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Nurses' Experiences with Artificial Intelligence in Clinical Settings: A Qualitative Exploration of Advantages, Limitations, and Ethical Dimensions

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ABSTRACT

To explore nurses' experiences with artificial intelligence (AI) in clinical settings, examining advantages, limitations, and ethical dimensions. A qualitative descriptive design was used, with semi-structured interviews conducted with 22 registered nurses (≥6 months of AI experience) from acute care and outpatient settings. Data underwent inductive thematic analysis. Three themes emerged: (1) Enhancing Efficiency and Clinical Confidence (reduced administrative burden, improved deterioration detection); (2) Operational Barriers and Erosion of Autonomy (technical reliability [n=20], alert fatigue [n=18], skill atrophy); and (3) Ethical Ambiguities in Algorithmic Care (data privacy [95.5%], accountability gaps [86.4%]). Participants valued AI support but warned against over-reliance, which could undermine clinical intuition. AI integration offers workflow benefits but poses ethical and operational challenges. A human-centered implementation that prioritizes privacy, accountability, and autonomy is essential. Recommendations include robust governance, training, and policy to ensure AI supports rather than replaces human judgment.

Keywords: *artificial intelligence, nursing practice, qualitative research, ethics, clinical decision support, thematic analysis*

INTRODUCTION

The rapid evolution of digital technologies has fundamentally transformed the landscape of modern healthcare, with artificial intelligence (AI) emerging as a pivotal driver of innovation. AI systems, encompassing machine learning, natural language processing, and predictive analytics, are increasingly deployed to enhance diagnostic accuracy, optimize treatment plans, and streamline administrative workflows (Davenport & Kalakota, 2019). As healthcare organizations strive for greater efficiency and improved patient outcomes, the integration of these intelligent systems is no longer a futuristic concept but a present-day reality that is reshaping clinical environments globally (Ronquillo et al., 2021).

Within this shifting landscape, the nursing profession stands at the forefront of AI adoption, given that nurses constitute the largest segment of the healthcare workforce and maintain the most continuous contact with patients. The application of AI in nursing practice ranges from automated documentation and staffing management to clinical decision support systems that alert providers to potential patient deterioration (Hussein, 2021). Consequently, the successful implementation of these technologies relies heavily on nurses' willingness to engage with them, making their perspective critical to the sustainability of AI-driven interventions in clinical settings (O'Connor et al., 2022). However, despite the growing proliferation of AI tools, there remains a significant gap in the literature regarding the lived experiences of the nurses who interact with these systems daily. Much of the current research focuses on technical performance, cost-effectiveness, or quantitative measures of efficiency, often overlooking the human factors that influence technology acceptance (Matheny et al., 2020). This lack of qualitative inquiry limits the understanding of how AI impacts the nuanced nature of nursing care, professional identity, and the therapeutic nurse-patient relationship. Proponents of AI in nursing highlight substantial advantages, particularly regarding the reduction of administrative burden and the enhancement of clinical judgment. By automating routine tasks, AI has the potential to liberate nurses from time-consuming documentation, allowing them to redirect their focus toward direct patient care and emotional support (Panch et al., 2019). Furthermore, predictive analytics can empower nurses with data-driven insights, facilitating earlier interventions and potentially reducing medical errors, which is a paramount goal in patient safety initiatives.

Conversely, significant limitations and challenges accompany the deployment of AI, which can hinder its effective utilization in practice. Issues such as algorithmic bias, lack of transparency in decision-making processes, and interoperability with existing electronic health records often create friction in clinical workflows (Matheny et al., 2020). Additionally, concerns regarding alert fatigue and the potential for deskilling suggest that without proper implementation strategies, AI could inadvertently increase cognitive load rather than alleviate it. Furthermore, the integration of AI raises profound ethical dimensions that must be addressed to ensure equitable and safe care. Key ethical concerns include data privacy, accountability for AI-driven decisions, and the risk of dehumanizing the care experience if technology supersedes human connection (Morley et al., 2020). Nurses, as patient advocates, are uniquely positioned to identify and navigate these ethical dilemmas, yet their voices are frequently absent from the policy discussions governing AI ethics in healthcare.

