


Insights Into Perceived Worries Regarding the Adoption of Artificial Intelligence Among Intensive Care Unit Nurses in the West Bank

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Abstract

Background: The integration of artificial intelligence (AI) into healthcare is advancing rapidly, yet little is known about how ICU nurses perceive this shift, particularly in low-resource settings.

Objectives: This study aimed to examine ICU nurses' perceived concerns regarding AI adoption, focusing on awareness, prior experience, and levels of worry related to AI integration.

Methods: A cross-sectional survey was conducted among 235 ICU nurses from nine hospitals in the West Bank. Data were collected using the Worries of Applying Artificial Intelligence in Healthcare Questionnaire (WAAI-HCQ). Descriptive statistics and regression analyses were performed using SPSS.

Results: Nurses demonstrated moderate AI awareness ($M = 2.6$, $SD = 0.5$) and limited prior experience (mean = 2.3, $SD = 0.5$). The overall worry regarding AI was moderate ($M = 3.2$, $SD = 0.9$), with the greatest concerns centered on its impact on healthcare providers ($M = 3.3$, $SD = 1.0$) and the least on regulatory and ethical issues ($M = 2.9$, $SD = 0.7$). Regression analysis revealed that AI awareness significantly predicted higher worry levels ($B = 2.007$, $p < .001$), while prior experience with AI predicted reduced worry ($B = -0.952$, $p < .001$). The findings suggest that greater AI awareness without practical experience may lead to increased apprehension, while hands-on exposure reduces anxiety and builds confidence.

Conclusions: While ICU nurses recognized the potential benefits of AI, concerns about job displacement, depersonalization of care, and workflow disruption were prevalent. These findings underscore the need for targeted AI education, practical training, and supportive policies that address ethical and workforce-related implications. Context-specific strategies are essential to enhance nurses' readiness and confidence in adopting AI technologies in critical care settings.

Keywords

Artificial intelligence, concerns, nurses, intensive care units, awareness, experience, Middle East, AI implementation, Palestine

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Introduction

Artificial intelligence (AI) technology has fundamentally transformed healthcare delivery worldwide, with significant implications for nursing practice (Labrague et al., 2023). In healthcare settings, AI encompasses machine learning algorithms, natural language processing, clinical decision support systems, and robotic technologies that can assist in patient monitoring, diagnosis, treatment planning, and care coordination (Catalina et al., 2023; Swed et al., 2022).

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The integration of AI into healthcare holds transformative potential for improving both accessibility and quality of services, particularly in intensive care units where complex decision-making and continuous monitoring are critical (Castagno & Khalifa, 2020). In nursing practice, AI can enhance care quality by supporting clinical documentation, streamlining workflows, aiding in decision-making, and reducing occupational stress (Watson et al., 2020). AI-driven tools are designed to augment nurses' capabilities, enabling them to focus on their core role in delivering human-centered care (Laukka et al., 2022; McGrow, 2019).

Despite these potential benefits, the adoption of AI in healthcare raises significant concerns that warrant empirical investigation. "Worry" in the context of AI adoption refers to the emotional and cognitive concerns that healthcare professionals experience regarding the integration of AI technologies into their practice environment (Alsaedi et al., 2024; Ayed et al., 2025). In this study, "worry" encompasses cognitive-emotional concerns about AI's impact on professional identity, job security, and patient care depersonalization, reflecting the multifaceted nature of healthcare professionals' apprehensions toward technological integration (Ronquillo et al., 2021). These worries encompass fears about job displacement, concerns about technology reliability, ethical implications, and the potential depersonalization of patient care (Ronquillo et al., 2021). Understanding these concerns is crucial for successful AI implementation, as unaddressed worries can lead to resistance, reduced adoption rates, and suboptimal utilization of AI technologies (Gao et al., 2020).

