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Assessing Nursing Students' Knowledge and Attitudes toward Artificial Intelligence

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ABSTRACT

Introduction: The adaptation of Artificial Intelligence (AI) in healthcare is transformative in nature. This evolution requires nursing students to be more aware and to have a more positive perception towards AI. The AI integration in clinical practice certainly calls for the proper understanding from the students as for the proper application AI in healthcare. This study investigates the knowledge and attitudes of nursing students towards AI in healthcare. Methodology: This quantitative cross-sectional study consisted of 196 undergraduate nursing students with a Target population of 400 nursing students. The selection method used was convenient sampling. A structured questionnaire focusing on students' knowledge and attitude towards AI was the main tool used to collect the data. Also, descriptive and inferential statics such as frequencies, percentages, means and t-test available on SPSS Version 26 were used. The study had ethical approval and anonymity was guaranteed. Results: Among 196 nursing students, 93.3% demonstrated good knowledge of AI, while only 6.7% showed fair knowledge. Most (83.3%) had prior experience with AI tools such as ChatGPT and Google Lens, and 73.3% reported using them for academic purposes. In terms of attitudes, 66.7% agreed that AI improves nursing care, while 53.3% disagreed that it could replace nurses. A strong majority (80%) supported integrating AI into the nursing curriculum, and 60% expressed confidence in using AI in clinical settings. Overall, students showed strong knowledge and positive attitudes, though limited confidence in clinical application was observed. Conclusion: This study shows that nursing students possess good knowledge and a positive attitude toward AI, with most using it for academic purposes. However, confidence in applying AI in clinical practice remains limited, reflecting a gap between awareness and hands-on use. While students recognize AI's potential to improve nursing care, they also value the human aspects of nursing that technology cannot replace. These findings highlight the need to integrate AI-focused training into nursing curricula to enhance digital competence, bridge clinical application gaps, and prepare students for responsible use of AI in healthcare.

INTRODUCTION

Artificial Intelligence (AI) refers to the simulation of human intelligence in computer systems and machines that are programmed to perform tasks that typically require human cognitive abilities. These tasks include learning from data (machine learning), reasoning, problem-solving, decision-making, understanding natural language, and adapting to new inputs. In healthcare and nursing, AI encompasses tools and technologies designed to support clinical decision-making, enhance efficiency, improve patient care, and assist in education and research. The emergence of big data, cloud computing, artificial neural networks, and machine learning has enabled engineers to create a machine that can simulate human intelligence. Building on these technologies, this study refers to machines that are able to perceive, recognize, learn, react, and solve problems as AI (AI) (1). The integration of AI in healthcare is rapidly transforming patient care by enhancing diagnostic accuracy, operational efficiency, and the quality of services provided. The use of AI in modern healthcare has the potential to improve the accuracy of diagnosis, improve the quality of patient care, and make healthcare operations more efficient (2). In the past few years, AI has been adopted in clinical practices for patient monitoring, predictive analytics, virtual assistants, and even sophisticated decision-support systems (3).

This adaptation underscores the urgent demand for healthcare workers of the future, and more specifically, nursing students, to appreciate, embrace, and become conversant with modern technologies (4). As the students are the nursing workforce of the future, the power to determine quality and efficiency in the provision of care rests on their ability to leverage AI technologies (5). AI has the potential to aid nurses in the analysis of complicated health information systems by detecting early signs of health deterioration, as well as, recommending relevant, evidence-based health interventions (6). Hence, instilling positive attitudes and AI literacy within nursing students is crucial to promote responsible decision-making for the deployment of AI-based technologies in practical environments (7). As much as AI is taking on more sophisticated roles, preliminary research indicates that nursing students do not appreciate the full scope of AI in clinical environments. In some instances, this gap in knowledge creates skepticism, reluctance, or anxiety around its application (8). In addition, a lack of background may make some graduates feel underprepared to use AI in their jobs (9). Understanding students' perceptions about AI in education is critical because this information shapes teaching and learning policy and plans (10). Higher learning institutions can proactively plan for a technology-integrated healthcare environment by addressing the identified gaps in AI awareness and

understanding among students (11). The purpose of this study is to assess the knowledge and attitude toward AI among nursing students.