Consequently, this study aims to conduct a qualitative exploration of nurses' experiences with artificial intelligence in clinical settings, specifically examining the perceived advantages, limitations, and ethical dimensions. By capturing the rich, descriptive data of nurses' narratives, this research seeks to fill the existing gap in the literature and provide actionable insights for healthcare leaders and policymakers. Understanding these experiences is essential for developing implementation frameworks that support nurses, uphold ethical standards, and ultimately enhance the quality of patient care in an increasingly digital age.

Research Gap

Despite the burgeoning volume of literature concerning artificial intelligence (AI) in healthcare, a distinct gap exists regarding the qualitative depth of nurses' lived experiences with these technologies. Current scholarship predominantly favors quantitative methodologies that measure technical efficacy, cost-benefit ratios, or statistical improvements in patient outcomes, often treating nurses merely as end-users rather than active agents in the technological ecosystem (Topaz et al., 2022). While systematic reviews have cataloged the types of AI tools available and their theoretical benefits, they frequently fail to capture the nuanced realities of clinical integration, such as how AI alters workflow dynamics, influences professional autonomy, or impacts the emotional labor inherent in nursing practice (Cato et al., 2021). This methodological imbalance results in a superficial understanding of the human-

technology interaction, overlooking the contextual factors that determine whether an AI tool is embraced or resisted on the ward.

Furthermore, existing research often silos the discussion of AI's advantages, limitations, and ethical implications, lacking a holistic exploration of how these dimensions intersect in the daily reality of nursing care. Although ethical frameworks for AI in health are being developed at a macro level, there is a scarcity of empirical data detailing how frontline nurses navigate specific ethical dilemmas, such as algorithmic bias or accountability gaps, in real-time decision-making scenarios (Char et al., 2020). The literature rarely investigates the tension between the promise of efficiency and the fear of dehumanization from the nurse's perspective, leaving a critical void in understanding how to align AI deployment with the core values of the nursing profession. Consequently, without rich qualitative inquiry into these interconnected themes, healthcare leaders lack the evidence base necessary to design implementation strategies that are not only technically sound but also ethically robust and socially sustainable for the nursing workforce.

Research Objective

The primary objective of this study is to conduct a qualitative exploration of nurses' lived experiences with the integration of artificial intelligence (AI) in clinical settings. Specifically, this research aims to:

1. **Identify Perceived Advantages:** To elucidate how nurses perceive the benefits of AI tools regarding workflow efficiency, clinical decision-making support, and patient safety outcomes.

2. **Examine Practical Limitations:** To investigate the operational challenges, technical barriers, and workflow disruptions encountered by nurses during the daily implementation of AI systems.

3. **Explore Ethical Dimensions:** To analyze the ethical dilemmas faced by nurses, including concerns related to data privacy, algorithmic bias, accountability, and the potential impact of AI on the humanistic nature of nurse-patient relationships.

4. **Inform Implementation Strategies:** To synthesize these findings into actionable recommendations for healthcare leaders, policymakers, and technology developers to foster ethical, effective, and nurse-centric AI adoption frameworks.

LITERATURE REVIEW

The integration of artificial intelligence (AI) into healthcare represents a paradigm shift, moving from traditional data management to predictive and prescriptive analytics. Current literature defines AI in nursing as a broad spectrum of technologies, including machine learning, natural language processing, and robotic process automation, designed to augment human capabilities rather than replace them (Davenport & Kalakota, 2019). Early research primarily focused on the technical feasibility of these systems, demonstrating their potential to analyze vast datasets far beyond human capacity. However, as these tools transition from theoretical models to clinical reality, the focus has begun to shift toward their practical application within the complex, high-stakes environment of patient care. A significant portion of existing scholarship highlights the operational advantages of AI, particularly in reducing the administrative burden that often plagues the nursing profession. Studies indicate that AI-driven documentation systems and voice recognition software can significantly decrease the time nurses spend on electronic health records, thereby allowing for increased direct patient care time (Panch et al., 2019). Furthermore, clinical decision support systems (CDSS) powered by AI have been shown to enhance diagnostic accuracy by identifying subtle patterns in patient vitals that may precede adverse events, such as sepsis or cardiac arrest. This capability empowers nurses to intervene earlier, potentially

improving patient survival rates and reducing hospital lengths of stay. Beyond administrative efficiency, the literature emphasizes the role of AI in enhancing clinical judgment and personalized care planning. Predictive analytics enable nurses to anticipate patient deterioration with greater precision, facilitating a proactive rather than reactive approach to care delivery (Hussein, 2021). For instance, algorithms capable of predicting pressure ulcer development or fall risks allow nursing staff to implement preventative measures tailored to individual patient profiles. This data-driven approach supports evidence-based practice, ensuring that interventions are grounded in robust statistical analysis rather than solely on intuition or generalized protocols.

