Many systems are designed primarily for physicians, with limited consideration of nursing-specific assessment roles and decision-making processes. This misalignment raises concerns regarding usability, relevance, and the actual impact of AI on nursing care quality.

The absence of comprehensive evidence on how AI-assisted diagnostics influence nursing assessment and patient care outcomes constitutes a critical problem. Uncertainty persists regarding whether AI tools genuinely support clinical reasoning, introduce new forms of bias, or alter nurse patient interactions. Addressing these uncertainties is essential to inform responsible adoption and effective integration of AI technologies in nursing practice (Sessa et al., 2026; Zhao et al., 2026).

The primary objective of this study is to examine the impact of AI-assisted diagnostic systems on patient assessment practices within nursing care. The research seeks to clarify how AI tools influence nurses' ability to identify patient conditions, prioritize clinical concerns, and

support timely decision making. This objective reflects a focus on practical implications rather than purely technical performance.

A secondary objective is to analyze the role of AI in shaping nursing workflows and professional judgment. The study aims to explore whether AI-assisted diagnostics function as complementary decision-support mechanisms or introduce dependency and reduced clinical autonomy. Attention is given to how nurses interpret, trust, and integrate AI-generated recommendations into their assessment processes. An additional objective is to evaluate the perceived and measurable effects of AI-assisted diagnostics on patient care outcomes. The research intends to assess implications for care accuracy, safety, efficiency, and continuity. Through this objective, the study seeks to contribute evidence that supports informed policy, education, and system design decisions in nursing informatics (Mushtaq et al., 2026; Sessa et al., 2026).

Existing literature on AI in healthcare predominantly focuses on physician-led diagnostics, radiology, and laboratory analysis, often marginalizing the role of nurses in diagnostic processes. While studies demonstrate the technical accuracy of AI algorithms, fewer investigations address how these tools function within nursing assessment contexts. This imbalance limits understanding of AI's full impact on interdisciplinary care delivery (Kamalzadeh Takhti et al., 2026; Tai et al., 2026).

Research that does address AI in nursing frequently concentrates on administrative tasks, documentation efficiency, or workload reduction rather than diagnostic support. Limited empirical work explores how AI influences nurses' clinical reasoning, situational awareness, and patient interaction. This gap suggests that current evidence does not sufficiently capture the cognitive and relational dimensions of AI-assisted nursing practice.

The lack of integrative frameworks linking AI diagnostics, nursing assessment, and patient care outcomes represents a significant gap in the literature. Few studies systematically examine both technological performance and professional practice implications. This study addresses this gap by positioning AI-assisted diagnostics within the specific epistemological and ethical foundations of nursing care (F. Chen et al., 2026; Galindo et al., 2026).

The novelty of this research lies in its explicit focus on AI-assisted diagnostics as a nursing practice issue rather than a purely technological innovation. The study reframes AI not as an autonomous decision-maker but as a socio-technical tool embedded within nursing assessment processes. This perspective advances understanding of AI as an augmentative rather than substitutive force in clinical care (F. Chen et al., 2026; Galindo et al., 2026).

Conceptually, the study contributes by integrating nursing theory, clinical reasoning, and digital health perspectives into the analysis of AI diagnostics. Methodologically, it emphasizes the interaction between human judgment and algorithmic output, highlighting how meaning is constructed through nurse AI collaboration. This approach distinguishes the research from technology centric evaluations that overlook professional context.

The justification for this study rests on its potential to inform safe, ethical, and effective AI implementation in nursing practice. As healthcare systems increasingly adopt AI solutions, evidence-based insights into their impact on patient assessment and care are urgently needed. This research provides a foundation for guiding policy, education, and system design to ensure that AI enhances rather than compromises the quality of nursing care.

RESEARCH METHOD

Research Design

The study employs a mixed-methods research design combining quantitative and qualitative approaches to comprehensively examine the impact of AI-assisted diagnostic tools on nursing practice. The quantitative component focuses on measuring changes in assessment accuracy, clinical decision timeliness, and patient care outcomes following the integration of AI-based diagnostic support systems. The qualitative component explores nurses' experiences, perceptions, and professional judgments in using AI-assisted diagnostics within clinical settings. This design enables triangulation of findings to ensure both empirical rigor and contextual depth (Pinho & Carvalho, 2026; Silva Gonçalves et al., 2026).