METHODOLOGY

The goal of this study was to evaluate knowledge and attitude of nursing students toward AI (AI) in the context of healthcare through a descriptive cross-sectional study. It was conducted at private Nursing institute in Karachi, Pakistan and spanned 4 months after the study's ethical approval was granted. The study was limited to undergraduate nursing students at the college, which had an approximate student population of 400. Using OpenEpi software, a sample size of 196 was calculated with a 95% confidence level and a 50% expected frequency. Participants were recruited through convenience sampling. Inclusion criteria were active undergraduate nursing students who were willing to participate. Data was gathered using a structured and validated questionnaire. The tool had sections related to demographics, knowledge and attitudes towards AI usage in clinical practice. To enhance accessibility, the questionnaire was distributed in digital formats such as Google form. Data collection lasted two months with participants informed about the study's purpose and given assurances of confidentiality and voluntary participation. Responses were anonymized and coded to protect data privacy. Data were analyzed using SPSS version 26. Response summary included frequencies and percentages. Ethical approval was sought from the Institutional Review Board and all participants provided informed consent prior to inclusion.

RESULTS

A total of 196 undergraduate nursing students participated in the study. Participants were aged between 18–24 years, with the majority falling into the 21–23 years category (approximately 50%, $n = 98$), followed by those aged 18–20 years ($\approx 40\%$, $n \approx 78$), and a minority aged 24+ years ($\approx 10\%$, $n \approx 20$). A higher proportion of respondents were female (76.7%, $n \approx 150$) compared to male (23.3%, $n \approx 46$). Academic year distribution showed that most students were in their 3rd year (33.3%, $n \approx 65$), followed by final-year students (26.7%, $n \approx 52$), 2nd year (23.3%, $n \approx 46$), and the remaining in 1st year (16.7%, $n \approx 33$).

TABLE 1: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS (N = 196)

Variable	Category	Frequency (f)	Percentage (%)
Age	18–20 years	78	40%
	21–23 years	98	50%
	24+ years	20	10%
Gender	Male	46	23.3%
	Female	150	76.7%
Year of Study	1st Year	33	16.7%
	2nd Year	46	23.3%
	3rd Year	65	33.3%
	Final Year	52	26.7%

Table 2 presents the level of knowledge of AI among nursing students. The majority demonstrated good knowledge regarding AI (93.3%, n ≈ 183), while a smaller proportion showed fair knowledge (6.7%, n ≈ 13). When considering the practical use of AI tools such as ChatGPT and Google Lens, most students reflected good knowledge through prior usage (83.3%, n ≈ 163), whereas 16.7% (n ≈ 33) indicated poor knowledge by not using them. Similarly, in the educational setting, 73.3% (n ≈ 144) reflected good knowledge of AI by applying it for academic purposes, while 26.7% (n ≈ 52) had poor knowledge in this context.

TABLE 02

Statement	Good Knowledge (f / %)	Fair Knowledge (f / %)	Poor Knowledge (f / %)
Knowledge of AI	183 (93.3%)	13 (6.7%)	0 (0%)
Use of AI tools (e.g., ChatGPT, Google Lens)	163 (83.3%)	0 (0%)	33 (16.7%)
Use of AI for educational purposes	144 (73.3%)	0 (0%)	52 (26.7%)

ATTITUDES TOWARD AI IN NURSING

Table 3 highlights the attitudes of nursing students toward the integration of AI in nursing practice. A majority of students showed a positive attitude by agreeing that AI enhances the quality of nursing care (66.7%, n ≈ 131), while 26.7% (n ≈ 52) demonstrated a neutral attitude, and only 6.6% (n ≈ 13)

reflected a negative attitude. Regarding concerns that AI may replace nurses in the future, 53.3% (n ≈ 104) expressed a negative attitude (disagreeing with the statement), 33.3% (n ≈ 65) remained neutral, and 13.3% (n ≈ 26) reflected a positive attitude by agreeing. Furthermore, inclusion of AI in the nursing curriculum was strongly supported, with 80% (n ≈ 157) showing a positive attitude, 16.7% (n ≈ 33) neutral, and only 3.3% (n ≈ 6) negative. Finally, 60% (n ≈ 118) expressed confidence and a positive attitude toward using AI in clinical settings, while 30% (n ≈ 59) were neutral, and 10% (n ≈ 19) reflected a lack of confidence, indicating a negative attitude.

