

Nursing Students' Awareness, Perceptions, and Attitudes Toward Artificial Intelligence in Healthcare: A Cross-Sectional Study in Erbil, Iraq

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Abstract: ***Background:** Artificial intelligence is increasingly influencing healthcare delivery and nursing education. Understanding nursing students' perceptions is important for preparing future professionals to use AI responsibly. **Objective:** To assess nursing students' awareness, experiences, perceptions, and training needs concerning artificial intelligence in healthcare. **Methods:** A descriptive, survey-based study was conducted among 175 nursing students at Cihan University-Erbil, Iraq. Data were collected using a 22-item closed-ended questionnaire and summarized using descriptive statistics. **Results:** Most participants were aware of AI (81.7%), and 56.6% reported previous AI use. Approximately 64.6% believed that deep learning-based AI could improve patient care, while 68.0% recognized its potential to facilitate communication across language barriers. Only 30.3% had received formal AI training, and 63.4% believed that additional training was necessary. Concerns included possible reductions in human nursing skills through excessive AI dependence. **Conclusion:** Nursing students demonstrated substantial awareness of AI and generally positive perceptions of its potential applications. However, limited formal training and concerns about professional skills indicate the need for structured AI education, ethical guidance, and continued human oversight. Further research involving multiple institutions is recommended.*

Keywords: Artificial intelligence; Nursing; Healthcare technology; Patient care; AI training; Clinical decision support systems; Ethical considerations

1. Introduction

Artificial intelligence (AI) is transforming healthcare by improving diagnostic accuracy, streamlining workflows, and enhancing patient outcomes. In nursing, applications range from the automation of administrative tasks to clinical decision support systems, which allow nurses to devote more time to direct patient care. Integrating AI into nursing practice is expected to help address workforce shortages, improve patient management, and reduce the overall burden on healthcare professionals [1]. One of its most important benefits is support for early diagnosis and the development of individualized treatment plans. AI algorithms can analyze very large volumes of data and detect patterns that clinicians may not readily notice. This capacity enables early identification of conditions such as sepsis, diabetes, and cardiovascular disease, allowing treatment to be given at the right moment and improving prognosis [2]. Despite these advantages, AI also raises concerns, and ethical challenges must be addressed to ensure that healthcare is delivered fairly.

Common concerns include the protection of patient privacy and data and the risk of bias in AI algorithms. The degree to which AI should operate autonomously, particularly in critical care settings where human oversight remains essential, is also under continuing debate [3]. The integration of AI into the nursing profession is closely linked to the availability of appropriate education and training. Many nurses lack the knowledge needed to work with these technologies, so continuing professional development is required to close the gap between nurses and AI-enabled

tools. Including AI training in nursing curricula would help future nurses acquire the skills needed to engage effectively with AI throughout their careers, with the potential to change the profession fundamentally [4]. Another topic attracting considerable attention is the use of AI-driven clinical decision support systems. These systems assist nurses in several ways, notably by generating real-time recommendations from patient data, which may reduce medical errors and improve diagnostic accuracy. Concerns remain, however, about over-reliance on AI and its effect on nurses' critical thinking, especially given how rapidly AI is spreading through the field [5].

AI has also shown that it can help overcome language barriers in patient communication. AI-powered translation systems could give nurses the tools to interact effectively with patients who speak different languages, which may improve not only the overall quality of care but also patients' satisfaction with it [3]. AI in nursing practice also holds great promise for aged care: recent studies indicate that large language models (LLMs) can enhance patient monitoring and interaction, ultimately yielding more tailored and effective care for older adults [6]. The ethical issues that may arise require careful consideration. Transparency and explainability of AI systems are essential so that clinical staff can trust and effectively oversee AI-informed decisions, thereby preserving patient autonomy and safety. AI also contributes to perioperative patient care; machine-learning methods have been used to anticipate postoperative complications, making it possible to implement preventive measures and improve the allocation of resources, and hence patient outcomes [7]. Remote patient monitoring (RPM) is

Volume 15 Issue 10, October 2026

Fully Refereed | Open Access | Double Blind Peer Reviewed Journal

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another area that AI could transform. RPM systems use AI to provide personalized monitoring, detect early warning signs of declining health, and adapt to the particular needs of each patient, which reduces hospital readmissions and improves quality of life [8]. Finally, detecting and removing bias in AI systems is crucial for the fair provision of healthcare, and research on methods to do so is ongoing, with the aim of promoting fairness and credibility in AI-assisted medical decisions [9].