Healthcare providers globally have expressed mixed reactions to AI integration, ranging from optimism about improved efficiency to apprehensions about job displacement and the depersonalization of care (Gao et al., 2020). The Technology Acceptance Model (TAM) suggests that perceived usefulness and ease of use are key determinants of technology adoption, while concerns about job security and professional identity can create significant barriers (Amin et al., 2025). In the context of nursing, these concerns are particularly relevant given the profession's emphasis on human connection and holistic care delivery.

The Palestinian healthcare context presents unique challenges that may influence nurses' perceptions of AI adoption. The healthcare system in Palestine faces ongoing challenges including limited access to advanced technologies, resource constraints, underinvestment in digital health infrastructure, and political instability (Aqtam et al., 2023). These factors create a complex environment where technological innovation must be balanced against immediate healthcare needs and limited resources. Furthermore, the lack of established AI governance frameworks and limited exposure to AI technologies in clinical practice may contribute to heightened concerns among healthcare professionals.

The specific role of nurses in AI-driven healthcare environments remains inadequately defined, particularly in

low-resource settings like Palestine (McGrow, 2019; von Gerich et al., 2022). Existing literature reveals a significant gap in understanding how Palestinian nurses perceive and respond to the integration of AI in clinical settings, especially in intensive care units where technology adoption can have immediate patient care implications. Thus, this study aims to assess ICU nurses' perceived worries regarding the adoption of AI technologies in clinical practice in Palestine.

Literature Review

Recent research has identified several key themes in healthcare professionals' concerns about AI adoption, with particular relevance to intensive care settings and low-resource environments.

Professional Identity and Job Security Concerns

Studies consistently highlight that nurses perceive AI as a potential threat to traditional roles, with fears that intelligent systems may replace certain clinical tasks such as monitoring vital signs, documenting care, or assisting in patient assessments (O'Connor et al., 2023; Topaz & Pruinelli, 2017). However, emerging evidence suggests that AI is more likely to augment rather than replace nursing roles, emphasizing the continued need for human empathy and critical thinking that machines cannot replicate (Alrassi et al., 2021; Rony et al., 2024).

Trust and Reliability Issues

Many nurses report concerns about the reliability and transparency of AI algorithms, including potential biases in AI models, the "black-box" nature of some technologies, and difficulties in understanding how AI-driven decisions are made (Albahri et al., 2023). These concerns are particularly relevant in ICU settings where clinical decisions can have immediate life-or-death implications.

Ethical and Privacy Concerns

Research has identified ethical implications such as accountability, patient privacy, and informed consent as major sources of worry among healthcare professionals (Wei et al., 2025). The integration of AI raises specific concerns about data security and the ethical use of patient information, particularly in systems that rely on large-scale data analytics (Esmailzadeh, 2024).

Care Depersonalization Concerns

Studies reveal that nurses worry about increased reliance on AI potentially depersonalizing care delivery. Given that nursing is deeply rooted in human connection, there are legitimate

concerns that AI systems might reduce meaningful patient–nurse interactions (Rony et al., 2024; Watson et al., 2020).

Training and Preparedness Gaps

Research consistently showed that many nurses feel unprepared to work alongside AI technologies due to limited exposure and training opportunities (Ramadan et al., 2024; Rony et al., 2024). This preparation gap not only hinders effective implementation but also contributes to anxiety and resistance among staff (Aqtam et al., 2023). The relationship between prior AI exposure and reduced anxiety has been demonstrated across multiple healthcare settings, suggesting that experiential learning plays a crucial role in technology acceptance.

Methods

Design and Settings

This study employed a cross-sectional design to investigate the perceived worries associated with the adoption of AI among nurses working in ICUs. This study adheres to the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional studies (Supplemental File 1). The research was conducted across nine hospitals in the West Bank, Palestine, including four governmental and five non-governmental hospitals. Data were collected over a three-month period, from December 1, 2024, to February 28, 2025.

Research Question

What are the perceived worries regarding the adoption of artificial intelligence among Intensive Care Unit nurses?