TABLE 03

Statement	Positive Attitude (f/%)	Neutral Attitude (f/%)	Negative Attitude (f/%)
AI improves the quality of nursing care	131 (66.7%)	52 (26.7%)	13 (6.6%)
AI will replace nurses in the future	26 (13.3%)	65 (33.3%)	104 (53.3%)
AI should be included in nursing curriculum	157 (80%)	33 (16.7%)	6 (3.3%)
I am confident using AI tools in clinical settings	118 (60%)	59 (30%)	19 (10%)

DISCUSSION

The focus of this study was to evaluate the scholarly knowledge, practical application, and overall attitude of undergraduate nursing students toward AI (AI). Our sample of 196 participants demonstrated a strong level of recognition and acceptance of AI technologies in both educational and clinical contexts. The findings revealed that 93.3% of the students had good knowledge regarding AI, highlighting a broad awareness of its existence and functions. This aligns with global trends, where increasing integration of technological innovations is reshaping healthcare education systems (11,12). In terms of application, the majority of students (83.3%) reported prior use of AI tools such as ChatGPT and Google Lens, reflecting the rising adoption of such platforms for academic problem-solving. Consistent with previous literature, students not only show willingness to adopt new pedagogical technologies but are already engaging with them to supplement learning (13). Furthermore, 73.3% of participants reported using AI for educational purposes, with academic assistance (66.7%) being the most common domain of use. These results suggest that AI is serving as a

complementary resource to textbooks and lectures, thereby enhancing students' ability to process and apply theoretical knowledge (14). However, clinical application of AI tools remained relatively limited, with only 16.7% utilizing AI for decision support in practice. This limited engagement may reflect either insufficient exposure to AI technologies in clinical placements or the lack of structured instruction in the nursing curriculum (15). Attitudes toward AI were generally positive. Two-thirds of respondents (66.7%) expressed the view that AI contributes positively to the quality of nursing care. This perception aligns with evidence that AI has the potential to improve clinical accuracy, minimize human error, and streamline documentation processes (16). Importantly, more than half of the participants (53.3%) disagreed with the notion that AI will replace nurses, emphasizing that the unique qualities of nursing, critical thinking, empathy, and direct patient interaction cannot be replicated by machines. This reflects a balanced and rational perspective, acknowledging the benefits of AI while recognizing its limitations (17). A notable 80% of respondents supported the inclusion of AI in the nursing curriculum, indicating strong demand for structured educational interventions to build technological competence. This is consistent with global recommendations that nursing education must incorporate digital health literacy to prepare students for evolving, technology-driven healthcare systems (18,19). Despite this enthusiasm, only 60% of students reported confidence in using AI in clinical settings, highlighting gaps in hands-on training and the need for targeted capacity-building initiatives (20). Overall, our study demonstrates that undergraduate nursing students possess a good level of knowledge and a positive attitude toward AI in education and nursing practice. However, their limited clinical exposure to AI suggests the necessity of curriculum redesigns to integrate AI-focused training, digital competency, and ethical considerations. Future studies should explore barriers to clinical adoption of AI and evaluate the outcomes of its inclusion in nursing curricula, ensuring that nursing graduates are well-prepared for practice in technologically sophisticated healthcare environments (21).

CONCLUSION

This study shows that nursing students possess good knowledge and a positive attitude toward AI, with most using it for academic purposes. However, confidence in applying AI in clinical practice remains limited, reflecting a gap between awareness and hands-on use. While students recognize AI's potential to improve nursing care, they also value the human aspects of nursing that technology cannot replace. These findings highlight the need to integrate AI-focused training into nursing

curricula to enhance digital competence, bridge clinical application gaps, and prepare students for responsible use of AI in healthcare.

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