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Workplace Challenges of Artificial Intelligence in Healthcare: Implications for Nursing Education and Practice

—A Scoping Review

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Abstract

Background: Artificial intelligence (AI) in healthcare systems is transforming clinical workflows, decision-making, and professional roles. While AI offers opportunities to improve patient outcomes and operational efficiency, it also introduces complex workplace challenges, particularly for the nursing workforce. **Objectives:** This scoping review aims to synthesize current evidence on AI-related workplace challenges in healthcare and to examine implications for nursing education and practice. **Methods:** The PRISMA-ScR methodology and predefined inclusion criteria were used to screen studies, and data were extracted and analyzed to identify themes related to workplace challenges. **Results**: Seven major themes were identified: 1) workforce disruption and role transformation, 2) AI literacy and competency gaps, 3) workflow disruption and integration challenges, 4) trust, acceptance, and professional resistance, 5) ethical and legal concerns, 6) data quality and infrastructure limitations, and 7) impacts on patient care and professional identity. These themes highlight significant preparedness gaps among nurses and healthcare organizations. **Conclusions:** AI integration in healthcare requires a human-centered approach that prioritizes workforce readiness, ethical governance, and educational reform. Nursing education must evolve to incorporate AI competencies, critical thinking, and digital literacy, preparing future nurses for AI-enabled environments.

Keywords

Artificial Intelligence, Healthcare, Nursing Education, Workplace Challenges, Scoping Review

1. Introduction

Artificial intelligence (AI) is rapidly transforming healthcare systems worldwide. As a computational system capable of performing tasks that typically require human intelligence, AI encompasses machine learning, natural language processing, and predictive analytics. These technologies support clinical decision-making, diagnostic imaging, patient monitoring, workflow automation, and administrative functions. The integration of AI into healthcare promises greater efficiency, improved accuracy, and better patient outcomes. For example, AI-driven tools can support early disease detection, optimize staffing models, and reduce administrative burdens. However, these advancements also bring significant workplace challenges that affect healthcare professionals, particularly nurses, who make up the largest segment of the healthcare workforce.

A workplace challenge is any condition, demand, or barrier in a work environment that hinders individuals or organizations from achieving optimal performance, efficiency, well-being, or outcomes (Pindek, Meyer, Valvo, & Arvan, 2024). In healthcare and nursing education, a workplace challenge is any observable, measurable condition arising from clinical workflows, educational systems, technology (including AI), staffing levels, or regulatory requirements that negatively affect care quality, patient safety, teaching effectiveness, workforce performance, or staff well-being and necessitates targeted organizational or policy action. In applied terms, a workplace challenge is a persistent or emerging difficulty arising from organizational structures, processes, technologies, workforce capabilities, or external pressures that require adaptation, problem-solving, or systemic change. Typically, a true workplace challenge impacts performance (quality of work, productivity, safety), is not self-resolving, affects individuals, teams, or systems, and involves complex, interrelated factors.

Nurses are at the forefront of patient care and play a critical role in implementing and using AI technologies. As such, they experience both the benefits and challenges of AI integration. Emerging evidence suggests that AI is reshaping nursing roles, altering workflows, and raising concerns about ethics, trust, and professional identity.

Recent literature highlights that AI literacy is becoming a foundational competency in nursing education, with growing calls to embed structured AI training across curricula to ensure workforce readiness (Hoelscher & Pugh, 2025). Furthermore, generative AI technologies serve as supportive tools in clinical practice and education, reinforcing rather than replacing professional nursing judgment (Anwar et al., 2026). Despite the growing body of literature on AI in healthcare, there remains a lack of comprehensive synthesis focused specifically on workplace challenges and their implications for nursing education. Understanding these challenges is essential for preparing nurses to function effectively in AI-enabled environments.

Purpose of the Review

The purpose of this scoping review is to:

1) Identify and synthesize workplace challenges associated with AI in healthcare.
2) Examine the implications of these challenges for nursing practice.
3) Explore the impact on nursing education and workforce preparedness.
4) Offer intervention to address AI literacy challenges in nursing education.

2. Method

The scoping review followed the Arksey and O'Malley (2005) methodological framework, which provides a systematic approach to identifying, mapping, and synthesizing evidence on a topic. This framework guided the stages of formulating the research question, identifying relevant studies, selecting evidence, charting data, and synthesizing results. To ensure transparency and rigor, the review also adhered to the PRISMA-ScR guidelines (**Table 1**) by Tricco et al. (2018), which specify standardized criteria for documenting search strategies, study selection, data extraction, and synthesis of evidence on workplace challenges associated with AI technologies, workforce experiences, implementation processes, or organizational impacts in healthcare, nursing, or educational settings. Two independent reviewers screened titles and abstracts for relevance, followed by a full-text review of peer-reviewed empirical studies, reviews, and conceptual papers published in English between January 2022 and March 2026. Disagreements were resolved through discussion and consensus to ensure consistency and reduce selection bias. The team excluded editorials, commentaries, dissertations, conference abstracts, and studies unrelated to AI or workplace dynamics.