Population and Sampling

The target population for this study comprised all Palestinian ICU nurses. The sample size was calculated using Raosoft software based on a population of 500 ICU nurses, yielding a target sample size of 218 with a 95% confidence level. To account for potential non-responses, a convenience sample of 250 nurses was initially selected. Of these, 235 nurses returned complete questionnaires, resulting in a 94.0% response rate.

Inclusion and Exclusion Criteria

Inclusion criteria for the study included all nurses who consented to participate, worked full-time in the ICU, and had more than one year of experience in these units. Full-time ICU nurses were specifically targeted to ensure participants had sufficient exposure to intensive care environments and could provide informed perspectives on AI integration in critical care settings. Exclusion criteria included all nurses who

did not consent to participate, worked part-time in the ICU, had less than one year of experience in these units, and nurses who were unavailable or on leave.

Instruments

A self-administered questionnaire was completed by participants divided into two sections, which included demographic and professional characteristics and worries of applying AI in healthcare questionnaire (WAAI-HCQ) (Alsaedi et al., 2024).

Demographic and Professional Characteristics: This is the first section of the instrument that collected demographic and professional information, which included age, gender, educational level, work experience in the ICU, AI education, and AI use.

Worries of Applying AI in Healthcare Questionnaire (WAAI-HCQ): The Worries of Applying AI in Healthcare Questionnaire (WAAI-HCQ) was developed by Alsaedi et al. (2024) and was used in this study to assess nurses' concerns regarding the implementation of AI. The instrument consists of 33 items rated on a 5-point Likert-type scale and is divided into two main parts. The first part measures AI awareness and previous experience through 13 items: 8 items assess awareness, rated from 1 ("strongly disagree") to 5 ("strongly agree"), while 5 items evaluate prior experience, rated from 1 ("never") to 5 ("always"). The second part examines AI-related worries using 20 items rated from 0 ("strongly disagree") to 5 ("strongly agree"). These items are categorized into four subscales: profession and practice, healthcare providers, data management, and regulatory/ethical concerns, each comprising five items. Higher mean scores indicate greater concern about AI adoption (Alsaedi et al., 2024). Sample items from each subscale are provided in Supplemental File 2. The tool is culturally acceptable, as it was developed in Saudi Arabia, a country that shares many cultural, linguistic, and professional similarities with Palestine. The original instrument demonstrated good reliability, with Cronbach's alpha values ranging from 0.731 to 0.889 and an overall reliability score of 0.882 (Alsaedi et al., 2024). In the present study, the WAAI-HCQ also showed strong internal consistency, with Cronbach's alpha values ranging from 0.82 to 0.94 and a total score of 0.90.

Data Collection

After obtaining permission to use the data collection tool from its original developers, ethical approval was obtained from Palestine Ahliya University, along with authorization to collect data from governmental hospitals by the Palestinian Ministry of Health (MOH). Subsequently, meetings were held with head nurses in the selected hospitals to explain the study objectives, obtain lists of eligible ICU nurses, and secure permission to access the ICU units. Eligible nurses were invited to participate in the study, provided with a clear explanation of the research purpose, and asked to sign an

Table 1. Demographic Characteristics of the Participants (N = 235).

Characteristics	Category	N (%)	M (SD)
Age			32.0 (9.1)
Gender	Male	174 (74.0)	
	Female	60 (25.5)	
Educational level	Diploma degree	83 (35.3)	
	Bachelor's degree	116 (49.4)	
	Master's degree and above	36 (15.3)	
Work experience in the intensive care unit			10.1 (8.9)
Artificial intelligence education	Yes	35 (14.9)	
	No	200 (85.1)	
Artificial intelligence use	Yes	76 (32.3)	
	No	159 (67.7)	

informed consent form prior to completing the questionnaire. Each participant received a sealed envelope in which to place the completed questionnaire and was allowed as much time as needed to complete it. Questionnaires were completed paper-based in English. Given the professional educational background of ICU nurses in Palestine, who typically receive English-language medical training, adequate English comprehension was assumed. However, participants were encouraged to seek clarification on any items they found unclear to ensure accurate responses, and research assistants were available to provide translation support when needed. While this approach may have introduced some language-related limitations, the high response rate and internal consistency of responses suggest that comprehension barriers were minimal.