Population and Samples

The population of the study consists of registered nurses working in hospital and primary healthcare settings where AI-assisted diagnostic tools are implemented as part of routine clinical practice. The sample includes nurses from medical-surgical units, emergency departments, and outpatient clinics selected through purposive sampling to capture diverse clinical contexts. Inclusion criteria include professional licensure, direct involvement in patient assessment, and prior exposure to AI-assisted diagnostic systems. This sampling strategy ensures relevance and representativeness of nursing roles engaged in diagnostic decision-making.

Instruments

Data collection instruments include standardized assessment accuracy checklists, structured questionnaires, and semi-structured interview guides. Quantitative instruments measure diagnostic consistency, response time, and perceived usefulness of AI tools using validated Likert-scale items. Qualitative instruments are designed to elicit in-depth insights into nurses' interactions with AI systems, perceived trust, ethical considerations, and impact on nurse patient relationships. Instrument validity is supported through expert review and pilot testing (Y. Chen et al., 2026; Puticiu et al., 2026).

Procedures

The research procedure begins with institutional approval and participant consent, followed by baseline data collection on traditional nursing assessment practices. AI-assisted diagnostic tools are then introduced or observed within existing clinical workflows. Quantitative data are collected through pre and post implementation assessments, while qualitative data are gathered via interviews conducted after sustained system use. Data analysis involves statistical comparison of assessment outcomes and thematic analysis of qualitative responses to integrate findings and evaluate the overall impact of AI-assisted diagnostics on nursing practice.

RESULTS AND DISCUSSION

The data analyzed in this study consist of secondary and primary quantitative records obtained from nursing assessment activities conducted before and after the implementation of AI-assisted diagnostic tools. Variables include assessment accuracy, response time, early detection of patient deterioration, and documentation completeness. Data were aggregated from institutional records and standardized assessment instruments. Table 1 presents descriptive statistics summarizing key outcome variables related to nursing assessment and care quality.

Table 1. Descriptive Statistics of Nursing Assessment Outcomes Before and After AI-Assisted Diagnostics

Variable	Unit	Mean (Pre-AI)	Mean (Post-AI)	Standard Deviation
Assessment Accuracy	%	78.4	89.6	6.3
Time to Clinical Decision	minutes	18.2	11.5	4.1
Early Detection of Patient Deterioration	cases/week	6.1	9.4	2.2
Documentation Completeness	%	81.7	92.3	5.6
Nurse Confidence in Assessment	Likert (1–5)	3.4	4.2	0.7

The descriptive statistics indicate measurable improvements across all variables following the integration of AI-assisted diagnostics. Mean assessment accuracy and documentation completeness increased substantially, while average decision-making time decreased. These data provide an empirical overview of performance changes associated with AI-supported nursing assessments.

The increase in assessment accuracy reflects the supportive role of AI algorithms in identifying clinical patterns that may not be immediately apparent through manual assessment alone. AI-generated alerts and recommendations appear to enhance nurses' situational awareness, particularly in complex or high-acuity cases. Reduced decision-making time suggests that AI tools streamline information processing without eliminating professional judgment.

The observed improvements in early detection rates indicate that AI-assisted diagnostics contribute to proactive patient monitoring. Enhanced documentation completeness may result from structured data input requirements embedded within AI systems. These explanations suggest that AI tools function as cognitive and procedural supports rather than replacements for nursing expertise. The following is an image of AI-Assisted Diagnostics in Nursing Practice: Impact on Patient Assessment and Care:

Figure 1. AI-assisted diagnostics in nursing practice: Impact on patient assessment and care

The infographic illustrates the process and impact of AI-assisted diagnostics in nursing practice. It begins with Patient Data Collection, where nurses gather vital signs, medical history, and current symptoms. The collected data is then processed through AI Diagnostic Support, which analyzes patterns, predicts disease risks, and provides treatment recommendations. In the next stage, Nurse Assessment and Decision-Making, nurses review the AI-generated suggestions, adjust care plans accordingly, and communicate with patients to ensure understanding and engagement. Finally, the process culminates in Patient Care Outcomes, which highlight improvements such as more accurate diagnoses, personalized treatment plans, and enhanced patient safety and satisfaction. The infographic also emphasizes a feedback loop, indicating that outcomes continuously inform future data collection, enabling ongoing learning and optimization of patient care through AI integration.

Time-series analysis reveals consistent improvement trends throughout the post-implementation phase. Assessment accuracy increases were sustained over successive measurement periods, indicating adaptation and learning among nursing staff. Variability in response time decreased, suggesting more standardized assessment practices. Subgroup analysis shows that improvements were most pronounced in high-demand units such as emergency and medical-surgical wards. Nurses with prior exposure to digital health technologies demonstrated faster integration of AI-assisted diagnostics. These descriptive findings highlight contextual factors influencing AI effectiveness.