Table 1. PRISMA-ScR.

Phase	Description	Number (n)
Identification	Records identified through database searching	750
	Additional records identified through other sources	18
	Total records identified	**768**
	Records screened (title/abstract)	768
	Records excluded	558
Eligibility	**Full-text articles assessed for eligibility**	**210**
	Full-text articles excluded	171
	• Not workplace-focused	63
	• Not healthcare-specific	39
	• Editorial/opinion only	43
	• Insufficient data	25
Included	**Studies included in the review**	**39**

2.1. Overview of Included Studies

The review used descriptive and thematic analyses to synthesize findings from

qualitative research, cross-sectional surveys, systematic reviews, and mixed-methods studies conducted in healthcare settings, including hospitals, primary care, and academic institutions. The synthesis identified patterns, relationships, and gaps in the evidence on integrating AI technologies into nursing practice and education within a human-centered care framework. It categorized workplace challenges into workflow disruptions, skill gaps, trust and acceptance, ethical issues, data privacy concerns, and workforce well-being. The reviewers conducted an inductive thematic analysis, allowing themes to emerge from the literature without a predetermined theoretical framework. After generating the themes, they applied Schlossberg's Transition Theory deductively to organize and interpret the findings across the Situation, Self, Support, and Strategies domains. The researchers selected Schlossberg's Transition Theory for its practical approach to understanding how individuals adapt to complex professional transitions, making it well-suited to examining nurses' experiences with AI integration in education and clinical practice.

2.2. Workplace (Clinical Practice) Challenges

2.2.1. Workforce Disruption and Role Transformation

AI is fundamentally altering the nature of healthcare work. Automating routine tasks, such as documentation and triage, can improve efficiency but also raise concerns about job displacement and role ambiguity. Nurses report uncertainty about how AI will redefine their responsibilities. While some tasks may decrease, others, such as interpreting AI outputs and ensuring patient safety, may increase (Bodur et al., 2025). This shift may require nurses to adopt hybrid roles that blend clinical expertise with technological proficiency. Additionally, there is concern about deskilling, as overreliance on AI may erode critical clinical skills. For example, reliance on diagnostic algorithms could reduce opportunities for experiential learning and the development of clinical judgment (Natali et al., 2025).

2.2.2. Workflow Disruption and Integration Challenges

AI technologies often do not integrate seamlessly into existing healthcare workflows. Poor interoperability with electronic health records (EHRs) is a major challenge. Common issues include increased documentation burden, alert fatigue from AI-driven notifications, and redundant processes. In some cases, AI systems introduce inefficiencies rather than reducing the workload. Nurses report frustration when systems require extra steps or do not align with clinical realities (Wei et al., 2025).

2.2.3. Trust, Acceptance, and Professional Resistance

Trust remains a central determinant of AI adoption in healthcare, as clinicians often express skepticism toward systems perceived as unclear technologies. Barriers to trust include limited algorithmic transparency, concerns about accuracy, reliability, and apprehension that AI may diminish professional autonomy. This resistance often impedes commitment to patient safety and the preservation of

human-centered care, particularly when clinicians perceive AI as potentially undermining clinical judgment. Empirical studies demonstrate that trust improves when clinicians are actively engaged in the design, evaluation, and implementation of AI tools, underscoring the importance of participatory development approaches in fostering acceptance and responsible integration (Eke et al., 2025; Asan et al., 2020).

2.2.4. Ethical and Legal Challenges

Ethical considerations pose significant challenges to integrating artificial intelligence into healthcare. Prominent concerns include the risk of algorithmic bias that can exacerbate existing health disparities, heightened vulnerability of patient data due to extensive training of data-driven models, and persistent questions about accountability when AI systems influence or directly support clinical decision-making. These issues underscore the need for robust governance frameworks that address fairness, privacy, transparency, and responsibility in AI-enabled care delivery (Singh et al., 2026; Gorelik et al., 2025).

Legal and regulatory frameworks have not fully resolved questions of liability when AI-driven errors occur in clinical practice, creating significant uncertainty for healthcare organizations and individual providers. Ambiguity in the law regarding harm caused by AI systems, along with the difficulty of applying traditional product liability standards, heightens this uncertainty (Chew et.al., 2025; Taylor Wessing, 2024).