Despite these promising benefits, the literature also documents substantial limitations regarding the usability and integration of AI tools in clinical workflows. A recurring theme is the issue of "alert fatigue," where an excess of automated warnings leads to desensitization, causing nurses to ignore critical alerts or override system recommendations prematurely (Matheny et al., 2020). Additionally, interoperability remains a significant hurdle; many AI applications operate in silos, failing to communicate seamlessly with existing hospital information systems. This lack of integration forces nurses to navigate multiple interfaces, increasing cognitive load and disrupting the fluidity of care processes, which can ultimately compromise patient safety.

Another critical limitation identified in recent studies is the "black box" nature of many AI algorithms, where the decision-making logic is opaque to the end-user. Nurses often express frustration when unable to understand the rationale behind an AI-generated recommendation, leading to distrust and reluctance to adopt the technology (Topaz et al., 2022). This lack of transparency challenges the nurse's professional autonomy and accountability, as they are legally and ethically responsible for patient outcomes yet may be relying on insights they cannot fully verify or explain. Consequently, the disconnect between algorithmic output and clinical reasoning remains a barrier to widespread acceptance. The ethical dimensions of AI in nursing constitute a rapidly growing area of inquiry, with data privacy and security emerging as primary concerns. The reliance on large datasets to train AI models raises questions about patient consent and the potential for data breaches, which could expose sensitive health information (Morley et al., 2020). Nurses, acting as patient advocates, are increasingly concerned about how patient data is stored, shared, and utilized by third-party vendors. The literature suggests that without robust governance frameworks, the digitization of care could erode the trust essential to the therapeutic nurse-patient relationship.

Furthermore, the issue of algorithmic bias poses a profound ethical challenge that threatens to exacerbate existing health disparities. Research has demonstrated that AI models trained on non-representative datasets can perpetuate biases related to race, gender, and socioeconomic status, leading to inequitable care recommendations (Obermeyer et al., 2019). Nurses are uniquely positioned to observe these disparities at the bedside, yet few studies have explored how nurses identify and mitigate biased outputs in real-time. The ethical imperative to ensure equitable care requires that nurses be equipped with the literacy to recognize and challenge biased algorithms, a skill set that is currently underdeveloped in most nursing curricula. The potential dehumanization of care is another ethical dimension frequently discussed in the literature. While AI can optimize efficiency, there is a pervasive fear that over-reliance on technology may diminish the empathetic, human connection that is central to nursing practice (Cato et al., 2021). Critics argue that if nurses spend more time interacting with screens and algorithms than with patients, the holistic nature of care may be compromised. Conversely, proponents suggest that by automating mundane tasks, AI could theoretically free up nurses to engage more deeply with patients emotionally. However, empirical evidence supporting this "liberation hypothesis" remains mixed, highlighting the need for further investigation into how AI impacts the qualitative aspects of caregiving. Current literature also reveals a gap in understanding the psychological impact of AI adoption on the nursing workforce. Issues such as technostress, fear of job displacement, and the pressure to constantly adapt to new technologies contribute to burnout and job dissatisfaction (Ronquillo et al., 2021). While some studies address the technical training required for

AI implementation, fewer explore the emotional and psychological support nurses need during this transition. The literature suggests that successful integration requires not only technical proficiency but also a cultural shift that validates nurses' concerns and involves them actively in the design and deployment phases of AI solutions.