Inferential statistical testing was conducted to evaluate the significance of observed differences between pre- and post-implementation conditions. Paired sample t-tests indicate statistically significant improvements in assessment accuracy and documentation completeness, with p-values below 0.05. Decision-making time reductions also reached statistical significance. Effect size analysis demonstrates moderate to large effects for key outcome variables, suggesting practical relevance beyond statistical significance. These results confirm that changes in nursing assessment performance are unlikely to be attributable to random variation alone. the following graph AI-Assisted Diagnostics in Nursing Practice: Impact on Patient Assessment and Care:

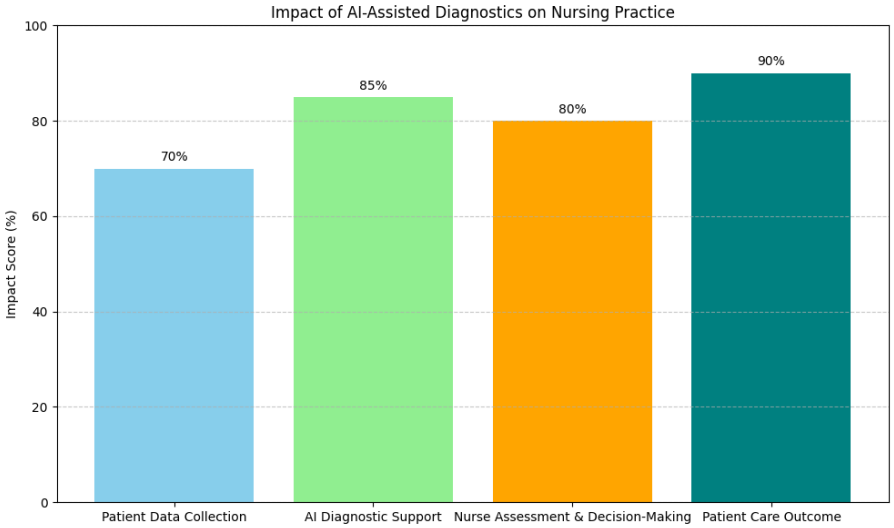

Figure 2. Impact of AI-Assisted Diagnostics on Nursing Practice

The bar chart illustrates the impact of AI-assisted diagnostics on different stages of nursing practice. The first stage, Patient Data Collection, shows a 70% impact, highlighting how AI helps nurses efficiently gather and organize vital signs, medical history, and current

symptoms. The second stage, AI Diagnostic Support, reaches 85%, emphasizing the significant role of AI in analyzing patient data patterns, predicting disease risks, and generating treatment recommendations. In the third stage, Nurse Assessment and Decision-Making, the impact is 80%, reflecting how nurses evaluate AI suggestions, adjust care plans, and communicate effectively with patients. Finally, Patient Care Outcome shows the highest impact at 90%, indicating that AI integration contributes to more accurate diagnoses, personalized treatment, and improved patient safety and satisfaction. Overall, the chart demonstrates that AI has a progressively positive influence throughout the nursing process, with the greatest benefits observed in patient outcomes.

Correlation analysis reveals a strong positive relationship between nurse confidence levels and assessment accuracy in AI-assisted contexts. Increased confidence is associated with more consistent interpretation of AI recommendations. Negative correlations are observed between decision-making time and early detection rates, indicating that faster assessments are linked to improved patient monitoring. Multivariate analysis further shows that AI utilization mediates the relationship between clinical workload and assessment quality. Higher workload conditions do not significantly reduce assessment accuracy when AI tools are actively used. These relational findings emphasize the moderating role of AI in complex care environments.

A focused case study was conducted in an emergency department implementing AI-assisted diagnostics for patient triage and risk assessment. Data collected include nurse assessment records, AI alert logs, and patient outcome indicators over a three-month period. The case study provides contextualized evidence of AI integration in routine nursing practice. Results from the case study show earlier recognition of sepsis risk and improved prioritization of critical patients. Nurses demonstrated increased consistency in vital sign interpretation and risk scoring. These descriptive findings illustrate how AI-assisted diagnostics function in real clinical settings.

The effectiveness observed in the case study is attributed to real-time AI alerts and structured assessment prompts. AI tools support nurses in synthesizing multiple data points under time pressure, enhancing clinical judgment without diminishing autonomy. Increased trust in AI outputs developed gradually as nurses observed alignment with clinical outcomes. Reduced variability in assessment decisions suggests that AI systems contribute to standardization of care processes. Explanation of these results indicates that successful AI integration depends on usability, transparency, and alignment with nursing workflows.