In summary, AI must be used carefully if its advantages are to be maximized and its hazards reduced. Although AI presents great opportunities to improve nursing practice, future studies should focus on ethical issues, AI-driven patient communication, and the psychological effects of AI-assisted treatment. Effective integration of AI into nursing practice will depend on subjecting AI technologies to rigorous testing before widespread deployment and on preserving human oversight.

1.1 Study aim and Objective

To assess nursing students' awareness, experiences, perceptions and training needs concerning artificial intelligence in healthcare.

2. Materials and Methods

2.1 Study design

A descriptive, analytical, survey-based study was conducted to determine how artificial intelligence may affect the future professional roles of nursing students. A quantitative approach was used, with a closed-ended questionnaire and statistical analysis of the data.

2.2 Participants

The target population comprised nursing students at Cihan University-Erbil. The sample size was 175 participants, determined by statistical analysis. Participants were eligible if they were enrolled as nursing students and had a basic understanding of artificial intelligence as applied in healthcare. Students not registered in nursing and students who declined to participate were excluded.

2.3 Data collection instrument

Data were collected using a paper-based, 22-item, closed-ended questionnaire. It comprised sections on (i) demographic information, including age, year of study, and work experience; (ii) knowledge of AI, i.e. how much participants know about its uses in their field; (iii) anticipated effects of AI on nursing, including advantages and drawbacks; and (iv) readiness to apply AI in a professional capacity. The questionnaire was designed on the basis of previous studies and modified according to the needs of the research.

2.4 Data collection procedure

The questionnaire was distributed to students on paper, and the confidentiality and privacy of participants were ensured.

2.5 Statistical Analysis

Data were entered and analyzed using SPSS and Microsoft Excel. Descriptive statistics (frequencies, percentages, and means) were calculated, and appropriate statistical tests were used to analyze relationships between variables. The results were interpreted in relation to the study objectives.

2.6 Ethical Considerations

Informed consent was obtained from every student before participation. Participants were assured that their data would remain confidential and would be used for research purposes only. Approval has been obtained from Cihan University-Erbil Research Ethical Committee.

3. Results

3.1 Participant characteristics

Table 1 shows the demographic characteristics of the 175 participants. Arab students (48.0%) formed a slightly larger group than Kurdish students (45.7%), followed by Turkmen (4.0%) and Assyrian students (2.3%). Males (61.1%) outnumbered females (38.9%), and the largest age group was 21–23 years (53.1%). Most participants were Muslim (94.3%) and single (85.1%; married, 14.3%). Students were mainly in the second (46.9%) and third (34.3%) stages of study. Nearly two-thirds (64.6%) were studying only, rather than working and studying at the same time, and 56.0% had never worked as a nurse, compared with 44.0% who had. Most students came from urban areas (80.6% vs. 19.4% rural), most held no prior qualification (59.4%), and most lived in an owned house (67.4%).

Table 1: Demographic characteristics of the participating nursing students (n = 175).

Variable	Category	n	%
Ethnicity	Arab	84	48
	Kurdish	80	45.7
	Turkmen	7	4
	Assyrian	4	2.3
Gender	Male	107	61.1
	Female	68	38.9
Age (years)	18–20	30	17.1
	21–23	93	53.1
	24–26	32	18.3
	27 or older	20	11.4
Religion	Muslim	165	94.3
	Christian	7	4
	Yazidi	3	1.7
Marital status	Single	149	85.1
	Married	25	14.3
	Widowed	1	0.6
Stage of study	1st	19	10.9
	2nd	82	46.9
	3rd	60	34.3
	4th	14	8
Occupation	Governmental employee	21	12
	Private worker	41	23.4
	Studying only	113	64.6
Previously worked as a nurse	Yes	77	44
	No	98	56
Residency	Urban	141	80.6
	Rural	34	19.4

Other qualification	Bachelor's (another)	49	28
	Diploma	22	12.6
	None	104	59.4
Economic status	Owned house	118	67.4
	Rented house	57	32.6

n = number of respondents; % = percentage of the total sample.

3.2 AI awareness and use

As shown in Table 2, 143 students (81.7%) had heard of AI, 22 (12.6%) had not, and 10 (5.7%) were unsure. More than half (n = 99; 56.6%) had used AI themselves, 66 (37.7%) had not, and 10 (5.7%) did not know whether they had. Awareness was therefore widespread, and over half of the students had personal experience of AI. The small proportion of students who were unsure whether they had used AI suggests that students may need greater clarity on what constitutes AI use.

Table 2: Awareness and use of AI among nursing students (n = 175).