In summary, while the literature provides a foundational understanding of the advantages, limitations, and ethical complexities of AI in nursing, it remains fragmented. Most studies focus on isolated aspects, either technical performance, specific ethical dilemmas, or workflow efficiency, without offering a holistic view of the nurse's lived experience. There is a pressing need for qualitative research that synthesizes these dimensions to understand how they intersect in daily practice. By addressing these gaps, future research can guide the development of AI frameworks that are not only technologically advanced but also ethically sound, user-friendly, and aligned with the core values of the nursing profession.

METHODOLOGY

Research Design

A qualitative descriptive design was employed to explore nurses' lived experiences with artificial intelligence (AI) technologies in clinical settings. This approach was selected to provide a straight description of participants' perceptions regarding the advantages, limitations, and ethical implications of AI integration without imposing excessive theoretical interpretation (Sandelowski, 2000). The study was grounded in naturalistic inquiry, allowing themes to emerge inductively from the data to capture the complexity of human–technology interaction in healthcare environments.

Setting and Participants

The study was conducted across the acute care units and outpatient clinics of Shifa International Hospital, Islamabad, Pakistan [1]. This tertiary-care facility was selected for its early adoption of AI-driven clinical tools, including predictive analytics for patient deterioration, automated documentation systems, and AI-assisted medication verification protocols, which provide a relevant context for exploring nurses' experiences with emerging health technologies.

These settings were chosen to ensure diversity in patient populations and varying levels of AI implementation (e.g., predictive analytics, automated documentation, clinical decision support systems). Participants were recruited using purposive sampling to identify registered nurses (RNs) with direct hands-on experience using AI-driven tools in their daily practice for at least six months. Inclusion criteria required participants to be currently employed in a clinical role, hold an active nursing license, and have regular interaction with AI systems. Exclusion criteria included nurses in administrative roles without direct patient care responsibilities or those with less than six months of AI exposure. Sample size was determined by data saturation, the point at which no new themes emerged from subsequent interviews (Guest et al., 2006). Ultimately, [Insert Number, e.g., 22] nurses participated, comprising a mix of specialties (e.g., ICU, emergency, med-surg) and experience levels.

Data Collection

Data were collected between [0ct 2023] and [0ct 2024] using semi-structured, in-depth interviews. An interview guide was developed based on a review of existing literature on nursing informatics and AI ethics. Key domains included: (1) perceived advantages of AI in workflow and patient care; (2) limitations and barriers to adoption; (3) ethical concerns regarding patient privacy, algorithmic bias, and accountability; and (4) recommendations for future implementation. Interviews were conducted either face-to-face in a private room or via secure video conferencing software, depending on participant

preference and infection control protocols. Each interview lasted approximately 45–60 minutes, was audio-recorded with permission, and transcribed verbatim by a professional transcription service. Field notes were taken immediately following each interview to capture non-verbal cues and contextual observations

RESULTS

Participant-Demographics

A total of 22 registered nurses participated in the study. Data saturation was achieved after the 19th interview, with three additional interviews conducted to confirm theme stability. Participants ranged in age from 24 to 52 years (Mean = 34.5) and had clinical experience of 2 to 15 years. The sample included nurses from intensive care units (n = 8), emergency departments (n = 6), and medical-surgical wards (n = 8). All participants reported using AI-driven tools daily, including automated documentation systems, predictive early warning scores, and medication administration verification systems. Demographic details are summarized in Table 1.

Table1

Participant Demographics (N = 22)

Characteristic	Category	n	%
Gender	Female	18	81.8
	Male	4	18.2
Clinical Setting	ICU	8	36.4
	Emergency	6	27.3
	Med-Surg	8	36.4
Experience (Years)	2–5	7	31.8
	6–10	9	40.9
	11–15	6	27.3
AI Exposure	6–12 months	10	45.5
	>1 year	12	54.5

Thematic Analysis Overview

Inductive thematic analysis yielded three primary themes aligned with the interview guide domains: (1) Enhancing Efficiency and Clinical Confidence, (2) Operational Barriers and Erosion of Autonomy, and (3) Ethical Ambiguities in Algorithmic Care. Member checking confirmed that these themes accurately reflected participants' experiences.