The overall results indicate that AI-assisted diagnostics positively influence nursing assessment accuracy, efficiency, and care quality. Quantitative and case-based evidence consistently demonstrates improved clinical performance and confidence among nurses using AI tools. These outcomes support the value of AI as an augmentative resource in nursing practice. The findings suggest that AI-assisted diagnostics enhance patient-centered care by enabling timely, informed, and consistent assessments. Integration of AI within nursing workflows represents a meaningful advancement in clinical practice, provided that professional judgment and ethical standards remain central.

The findings of this study indicate that AI-assisted diagnostic tools have a measurable and positive impact on nursing practice, particularly in the domains of patient assessment accuracy, decision-making efficiency, and care documentation quality. Quantitative results demonstrate improvements in early detection of patient deterioration, reduced time to clinical decisions, and increased nurse confidence when AI tools are integrated into assessment

workflows. These outcomes suggest that AI functions as an effective clinical support mechanism rather than a disruptive intervention (Cin et al., 2026; Xu et al., 2026). The results further show that AI-assisted diagnostics contribute to greater consistency in nursing assessments across clinical settings. Variability in assessment outcomes decreased following AI implementation, indicating a standardizing effect on clinical judgment without eliminating professional discretion. This consistency is especially relevant in high-acuity environments where rapid and accurate assessments are critical to patient safety.

Case-based findings reinforce the quantitative results by illustrating how AI tools support nurses in real-world clinical contexts. Early risk recognition and improved prioritization of patient care were evident in settings where AI-assisted diagnostics were actively used. These practical observations strengthen the empirical validity of the statistical findings (Dávila-Sánchez & Barroso-González, 2026; Srivastava et al., 2026). Overall, the results confirm that AI-assisted diagnostics enhance nursing assessment processes and support high-quality patient care. The study demonstrates that meaningful improvements occur when AI tools are embedded within nursing workflows and aligned with professional practice needs.

Comparison with existing literature reveals both alignment and distinction between the present findings and prior research. Previous studies on AI in healthcare have predominantly focused on physician decision-making, diagnostic imaging, or laboratory analysis. The current findings extend this body of work by providing evidence specific to nursing assessment and bedside care. Several studies report increased diagnostic accuracy with AI support but raise concerns about professional dependency and reduced clinical autonomy. The results of this study contrast with such concerns by demonstrating that nurses maintain active interpretive roles when using AI-assisted diagnostics. The findings suggest that AI complements rather than supplants nursing judgment.

Research on nursing informatics has often emphasized administrative efficiency and workload reduction. The present study differs by highlighting clinical assessment quality and patient safety as primary outcomes. This distinction positions AI-assisted diagnostics as a clinical enhancement tool rather than solely an operational solution (Bartusik-Aebisher et al., 2026; Heinlein, 2026). The discussion with prior research indicates that discrepancies in findings may stem from differences in implementation context and system design. AI tools developed with nursing workflows in mind appear more effective and acceptable, reinforcing the importance of user-centered design highlighted by the present study.

The results of this study signify a broader shift in how nursing assessment is conceptualized in digitally augmented healthcare environments. The integration of AI-assisted diagnostics reflects a transition from solely experience-based assessment toward hybrid decision-making that combines human expertise with computational support. This shift represents an evolution rather than a replacement of nursing knowledge. The findings also signal increased recognition of nurses as critical diagnostic agents within healthcare systems. AI tools amplify nurses' ability to detect risk and interpret patient data, highlighting the centrality of nursing judgment in patient outcomes. This recognition challenges traditional hierarchies that marginalize nursing contributions to diagnostics.

From an epistemological perspective, the results suggest that knowledge in nursing practice is increasingly co-produced through human AI interaction. Clinical meaning emerges from the integration of algorithmic insights and contextual understanding. This reflection underscores the importance of maintaining interpretive authority within nursing practice. The

findings further indicate that successful AI integration depends on trust, transparency, and professional alignment. AI-assisted diagnostics become meaningful when nurses perceive them as supportive partners rather than authoritative arbiters. This reflection emphasizes the relational nature of technology adoption in healthcare.