Ethical Considerations

Prior to data collection, permission was obtained from the original developers to use the instruments for this study. Ethical approval was granted by the Institutional Review Board (IRB) of Palestine Ahliya University, under reference number (CAMS/BSN/4/2025). Additionally, authorization to collect data from governmental hospitals was obtained from the Palestinian Ministry of Health (MOH), and letters of support were provided by the participating hospitals. Written informed consent was obtained from each participant before completing the questionnaire. Participation in the study was entirely voluntary, with the option to withdraw at any time without penalty. Anonymity was ensured, and all collected data were handled confidentially and stored securely. Throughout the research process, all ethical standards and guidelines were strictly followed.

Data Analysis

The collected data were analyzed using IBM SPSS Statistics, Version 26.0. Prior to analysis, all questionnaires were reviewed for completeness. Descriptive statistics, including

means, standard deviations, frequencies, and percentages, were used to summarize participants' demographic characteristics and their perceptions of AI-related worries. To examine the relationships between AI worry perceptions and demographic and professional characteristics, Pearson correlation coefficients were calculated. Furthermore, multiple linear regression analysis was conducted to identify significant predictors of perceived AI worries. A *p*-value of less than .05 was considered statistically significant for all analyses.

Results

Participants' Characteristics

Two-hundred and thirty-five nurses out of 250 completed the questionnaires, with a response rate of 94.0%. The mean age of participants was 32.0 years (SD = 9.1). The majority of participants 174 (74.0%) were males. This high proportion of male nurses is representative of the nursing profession in Palestine, where cultural factors and economic considerations have led to increased male participation in nursing careers, particularly in intensive care settings. Additionally, 116 (49.4%) held a bachelor's degree. The mean work experience in the ICU was 10.1 years (SD = 8.9). Regarding AI education, only 35 (14.9%) reported having received AI-related education. Furthermore, 76 (32.3%) of participants reported using AI in their practice, as seen in Table 1.

The mean score for AI awareness was 2.6 (SD = 0.5), indicating a moderate level of awareness among participants. AI previous experience had a lower mean score of 2.3 (SD = 0.5), suggesting limited prior exposure to AI technologies. Among the different categories of AI-related worries, worries related to healthcare providers were the highest (M = 3.3, SD = 1.0) while regulatory and ethical worries had the lowest mean score of 2.9 (SD = 0.7). The overall mean score for total AI-related worries was 3.2 (SD = 0.9), indicating a generally moderate level of worries among participants regarding AI's implications in healthcare settings, as seen in Table 2.

The analysis revealed that age, gender, work experience in ICU, AI education, and AI use did not show significant

Table 2. Distribution of Perception of Artificial Intelligence Worries (N = 235).

Variable	M	SD
Artificial intelligence awareness	2.6	.5
Artificial intelligence previous experience	2.3	.5
Total worries	3.2	.9
Profession and practice worries	3.1	.9
Healthcare providers worries	3.3	1.0
Data management worries	3.2	1.1
Regulatory/Ethics worries	2.9	.7

Note. WAAI-HCQ = Worries of Applying Artificial Intelligence in Healthcare Questionnaire. Scores range from 1 to 5 for awareness and experience variables, and 0 to 5 for worry variables, with higher scores indicating greater awareness, experience, or worry levels respectively.

Table 3. The Relationship Between Perception of Artificial Intelligence Worries and Demographic and Professional Characteristics of the Study (N = 235).