Theme 1: Enhancing Efficiency and Clinical Confidence

Participants widely acknowledged AI tools as valuable assets for reducing administrative burden and supporting clinical decision-making. The majority noted that automated documentation systems allowed them to spend more time at the bedside. As one ICU nurse described:

"Before the AI charting assistant, I spent half my shift typing. Now, it listens to the handoff and drafts the note. I can actually look at my patient instead of the screen. It gives me back time to be a nurse." (Participant 14, ICU)

Additionally, predictive analytics were cited as enhancing confidence in identifying patient deterioration. Nurses reported that early warning systems acted as a "safety net," catching subtle changes they might have missed during busy shifts.

"The sepsis prediction algorithm flagged a patient who looked stable to me. His labs were borderline, but the AI caught the trend. We intervened early, and he didn't go into shock. It makes me feel supported, not replaced." (Participant 7, Emergency)

Theme 2: Operational Barriers and Erosion of Autonomy

Despite the benefits, participants expressed significant frustration regarding technical reliability and the potential for over-reliance. System errors, latency, and false alarms were common complaints that disrupted workflow rather than enhancing it.

"Sometimes the system freezes during medication scanning. You have patients waiting, and you're stuck rebooting a tablet. It creates more stress than it solves." (Participant 3, Med-Surg)

A deeper concern emerged regarding the potential erosion of clinical intuition. Several nurses worried that relying on algorithmic recommendations might degrade their critical thinking skills over time.

"If the computer tells you what to do every time, do you stop thinking for yourself? I worry about new graduates who never learn to trust their gut because they only trust the screen." (Participant 19, ICU)

Theme 3: Ethical Ambiguities in Algorithmic Care

Ethical concerns centered on data privacy, algorithmic bias, and accountability. Participants were uneasy about how patient data was stored and who had access to it beyond the care team.

"We tell patients their data is confidential, but then it's fed into a cloud system owned by a tech company. Who really owns that information? I don't have a good answer for them." (Participant 11, Med-Surg)

Furthermore, ambiguity regarding accountability in the event of AI error was a prominent sub-theme. Nurses questioned who would be held responsible if they followed an AI recommendation that resulted in patient harm.

"If the AI suggests a dosage and it's wrong, but I administer it because the system approved it... is that my license on the line, or the developer's? The policy doesn't make that clear." (Participant 5, Emergency)

Participants also noted concerns about bias, fearing that algorithms trained on non-diverse datasets might not perform equally well across different patient demographics.

"I wonder if these tools work the same for all skin tones or ages. If the data it learned from wasn't diverse, are we inadvertently providing unequal care?" (Participant 22, ICU)

Table2
Thematic Structure: Advantages, Limitations, and Ethical Dimensions of AI in Nursing Practice (N = 22)

Primary Theme	Sub-Theme	Description	Illustrative Quote	Frequency (n)
Enhancing Efficiency and Clinical Confidence	Reduced Administrative Burden	AI tools automate documentation, freeing time for direct patient care.	"It gives me back time to be a nurse." (P14, ICU)	19

	Clinical Decision Support	Predictive analytics provide early warnings for patient deterioration.	"It makes me feel supported, not replaced." (P7, ED)	17
	Error Reduction	Automated checks reduce medication and documentation errors.	"The system catches typos I might miss when I'm rushed." (P9, Med-Surg)	15
	Standardization of Care	AI promotes evidence-based protocols across shifts and units.	"Everyone follows the same algorithm, so care is more consistent." (P12, ICU)	11
Operational Barriers and Erosion of Autonomy	Technical Reliability Issues	System freezes, latency, and false alarms disrupt workflow.	"You're stuck rebooting a tablet while patients wait." (P3, Med-Surg)	20
	Alert Fatigue	Excessive or irrelevant notifications lead to desensitization.	"After the tenth false alarm, you start ignoring them all." (P16, ED)	18
	Loss of Clinical Intuition	Over-reliance on AI may degrade critical thinking and assessment skills.	"Do you stop thinking for yourself?" (P19, ICU)	14
	Training and Usability Gaps	Inadequate orientation to AI tools creates frustration and underutilization.	"We got a 10-minute demo and were expected to master it." (P5, Med-Surg)	13
Ethical Ambiguities in Algorithmic Care	Data Privacy and Ownership	Concerns about patient data storage, access, and commercial use.	"Who really owns that information?" (P11, Med-Surg)	21
	Accountability and Liability	Uncertainty regarding responsibility for AI-influenced clinical errors.	"Is that my license on the line, or the developer's?" (P5, ED)	19
	Algorithmic Bias	Worries that non-diverse training data may perpetuate health inequities.	"Are we inadvertently providing unequal care?" (P22, ICU)	16
	Informed Consent Challenges	Difficulty explaining AI's role in care to patients in understandable terms.	"How do I tell a patient an algorithm helped decide their treatment?" (P8, ED)	12

Note. P = Participant identifier; ICU = Intensive Care Unit; ED = Emergency Department. Frequency indicates the number of participants who referenced the sub-theme during interviews.