Nurses, who serve as frontline patient advocates, express particular concern about maintaining ethical and professional accountability in AI-enabled care environments, especially as they navigate issues related to patient safety, informed consent, and data governance (van Holst, 2025; Mello & Guha, 2024). These unresolved legal and ethical complexities underscore the need for clearer guidance, institutional support, and evolving regulatory structures to protect both patients and clinicians.

2.2.5. Data Quality and Infrastructure Limitations

AI systems rely on high-quality data to perform accurately, yet healthcare data are often incomplete, fragmented, and biased. These limitations reduce model accuracy and weaken the generalizability of AI outputs across diverse patient populations. Poor data quality can lead to incorrect predictions that jeopardize patient safety. Infrastructure barriers, such as limited interoperability, inconsistent data standards, and outdated information systems, further hinder the effective development and implementation of AI (Arias-Duart, Cardello, & Cortés, 2025).

2.2.6. Impact on Patient Care and Professional Identity

AI integration in clinical settings has significant implications for patient care and nurses' professional identity. Nurses report concerns that increased automation may reduce meaningful patient interactions, foster overreliance on technology, and shift practice away from holistic, human-centered care. These apprehensions

reflect a broader tension between technological efficiency and the relational foundations of nursing practice. Qualitative evidence shows that nurses worry AI-enabled workflows may prioritize task completion over therapeutic presence, potentially weakening the nurse–patient relationship and diminishing the advocacy role central to nursing (Bodur et al., 2025; Henzler et al., 2025).

2.3. Education (Academic and Training) Challenges

2.3.1. AI Literacy and Competency Gaps

AI literacy remains significantly underdeveloped in nursing education, with gaps in conceptual understanding of AI systems, practical skills in applying AI, and ethical reasoning about AI use. Recent studies identify AI literacy as a core professional competency necessary for safe and effective practice in modern healthcare systems (Wang et al., 2026; Hoelscher & Pugh, 2025). A major barrier is the lack of structured AI integration in nursing curricula, leaving graduates underprepared for technology-enabled environments. Nurses frequently report limited understanding of how AI systems function, algorithmic limitations, and the interpretation of AI-generated outputs. These deficiencies contribute to anxiety, reduced confidence, and potential misuse of AI tools. The literature strongly advocates for competency-based curricula, incorporating data literacy, ethical and legal frameworks, and critical appraisal of AI outputs (El-Banna et al., 2025; Ang, 2025).

These dynamics underscore the need to balance innovation with the preservation of compassionate, relationship-based care.

2.3.2. Uneven Integration of AI in Learning Environments

Emerging evidence suggests that AI integration in nursing education enhances learning outcomes, including critical thinking, clinical reasoning, and student engagement. However, adoption remains inconsistent across institutions (Ma et al., 2025), creating disparity in graduate preparedness. Similarly, a systematic review (El-Banna et al., 2025) published in *Frontiers* emphasizes that nursing programs lack standardized AI competency frameworks, resulting in inconsistent expectations for student proficiency and uneven adoption across institutions. Ahmed et al. (2023) found that major barriers to AI implementation in healthcare include data privacy concerns, poor interoperability, financial constraints, workforce resistance, inadequate AI literacy, and ethical uncertainty, underscoring the need for organizational readiness and workforce preparation.

3. Interpretation through Schlossberg's Transition Theory (4S Framework)

To deepen understanding of workplace challenges, the analysis interpreted the findings through Schlossberg's Transition Theory (4S Framework), which conceptualizes adaptation across four domains: Situation, Self, Support, and Strategies (Schlossberg, 1981; Anderson et al., 2012). The selection of Schlossberg's Transition Theory is theoretically appropriate given its emphasis on transitions as multifactorial processes shaped by environmental demands, personal resources,

and adaptive capacity. This aligns closely with the multilayered challenges identified in AI-enabled nursing practice and education, where technological disruption intersects with professional identity, institutional readiness, and skill development (Figure 1).