Variable	Perception of Artificial Intelligence Worries <i>r</i> (<i>p</i> -Value)
Age	.051 (0.435)
Gender	.094 (0.152)
Education level	-.184** (0.005)
Work experience in the intensive care unit	.086 (0.191)
Artificial intelligence education	-.002 (0.980)
Artificial intelligence use	.044 (0.501)
Artificial intelligence awareness	.831** (0.000)
Artificial intelligence previous experience	.286** (0.000)

Note. **p* < .05, ***p* < .01.

associations with AI worries (*p* > .05). However, education level exhibited a weak but significant negative correlation with AI worries (*r* = -.184, *p* = .005), indicating that individuals with higher education levels had slightly lower AI-related worries. In contrast, AI awareness (*r* = .831, *p* < .001) and AI previous experience (*r* = 0.286, *p* < .001) demonstrated significant positive correlations, suggesting that participants with greater awareness and experience of AI reported higher levels of AI-related worries, as seen in Table 3.

A multiple linear regression analysis was conducted to identify predictors of perception of AI worries among nurses. The overall model was statistically significant (*p* < .001, *R*² = .852, adjusted *R*² = .805), meaning that 85.2% of the variance in perception of AI worries was explained by these variables. AI awareness was the strongest positive predictor of AI worries (*B* = 2.007, *p* < .001), suggesting that participants with greater awareness of AI tend to report significantly higher worries. In contrast, AI previous experience was a strong negative predictor (*B* = -0.952, *p* < .001), indicating that nurses with more experience using AI had significantly lower AI-related worries. These relationships align with TAM’s emphasis on perceived usefulness and ease of use, where practical experience enhances both perceptions while

theoretical awareness alone may increase perceived complexity, as seen in Table 4.

AI Worry Dimensions Among ICU Nurses

Significant variations were observed across different dimensions of AI-related worries among ICU nurses (*F* values not reported in current analysis). Figure 1 illustrates the distribution of worry levels across four key domains, revealing that healthcare provider-related concerns (*M* = 3.3, *SD* = 1.0) represented the highest source of anxiety, followed closely by data management worries (*M* = 3.2, *SD* = 1.1) and profession and practice concerns (*M* = 3.1, *SD* = 0.9). Notably, regulatory and ethical worries scored lowest (*M* = 2.9, *SD* = 0.7), suggesting that while nurses acknowledge these issues, their primary concerns center on more immediate professional and operational impacts of AI integration.

The pattern demonstrates that Palestinian ICU nurses are particularly concerned about AI’s direct impact on their professional roles and patient care relationships, while showing relatively less anxiety about regulatory frameworks, possibly reflecting limited awareness of AI governance structures rather than reduced concern about these fundamental issues.

Discussion

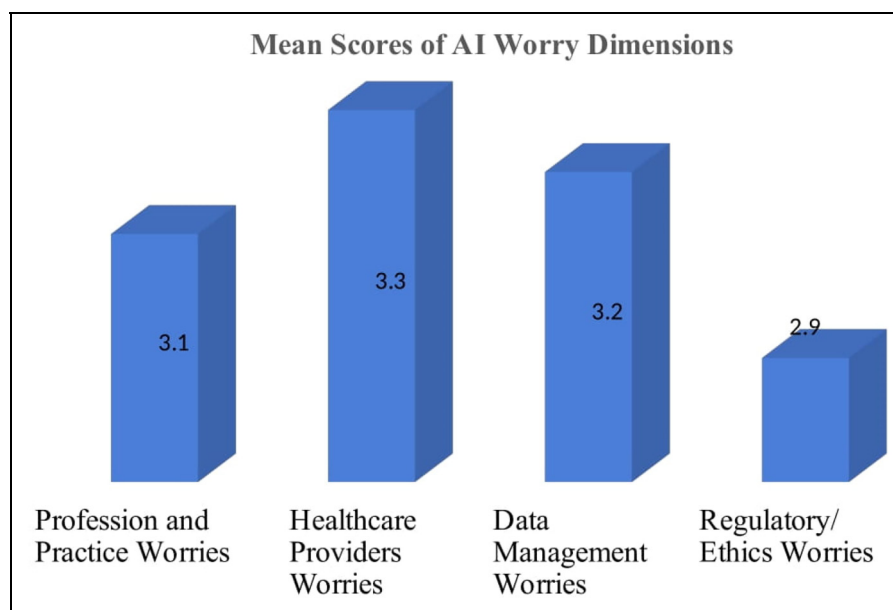
The current study reveals important insights into ICU nurses’ perceptions of AI adoption in Palestine, contributing to the limited literature on this topic in low-resource settings. The moderate level of AI awareness (*M* = 2.6) among Palestinian ICU nurses contrasts with findings from Hamd et al. (2023), who reported high awareness levels among health professionals in the United Arab Emirates. This disparity reflects the differential access to AI technologies and training opportunities between these regional contexts.