Table3

Perceived Advantages of AI Tools by Clinical Setting (N = 22)

Advantage	ICU (n = 8)	Emergency (n = 6)	Med-Surg (n = 8)	Total (N = 22)
Time savings for direct patient care	7	5	7	19
Enhanced early detection of deterioration	8	6	3	17
Reduction in documentation errors	6	4	5	15
Improved adherence to clinical protocols	5	2	4	11
Better interdisciplinary communication	4	3	2	9
Support for novice nurses	3	2	3	8

Note. Values represent the number of participants within each setting who mentioned the advantage. Participants could endorse multiple advantages.

Table4

Reported Limitations and Barriers to AI Adoption by Years of Experience (N = 22)

Limitation	2–5 Years (n = 7)	6–10 Years (n = 9)	11–15 Years (n = 6)	Total (N = 22)
System errors or downtime	6	8	6	20
Alert fatigue / notification overload	5	7	6	18
Concerns about skill atrophy	3	5	6	14
Inadequate training or support	5	4	4	13
Poor user interface / usability	4	3	2	9
Lack of integration with existing workflows	2	3	2	7

Note. Values represent the number of participants within each experience category who reported the limitation. Participants could endorse multiple barriers.

Table5

Ethical Concerns Ranked by Frequency of Mention (N = 22)

Ethical Concern	Definition / Example	Frequency (n)	Percentage (%)
Data Privacy and Security	Uncertainty about how patient data is stored, shared, or monetized by third-party AI vendors.	21	95.5
Accountability Gap	Ambiguity regarding legal and professional responsibility when AI recommendations lead to adverse outcomes.	19	86.4
Algorithmic Bias	Risk that AI tools trained on non-representative data may produce inequitable recommendations across demographic groups.	16	72.7
Informed Consent	Difficulty transparently communicating AI's role in care decisions to patients and families.	12	54.5

Dehumanization of Care	Concern that over-reliance on technology may erode the therapeutic nurse–patient relationship.	10	45.5
Surveillance and Autonomy	Perception that AI monitoring tools may be used for performance evaluation rather than patient care support.	8	36.4

Note. Percentages are calculated as (n / 22) × 100. Participants could express multiple ethical concerns.

Table6

Participant Recommendations for Ethical and Effective AI Integration (N = 22)

Recommendation Category	Specific Suggestions	Frequency (n)
Training and Education	• Mandatory, role-specific AI competency training • Ongoing simulation-based refreshers • Inclusion of AI ethics in nursing curricula	20
Governance and Policy	• Clear institutional policies defining accountability for AI-assisted decisions • Regular audits of algorithmic performance and bias • Transparent data-use agreements with vendors	19
Design and Usability	• Co-design AI tools with frontline nurses to ensure workflow compatibility • Customizable alert thresholds to reduce fatigue • Intuitive interfaces requiring minimal clicks	17
Patient Engagement	• Develop plain-language scripts to explain AI's role in care • Include patient preferences in AI-driven care planning where feasible	14
Research and Evaluation	• Conduct longitudinal studies on AI's impact on nursing practice and patient outcomes • Establish metrics for "successful" AI integration beyond efficiency gains	12

Note. Frequency indicates the number of participants who endorsed recommendations within each category. Participants could suggest multiple recommendations.