Question	Response	n	%
Have you heard about AI?	Yes	143	81.7
	No	22	12.6
	I don't know	10	5.7
Have you ever used AI?	Yes	99	56.6
	No	66	37.7
	I don't know	10	5.7

3.3 Perceived impact on patient care and outcomes

Most respondents (64.6%, n = 113) believed that AI using deep learning techniques could significantly improve patient care (Table 3). Fewer felt that AI improves patient treatment outcomes through early diagnosis (45.1%, n = 79), while 32.6% disagreed and 22.3% were unsure. Similarly, 42.9% (n = 75) believed that AI reduces healthcare costs and improves the quality of care, whereas 31.4% disagreed. Among items not tabulated, 48.0% believed that AI can lighten nurses' workload (30.9% disagreed), and 60.6% believed that intelligent robots and other AI-powered innovations will affect nursing roles.

Table 3: Perceived impact of AI on patient care and outcomes (n = 175)

Item	Yes, n (%)	No, n (%)	I don't know, n (%)
Q3 AI using deep learning techniques could significantly improve patient care.	113 (64.6)	33 (18.9)	29 (16.6)
Q8 AI can improve patient treatment outcomes when used in early diagnosis.	79 (45.1)	57 (32.6)	39 (22.3)
Q15 The use of AI in nursing reduces the cost of healthcare and improves the quality of patient care in general.	75 (42.9)	55 (31.4)	45 (25.7)

Values are n (%)

3.4 AI training and knowledge

Nearly two-thirds of students (63.4%, n = 111) felt that nurses require additional training to use AI effectively in daily practice (Table 4). While 42.9% (n = 75) felt knowledgeable about the potential applications of AI in nursing, 36.6% did not and 20.6% were unsure. Only 30.3% (n = 53) had received formal training on the use of AI in healthcare, whereas 58.9% (n = 103) had not. In addition, 54.3% (n = 95) thought that ongoing professional development in AI helps nurses keep pace with advances in healthcare technology, and 45.7% believed that nursing courses should incorporate AI instruction.

Table 4: AI training and knowledge among nursing students (n = 175).

Item	Yes, n (%)	No, n (%)	I don't know, n (%)
Q4 Nurses require additional training to use AI effectively in daily practice.	111 (63.4)	30 (17.1)	34 (19.4)
Q10 I feel knowledgeable about the potential applications of AI in nursing.	75 (42.9)	64 (36.6)	36 (20.6)
Q11 I have received formal training on the use of AI in healthcare.	53 (30.3)	103 (58.9)	19 (10.9)
Q20 Ongoing professional development in AI can improve nurses' ability to keep up with rapid advances in healthcare technology.	95 (54.3)	38 (21.7)	42 (24.0)

Values are n (%).

3.5 Ethical and practical concerns

More than half of the students (54.3%, n = 95) believed that over-reliance on AI could lead to a decline in human nursing skills, and 41.7% (n = 73) expected the integration of AI into healthcare to present challenges for the nursing profession (Table 5). A similar proportion (53.7%, n = 94) believed that ensuring AI uses fair and diverse data would help create equal healthcare outcomes for everyone. Among items not tabulated, 46.3% agreed that the accuracy of AI algorithms depends on high-quality data (28.6% were unsure), 56.0% thought that human oversight of AI in critical care should always be required, and 68.0% believed that AI should be thoroughly tested before general acceptance.

Table 5: Ethical and practical concerns regarding AI in nursing (n = 175).

Item	Yes, n (%)	No, n (%)	I don't know, n (%)
Q9 Over-reliance on AI could lead to a decline in human nursing skills.	95 (54.3)	52 (29.7)	28 (16.0)
Q13 The integration of AI into healthcare is expected to present challenges for the nursing profession.	73 (41.7)	69 (39.4)	33 (18.9)
Q21 Ensuring that AI uses fair and diverse data can help create equal healthcare outcomes for everyone.	94 (53.7)	51 (29.1)	30 (17.1)

Values are n (%).

3.6 AI and the patient experience

Two-thirds of respondents (68.0%, $n = 119$) believed that AI can help nurses communicate with patients who speak a different language (Table 6). Nearly half (47.4%, $n = 83$) felt that a patient's psychological state differs when treated by AI rather than by a nurse, while 26.9% disagreed and 25.7% were unsure.

Table 6: AI in patient communication and the patient experience ($n = 175$).

Item	Yes, n (%)	No, n (%)	I don't know, n (%)
Q14 AI can help a nurse communicate with a patient who speaks a different language.	119 (68.0)	29 (16.6)	27 (15.4)
Q17 A patient's psychological state differs if he or she is treated by AI instead of a nurse.	83 (47.4)	47 (26.9)	45 (25.7)

Values are n (%).