The finding that ICU nurses in Palestine report moderate levels of AI-related worry (*M* = 3.2) aligns with recent international research. Maraş et al. (2024) found that both intern students and surgical nurses exhibited moderate levels of anxiety regarding AI integration in healthcare. Similarly, research in Saudi Arabia revealed that nurses possessed moderate awareness about AI technology while harboring concerns about its implications (Alruwaili et al., 2024). This consistency across different healthcare contexts suggests that moderate levels of AI-related concern may be a universal phenomenon during the early stages of AI adoption.

The limited AI experience among Palestinian ICU nurses, despite their moderate awareness levels, can be understood within the broader socio-political and economic context of Palestine. The healthcare system faces ongoing challenges including limited access to advanced technologies, resource constraints, underinvestment in digital health infrastructure, and fewer opportunities for specialized training (Aqtam et al., 2023). The ongoing political instability and economic restrictions further hinder technological

Table 4. Predictors of Perception of Artificial Intelligence Worries: Multiple Linear Regression.

Model	B	Beta	t	p-Value	95.0% Confidence Interval	
					Lower Bound	Upper Bound
Education level	.040	.031	1.192	.235	-.026	.106
Artificial intelligence awareness	2.007	1.225	34.031	.000	1.891	2.123
Artificial intelligence previous experience	-.952	-.561	-15.879	.000	-1.070	-.834

**Figure 1.** Mean Scores of AI Worry Dimensions Among ICU Nurses.

advancement and innovation in healthcare institutions, thereby impacting nurses' familiarity and confidence with emerging technologies such as AI.

The study's most significant finding is the seemingly contradictory relationship between AI awareness, experience, and worry levels. While both awareness and experience showed positive correlations with worry in bivariate analysis, the regression analysis revealed that awareness increases worry while experience reduces it. This apparent contradiction can be explained by understanding that awareness without practical experience may lead to anxiety based on theoretical knowledge of potential risks, while hands-on experience provides practical understanding that reduces unfounded concerns.

This finding suggests that awareness of AI without practical experience may reflect a form of critical consciousness rather than simple anxiety. Nurses who are more aware of AI capabilities and limitations may be more cognizant of potential risks, ethical implications, and professional challenges. Conversely, nurses with practical AI experience have had opportunities to observe AI's actual performance, understand its limitations, and develop strategies for effective human-AI collaboration. These findings align with the

TAM, which posits that perceived usefulness and ease of use are key determinants of technology adoption. Our results suggest that AI awareness without experience may heighten perceptions of complexity and reduce perceived ease of use, leading to increased worry. Conversely, practical experience with AI tools allows nurses to develop realistic assessments of both usefulness and ease of use, thereby reducing anxiety and building confidence in the technology.

The finding that healthcare provider-related worries scored highest ($M = 3.3$) indicates that nurses are particularly concerned about AI's impact on their professional roles, job security, and the quality of patient care. This aligns with findings from Ramadan et al. (2024), who identified fears of job displacement and deskilling as major barriers to AI adoption among nurses in Saudi Arabia. The lower scores for regulatory and ethical concerns ($M = 2.9$) may reflect limited awareness of AI governance frameworks rather than reduced concern about these issues.

The negative correlation between education level and AI worries suggests that higher education may provide better preparation for understanding and adapting to technological changes. This finding supports the importance of educational

interventions in reducing AI-related anxiety and building confidence in technology adoption.