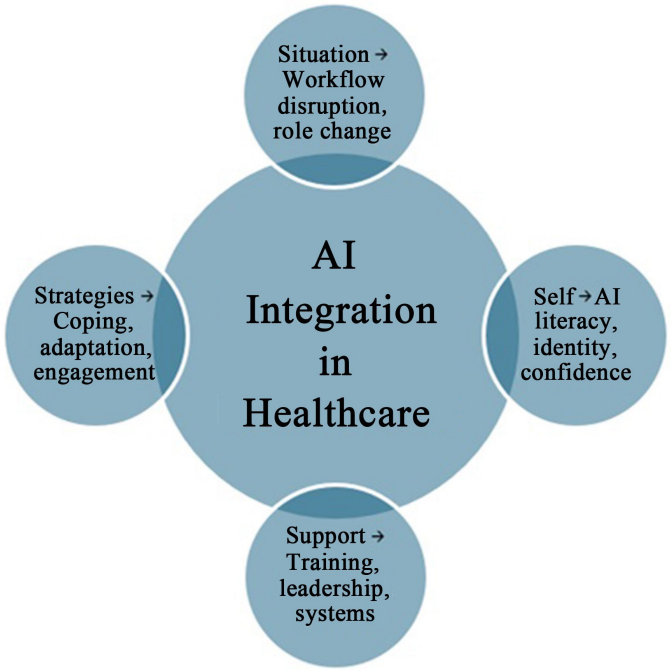

Figure 1. Conceptual model of workplace challenges of artificial intelligence in healthcare mapped to Schlossberg's Transition Theory (4S framework).

3.1. Situation (Nature of the Transition)

The introduction of AI is a non-normative organizational transition marked by rapid technological change and uncertainty. Nurses must adapt to evolving workflows, new responsibilities, and increased reliance on digital systems. AI-related disruptions, such as workflow redesign, role ambiguity, and system inefficiencies, reflect the complexity of the transition environment. The unpredictability of AI implementation contributes to stress and a reduced sense of control among healthcare professionals.

3.2. Self (Personal and Professional Characteristics)

The *self*-dimension emphasizes how individual characteristics shape nurses' adaptation to AI-enabled practice environments. Findings consistently show that nurses with prior digital experience demonstrate greater confidence and readiness when engaging with innovative technologies, whereas limited AI literacy contributes to anxiety, uncertainty, and resistance. Professional identity also plays a pivotal role in shaping responses to AI, as nurses evaluate whether emerging technologies align with core values such as autonomy, advocacy, and holistic care. Concerns about the potential loss of clinical autonomy and the erosion of human-centered practice re-

flect deeper tensions over identity and the meaning of nursing work in increasingly automated environments. These dynamics underscore the need to strengthen nurses' AI literacy, support their evolving professional identity, and ensure that technological integration reinforces, rather than diminishes, the relational foundations of nursing practice (Atalla et al., 2025; El-Bassal et al., 2025).

3.3. Support (External Resources and Systems)

National and professional organizations have increasingly emphasized the need for structured institutional support, including faculty development, policy guidance, and curriculum reform to address AI integration in nursing education (American Academy of Nursing, 2026). Chomutare et al. (2022) found that successful AI implementation in healthcare depends on organizational engagement, leadership, and workflow integration, whereas interoperability challenges, poor data quality, and a lack of trust remain major barriers to adoption. The support dimension underscores the critical role of organizational, educational, and collaborative structures in shaping nurses' ability to adapt to AI-enabled practice. Despite growing interest in AI integration, literature consistently identifies substantial gaps in institutional support. Organizations offer limited training, inconsistent leadership engagement, and minimal change-management guidance, leaving nurses without the resources needed to build confidence in AI-supported workflows. Educational preparation also remains uneven, as nursing curricula and professional development programs often fail to address foundational AI competencies. In addition, weak interdisciplinary collaboration, particularly among nursing, informatics, engineering, and administrative teams, constrains effective implementation. These deficits in organizational infrastructure and support exacerbate resistance, heighten uncertainty, and limit the meaningful adoption of AI technologies in clinical settings (Cary, Lytle, & Wolfe, 2026; Wei et al., 2025).

3.4. Strategies (Coping Responses)

Evidence suggests that nurses who proactively pursue learning and skill development are more adaptable and better able to integrate AI tools into practice (Wei et al., 2025). This review highlights that successful AI adoption in nursing requires workforce adaptation and skill development, and that nurses must develop competencies to integrate AI effectively into practice.

4. Discussion

The findings of this scoping review reinforce the argument that effective AI integration in nursing requires stronger workforce preparation, institutional support, and human-centered implementation. Across the included studies, nurses consistently report limited training, uncertainty about new responsibilities, and concerns about accuracy and accountability when interacting with AI-enabled systems. These gaps highlight the need for structured educational initiatives that build AI literacy, strengthen clinical decision-making, and prepare nurses to work

confidently with emerging technologies. At the organizational level, the literature shows that AI adoption succeeds only when institutions provide clear policies, adequate resources, leadership engagement, and workflow alignment. Without these supports, AI tools often increase cognitive burden and disrupt clinical processes rather than improving them. Finally, the review underscores the importance of human-centered implementation strategies that prioritize transparency, usability, and alignment with nurses' clinical reasoning. When AI systems fail to reflect human factors, nurses may distrust recommendations, override outputs, or disengage from technology altogether. Collectively, these insights affirm that AI can enhance nursing practice only when implementation efforts center the workforce, strengthen institutional readiness, and preserve the human expertise essential to safe, ethical, and relational care.