3.7 Overall findings

A substantial proportion of students believed that AI can improve patient care, treatment accuracy, and communication, and there was general agreement that nursing education and practice need more AI training (Figure 1). At the same time, excessive dependence on AI and its effect on nursing skills remain ethical concerns. Although students expected AI to change nursing roles, there was a widespread preference for thorough testing and human oversight.

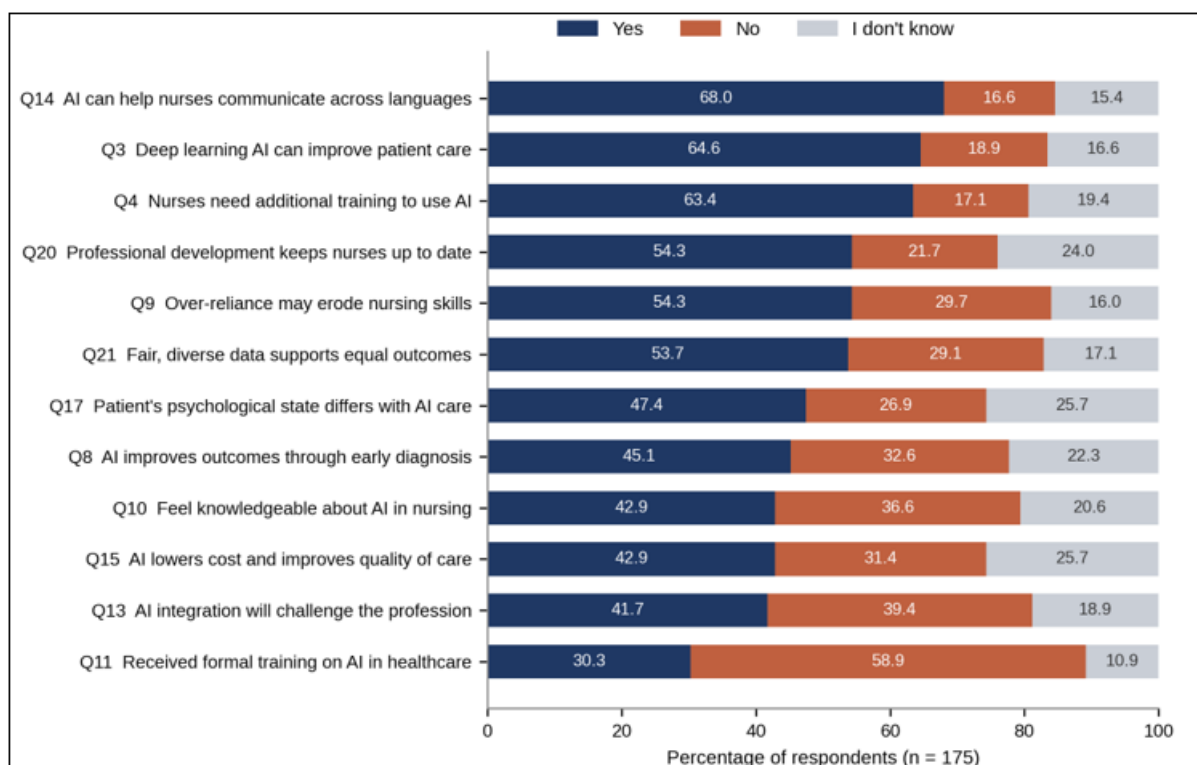


Figure 1: Distribution of responses (%) across the twelve tabulated survey items ($n = 175$), ordered by proportion answering "Yes". Item numbers correspond to Tables 3–6.

4. Discussion

This study assessed the awareness, perceptions, and attitudes of nursing students at Cihan University–Erbil toward artificial intelligence (AI), and the results offer a useful picture of the current state of AI integration in nursing education and practice, including both its prospects and its constraints.

More than half of the participants (56.6%) had used AI applications, and a large majority (81.7%) were aware of them, although only 42.9% felt knowledgeable about its applications in nursing. Most respondents (64.6%) believed

that deep learning-based AI could enhance patient care, and 63.4% acknowledged that more training is needed to apply AI in daily practice. Nevertheless, concerns were expressed about the possibility that AI might reduce human nursing skills (54.3%) and about challenges in integrating AI into nursing (41.7%). Earlier surveys show growing interest in AI across the healthcare sector, and our findings are consistent with those of Nashwan et al., who reported that nurses held a positive opinion of AI because of its ability to improve both patient outcomes and productivity [10].