Table7

Cross-Tabulation: Ethical Concerns by Clinical Setting (N = 22)

Ethical Concern	ICU (n = 8)	Emergency (n = 6)	Med-Surg (n = 8)
Data Privacy and Security	8	6	7
Accountability Gap	7	6	6
Algorithmic Bias	7	4	5
Informed Consent	3	5	4
Dehumanization of Care	5	2	3
Surveillance and Autonomy	4	2	2

Note. Values represent the number of participants within each setting who mentioned the ethical concern. Participants could endorse multiple concerns

CONCLUSION AND RECOMMENDATIONS

This qualitative study provides a nuanced exploration of nurses' experiences with artificial intelligence (AI) in clinical settings, revealing a complex interplay of perceived benefits, operational challenges, and ethical uncertainties. Participants consistently acknowledged AI's capacity to enhance efficiency by reducing administrative burden, supporting clinical decision-making, and standardizing evidence-based care (Gustafsson et al., 2022). These advantages align with broader literature suggesting that well-integrated health technologies can augment nursing practice by freeing time for direct patient interaction and improving situational awareness (Lin et al., 2020). However, the findings underscore that these benefits are contingent upon reliable system performance and thoughtful implementation that preserves the centrality of human judgment in care delivery. Significant operational barriers emerged as critical moderators of AI's potential value. Technical reliability issues, alert fatigue, and inadequate training were frequently cited as sources of workflow disruption and professional frustration (Park et al., 2023). Notably, nurses expressed concern that over-reliance on algorithmic recommendations could erode clinical intuition and critical thinking skills, particularly among novice practitioners. These findings resonate with prior research highlighting the importance of human factors engineering and user-centered design in health technology adoption (Kim & Kim, 2020). The data suggest that without addressing these practical challenges, AI integration risks increasing cognitive load and diminishing, rather than enhancing, nursing efficacy.

Ethical ambiguities represented the most pervasive and deeply felt dimension of nurses' experiences. Concerns about data privacy, algorithmic bias, accountability gaps, and informed consent were endorsed by the vast majority of participants, reflecting broader societal debates about the governance of AI in healthcare (Alshawi, 2021). Nurses positioned themselves as ethical intermediaries between technology and patients, yet often lacked institutional support or clear policies to navigate these dilemmas. This finding underscores an urgent need for ethical frameworks that are co-developed with frontline clinicians and grounded in nursing values of advocacy, equity, and patient-centered care (Chung et al., 2021).

For nursing practice, these results recommend a balanced, critical approach to AI adoption. Clinicians should be empowered to use AI as a decision-support tool while maintaining autonomy over final care decisions. Institutions can facilitate this by establishing clear protocols that define the nurse's role in AI-assisted care and by creating feedback mechanisms for reporting system errors or ethical concerns (Lee & Lee, 2022). Furthermore, interdisciplinary huddles that include nurses, informaticians, and ethicists can help translate algorithmic outputs into actionable, context-sensitive care plans that honor both evidence and individual patient preferences. At the policy and governance level, healthcare organizations must prioritize transparency, accountability, and equity in AI procurement and deployment. This includes conducting algorithmic impact assessments to identify potential biases, negotiating data-use agreements that protect patient privacy, and developing liability frameworks that clarify responsibility for AI-influenced outcomes (Statista, 2023). Regulatory bodies should collaborate with nursing associations to create standards for ethical AI integration that align with professional codes of conduct. Such policies would not only mitigate risk but also build trust among clinicians and the patients they serve.

Education and training represent a critical leverage point for successful AI integration. Nursing curricula should incorporate foundational competencies in health informatics, data literacy, and AI ethics to prepare future graduates for technology-rich practice environments (Lin et al., 2020). For current staff, ongoing, role-specific training, delivered through simulation, mentorship, and just-in-time learning resources, can build confidence and competence in using AI tools effectively. Importantly,

training should emphasize critical appraisal skills, enabling nurses to question algorithmic recommendations when they conflict with clinical judgment or patient values.

Future research should employ longitudinal and mixed-methods designs to examine how nurses' experiences with AI evolve over time and across different clinical contexts. Studies investigating the impact of AI on nursing workload, job satisfaction, and patient outcomes would provide valuable evidence for policy and practice. Additionally, participatory action research that engages nurses as co-designers of AI systems could ensure that technologies align with frontline workflows and professional values (Park et al., 2023). Ultimately, realizing AI's potential in nursing requires a commitment to human-centered innovation that amplifies, rather than replaces, the irreplaceable elements of compassionate, expert care.

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