Emerging Trends in AI and Nursing Education

Recent literature documents a pronounced acceleration in the adoption of artificial intelligence in nursing education, driven by the rapid expansion of generative AI applications, increasingly sophisticated virtual simulation modalities, and adaptive learning platforms that personalize instruction and strengthen clinical competency development (Alrazeeni et al., 2026; Chan & Wong, 2025; Ma et al., 2025; Foronda et al., 2024).

These developments are reshaping pedagogical approaches by enabling personalized learning, real-time feedback, and enhanced student engagement. At the same time, they pose significant challenges for academic integrity, faculty preparedness, and the evaluation of AI-generated content, as recent studies have documented (Siah et al., 2026; Zgambo et al., 2025). Importantly, recent scoping reviews emphasize that positioning AI as a supportive augmentation tool rather than a replacement for clinical reasoning will reinforce the significant role of nurses in patient care (Anwar et al., 2026).

5. Implications for Nursing Education and Practice

5.1. Implications for Nursing Education

Integrating Schlossberg's framework suggests that nursing education must address all four dimensions:

- **Situation:** Prepare students for technological disruption and change management
- **Self:** Build confidence, resilience, and professional identity in digital contexts
- **Support:** Provide mentorship, faculty guidance, and interdisciplinary exposure
- **Strategies:** Teach adaptive coping, critical thinking, and lifelong learning skills

This comprehensive approach ensures that nurses are not only technically competent but also psychologically and professionally prepared for AI-enabled practice.

5.2. Implications for Practice and Policy

Healthcare organizations should recognize AI adoption as a transition process and provide structured support systems aligned with the 4S framework to foster cultures of learning and psychological safety. Policy frameworks must also address ethical, legal, and workforce implications to support sustainability.

5.3. Strategies for Developing an AI-Ready Workforce

The World Health Organization (2024), OECD (2024), and UNESCO IESALC (2024) emphasize that AI readiness requires continuous reskilling, interdisciplinary collaboration, governance structures, and lifelong learning systems. Li (2022) found that Industry 4.0 technologies are rapidly reshaping workforce demands, making lifelong reskilling and upskilling essential for workforce readiness, organizational competitiveness, and successful adaptation to AI-enabled environments. The WHO further recommends embedding digital and AI competencies into professional education curricula to prepare future workers. McGraw and Morgan (2026) argue that AI is no longer optional in nursing education and that educators should proactively integrate it into teaching and learning. They present AI as an inevitable part of healthcare practice, requiring educational systems to adapt. In healthcare and nursing education, simulation centers and AI-integrated laboratories can strengthen practical competencies in digital health, predictive analytics, and clinical decision support systems.

Developing an AI-ready workforce requires a multidimensional strategy that integrates competency frameworks, continuous reskilling, ethical governance, interdisciplinary collaboration, and investment in digital infrastructure to augment automation while remaining human-centered, all supported by regulatory safeguards. Organizations should begin by developing a standardized AI competency framework that defines the knowledge, skills, and attitudes required across workforce categories. Adequate infrastructure, including high-speed internet access, cloud computing systems, learning management platforms, simulation technologies, and secure data systems, is essential. In low- and middle-income countries, infrastructure limitations may widen digital inequalities. Consequently, governments and institutions should prioritize equitable digital access to prevent exclusion from AI-driven economic opportunities. This is especially relevant in healthcare education systems, where simulation centers, virtual learning environments, and telehealth training platforms can significantly improve workforce preparedness.

6. Conclusion

AI has the potential to transform healthcare delivery, but its successful integration depends on addressing significant workplace challenges. These include workforce readiness, workflow integration, ethical considerations, and data quality. For nursing, the implications are profound. Preparing nurses for AI-enabled environments requires a reimagining of education, practice, and professional identity. A

human-centered approach is essential to ensure that AI enhances, rather than diminishes, the core values of nursing care.

7. Limitations

The rapidly evolving nature of AI technologies and the variability in study designs limit the scope of this review. Focusing primarily on recent literature also risks overlooking earlier foundational studies.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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