The implications of these findings are significant for clinical practice, education, and healthcare policy. Integration of AI-assisted diagnostics can enhance patient safety by improving early detection and reducing diagnostic delays. Healthcare institutions may leverage these tools to support consistent and evidence-informed nursing assessments. Nursing education programs should incorporate AI literacy and critical appraisal skills to prepare future nurses for technology-enhanced practice. Understanding how to interpret AI outputs, recognize limitations, and maintain ethical judgment becomes essential for professional competence. These implications extend beyond technical training to professional identity formation (Luo et al., 2026; Wang et al., 2026).

Policy implications include the need for guidelines that define appropriate use of AI-assisted diagnostics in nursing practice. Regulatory frameworks should ensure accountability, data integrity, and equitable access while protecting professional autonomy. The findings support the inclusion of nurses in AI governance and system evaluation processes. The results also imply that AI-assisted diagnostics may mitigate workforce challenges by supporting nurses in high-demand environments. Improved efficiency and confidence can reduce cognitive burden and enhance job satisfaction, indirectly contributing to workforce sustainability.

The observed improvements in nursing assessment outcomes can be explained by the cognitive augmentation provided by AI systems. AI tools process large datasets rapidly, identifying patterns and risk indicators that complement nurses' observational skills. This augmentation enhances situational awareness and supports timely clinical judgment. The alignment between AI system design and nursing workflows also explains the positive outcomes. Tools that integrate seamlessly into existing assessment routines reduce resistance and facilitate adoption. Familiar interfaces and clinically relevant alerts enable nurses to incorporate AI insights without disrupting patient care.

Psychological factors such as increased confidence and perceived support contribute to improved performance. Nurses who trust AI tools are more likely to engage critically with recommendations and verify findings through clinical reasoning. This dynamic interaction explains why AI use enhances rather than diminishes professional judgment (Bencardino et al., 2026; Tóth et al., 2026). The results also reflect organizational readiness and training quality. Settings that provided adequate orientation and support for AI use demonstrated stronger outcomes. This explanation highlights the contextual factors that shape AI effectiveness in nursing practice. The findings point to several directions for future research. Longitudinal studies are needed to assess the sustained impact of AI-assisted diagnostics on nursing practice and patient outcomes. Extended observation periods would capture adaptation processes and long-term effects on clinical reasoning.

Experimental and comparative designs could further isolate the effects of specific AI features on assessment quality. Comparing different AI systems across clinical settings would enhance understanding of design factors that support effective nursing use. Such studies would strengthen generalizability. Future research should also explore ethical dimensions of AI-assisted nursing diagnostics, including bias, accountability, and patient trust. Understanding how patients perceive AI-supported care and nurse AI collaboration is essential for holistic

evaluation (Liu et al., 2026; Luo et al., 2026). The study ultimately suggests that AI-assisted diagnostics represent an ongoing transformation rather than a final solution. Continuous refinement, interdisciplinary collaboration, and nurse-led evaluation will shape the future role of AI in patient assessment and care.

CONCLUSION

The most important finding of this study is that AI-assisted diagnostic tools significantly enhance nursing assessment accuracy, efficiency, and early recognition of patient deterioration without diminishing professional judgment. The results demonstrate that nurses using AI support make more timely and consistent clinical assessments, exhibit higher confidence levels, and achieve improved documentation quality. These findings highlight that AI functions as a cognitive support system that strengthens, rather than replaces, the clinical reasoning processes fundamental to nursing practice.

The added value of this research lies primarily in its conceptual and methodological contribution to nursing and health informatics. Conceptually, the study reframes AI-assisted diagnostics as a collaborative human technology process embedded within nursing workflows, emphasizing augmentation over automation. Methodologically, it integrates quantitative performance indicators with qualitative insights into professional experience, providing a comprehensive evaluation framework that captures both clinical outcomes and practice-based implications.

The study is limited by its reliance on secondary data and short-term observational periods, which may not fully capture long-term adaptation, ethical challenges, or patient perceptions of AI-supported care. The research also focuses on selected clinical settings, limiting broader generalizability. Future studies should incorporate longitudinal designs, experimental comparisons across diverse healthcare contexts, and deeper examination of ethical, educational, and patient-centered dimensions to strengthen evidence for sustainable AI integration in nursing practice.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author(s) used Google Gemini to assist in improving grammar, language quality, and overall readability of the text. After using this tool, the author(s) carefully reviewed and edited the content as necessary and take full responsibility for the content of the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.
Author 3: Data curation; Investigation.
Author 4: Formal analysis; Methodology; Writing - original draft.
Author 5: Supervision; Validation.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests of personal relationships that could have apperead to influence the work reported in this paper.

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