Implications for Practice and Policy

Based on these findings, several targeted interventions are recommended to guide practice and policy. Given the resource constraints in Palestinian healthcare settings, implementation strategies should prioritize low-cost, high-impact interventions. This includes leveraging partnerships with international organizations for training resources, developing locally-adapted AI competency standards, and creating mentorship networks that maximize existing expertise while building new capabilities. First, structured AI education programs should be developed to move beyond theory and provide nurses with practical experience using AI tools relevant to ICU settings. Second, a phased implementation strategy should be adopted, beginning with pilot programs that enable nurses to gain experience in controlled environments before broader deployment. Third, there must be sustained professional development support focused on both technical AI skills and the evolving responsibilities of nurses within AI-integrated healthcare systems. Fourth, a clear ethical framework is essential; this should include guidelines and governance structures tailored to the Palestinian healthcare context, addressing accountability, transparency, and patient safety. Finally, stakeholder engagement is critical, nurses must be actively involved in the selection, implementation, and evaluation of AI technologies to ensure these tools align with clinical needs and uphold professional standards.

Strengths and Limitations of the Study

A key strength of this study lies in its focus on a relatively unexplored population, ICU nurses in Palestine, providing valuable insights into their perceptions and concerns regarding AI adoption in healthcare. The use of a validated instrument (WAAI-HCQ) with strong reliability further enhances the credibility of the findings. Additionally, the inclusion of nurses from both governmental and non-governmental hospitals across multiple regions ensures a diverse and representative sample. The high response rate (94.0%) and strong internal consistency of the instrument (Cronbach's $\alpha = 0.90$) further strengthen the study's methodological rigor. The exceptionally high response rate (94.0%) can be attributed to several factors: direct face-to-face recruitment by the research team, the relevance of the topic to participants' professional interests, strong institutional support from hospital administrations, and the voluntary nature of participation being clearly communicated through informed consent processes. Additionally, the relatively small and close-knit nursing community in Palestinian hospitals may have contributed to higher participation rates.

However, the study has several limitations. The cross-sectional design restricts the ability to establish causality

between variables, and the use of self-reported data may introduce response bias. Self-reported data may be influenced by social desirability bias, particularly when participants respond to questions about their professional competence and attitudes toward new technologies. The convenience sampling method introduces potential selection bias, which should be acknowledged when interpreting findings. The administration of the questionnaire in English, despite participants' professional background, may have created comprehension barriers for some participants. Additionally, the study lacks cross-cultural validation of the instrument in the Palestinian context, which may affect the generalizability of findings. Social desirability effects may have influenced responses, particularly regarding professional competence and technology acceptance. Finally, the study's focus on one geographic region limits the generalizability of findings to other low-resource settings or different cultural contexts.

Recommendations

The findings of this study indicate that AI adoption in Palestinian ICU settings requires a comprehensive, evidence-based approach that addresses both technical and human factors. The following specific recommendations are proposed.

Educational and Training Interventions

Educational and training interventions should focus on equipping ICU nurses with both foundational knowledge and practical skills in AI. Standardized AI competency frameworks must be developed to define clear learning outcomes that combine theoretical understanding with real-world application. Simulation-based training programs should be implemented to give nurses hands-on experience with AI tools in safe, controlled settings that build confidence and competence. Mentorship programs can support this transition by pairing experienced nurses with those new to AI, fostering peer learning and practical guidance. To ensure sustained knowledge development, AI literacy should be integrated into the continuing education requirements for ICU nurses, making it a core component of professional growth and readiness for AI-integrated clinical environments.