Similarly, 63.4% of our students supported additional AI training, which underlines the need to include AI knowledge

in nursing curricula so that students are adequately equipped for technological developments in healthcare [11]. Our findings also coincide with other research in which ethical concerns were prominent among nursing students, and we share the concern that AI could erode the skills that human nurses currently possess. According to Kwak et al., nursing students' concerns about AI may influence their intention to adopt AI-based healthcare solutions in the future [12]. This highlights the need to manage ethical issues and to ensure that AI applications support, rather than replace, the human components of nursing care [12].

Future nurses appear eager to embrace technological innovation, as reflected in their positive view of the role of AI in improving patient care. At the same time, the clear need for further training suggests that nursing programs should incorporate AI-related courses to give students the knowledge and skills they require. Doing so could make it easier to apply AI systems seamlessly in healthcare environments and thereby improve patient outcomes [13]. The possibility that AI may reduce essential human nursing skills, together with the challenges of integration, emphasizes the need for a comprehensive strategy. Even if AI can manage routine tasks and data analysis, the central importance of human empathy, critical thinking, and ethical judgment in nursing must be maintained. AI should therefore be regarded as a tool to enhance nursing practice, so that nurses can concentrate more on direct patient care.

4.1 Limitations

This study was conducted at a single university, which limits the generalizability of the findings. In addition, the self-reported nature of the survey may have introduced response bias. Future studies should use more varied samples drawn from other educational institutions and regions to confirm these findings.

5. Conclusion

This study found that nursing students at Cihan University-Erbil demonstrated considerable awareness of artificial intelligence and generally positive perceptions of its potential applications in healthcare. Students recognized possible benefits for patient care, clinical decision support, and communication across language barriers. However, formal AI training remained limited, and concerns about excessive reliance on technology and the preservation of essential nursing skills were evident. These findings highlight the importance of integrating practical AI education, ethical considerations, and human oversight into nursing curricula.

As the study was conducted at a single institution using self-reported responses, its findings should be interpreted within this context. Further multi-institutional research is recommended to examine students' preparedness and the educational implications of AI integration in nursing practice.

References

- [1] Rony, M. K. K., et al. (2024). Advancing nursing practice with artificial intelligence: Enhancing preparedness for the future. *Nursing Open*, 11(1).
- [2] Ruksakulpiwat, S., et al. (2024). A systematic review of the application of artificial intelligence in nursing care: where are we, and what's next? *Journal of Multidisciplinary Healthcare*, 1603–1616.
- [3] Pailaha, A. D. (2023). The impact and issues of artificial intelligence in nursing science and healthcare settings. *SAGE Open Nursing*, 9, 23779608231196847.
- [4] Glauber, G., et al. (2023). Artificial intelligence in nursing education: opportunities and challenges. *Hawai'i Journal of Health & Social Welfare*, 82(12), 302.
- [5] Ronquillo, C. E., et al. (2021). Artificial intelligence in nursing: Priorities and opportunities from an international invitational think-tank of the Nursing and Artificial Intelligence Leadership Collaborative. *Journal of Advanced Nursing*, 77(9), 3707–3717.
- [6] Sun, Q., et al. (2024). Enhancing nursing and elderly care with large language models: An AI-driven framework. *arXiv preprint arXiv:2412.09946*.
- [7] Ganskaia, I., & Abaimov, S. (2022). Before and after: Machine learning for perioperative patient care. *arXiv preprint arXiv:2201.08095*.
- [8] Shaik, T., et al. (2023). Remote patient monitoring using artificial intelligence: Current state, applications, and challenges. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 13(2), e1485.
- [9] Chinta, S. V., et al. (2024). AI-driven healthcare: A survey on ensuring fairness and mitigating bias. *arXiv preprint arXiv:2407.19655*.
- [10] Nashwan, et al. (2025). The evolving role of nursing informatics in the era of artificial intelligence. *International Nursing Review*, 72(1), e13084.
- [11] Almagharbeh, W. T., et al. (2025). Application of artificial intelligence in nursing practice: a qualitative study of Jordanian nurses' perspectives. *BMC Nursing*, 24(1), 92.
- [12] Kwak, Y., et al. (2022). Influence of AI ethics awareness, attitude, anxiety, and self-efficacy on nursing students' behavioral intentions. *BMC Nursing*, 21(1), 267.
- [13] Hamad, N. I., et al. (2024). Embracing the future: an insight into nursing students' attitude and perception towards the usability of artificial intelligence in healthcare. *Teaching and Learning in Nursing*.