Policy and Governance Recommendations

Clear regulatory and governance structures are essential for responsible AI integration in Palestinian healthcare. Regulatory frameworks must be established to provide detailed guidelines on clinical decision-making, data privacy, and professional accountability, ensuring safe and ethical AI use. Standardized protocols for AI validation and quality assurance should be developed to confirm that AI systems meet clinical standards before and during implementation. Multidisciplinary oversight committees, with active nursing representation, should be created to guide policy, monitor

risks, and ensure that AI tools align with patient care priorities. Transparent procedures must also be implemented for evaluating and monitoring the performance of AI systems over time, enabling continuous improvement and accountability.

Implementation Strategy Recommendations

Implementation strategies should follow a phased approach that supports gradual integration and continuous learning. Initial deployment should focus on small-scale pilots, allowing nurses to build familiarity and competence with AI tools before expanding to wider use. Priority should be given to AI applications that clearly support and enhance nursing tasks rather than replace them, reinforcing nurses' roles in clinical decision-making. Technical support must be readily available to address issues promptly and reduce disruptions in patient care. In parallel, feedback mechanisms should be established to enable nurses to report concerns, share insights, and recommend adjustments, ensuring that AI systems evolve in alignment with frontline needs and practical realities.

Research Priorities

Future research should focus on longitudinal studies that track changes in AI-related worries throughout the implementation process, intervention studies evaluating the effectiveness of different AI training approaches, and comparative studies examining AI adoption across different healthcare settings and cultural contexts. Longitudinal studies tracking the evolution of AI perceptions as technologies are gradually introduced would provide valuable insights into the temporal dynamics of technology acceptance. Additionally, comparative studies examining AI adoption patterns across different Middle Eastern healthcare contexts could identify culturally-specific factors that influence implementation success. Additionally, research is needed to develop and validate AI competency assessment tools specific to healthcare settings, providing a foundation for professional development standards and implementation guidelines.

Conclusion

This study provides important insights into the perceptions of ICU nurses in Palestine regarding the adoption of AI in healthcare. The findings revealed that while nurses demonstrated moderate AI awareness, their actual experience with AI tools remained limited. Most significantly, the study identified a complex relationship between AI awareness, experience, and worry levels: AI awareness emerged as the strongest positive predictor of AI-related worries, while previous experience with AI was a strong negative predictor. This suggests that awareness without practical experience may lead to heightened concerns, while hands-on exposure to AI technologies reduces anxiety and builds confidence.

These results have important implications for AI implementation strategies in healthcare settings. Rather than simply increasing awareness through theoretical education, successful AI adoption requires structured experiential learning opportunities that allow nurses to develop practical familiarity with AI tools. This approach can help bridge the gap between theoretical knowledge and practical confidence, ultimately supporting more effective and sustainable AI integration in clinical practice.

The study underscores the critical need for comprehensive strategies that address both educational and experiential components of AI adoption. Context-specific interventions that consider the unique challenges of low-resource healthcare settings, including limited infrastructure, resource constraints, and political instability, are essential for successful AI implementation. Furthermore, the development of supportive policies, ethical frameworks, and professional development programs is crucial for addressing nurses' concerns and building confidence in AI technologies.


Prioritize hands-on AI training over theoretical instruction, involve nurses actively in the selection and evaluation of AI tools, and provide ongoing support throughout the adoption process. By addressing both the technical and human factors involved in AI adoption, healthcare organizations can better prepare nurses for the evolving landscape of AI-enhanced healthcare delivery. This study represents the first comprehensive examination of AI-related concerns among ICU nurses in Palestine, providing crucial baseline data for healthcare organizations and policymakers in similar low-resource settings. The paradoxical relationship between AI awareness and worry, mediated by practical experience, offers a roadmap for evidence-based AI implementation strategies that prioritize experiential learning over theoretical education alone.


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Ethics Approval and Consent to Participate

First of all, permission was obtained from the owners to use the instruments in collecting data for this study. Likewise, the Institutional Review Board (IRB) of Palestine Ahliya University (PAU) granted ethical approval to the researchers, with IRB reference number: (CAMS/BSN/4/2025) and permission was obtained from the Palestinian MOH to collect data from governmental hospitals.

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Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Supplemental Material

Supplemental material for this paper is available online.

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