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ASSESSING THE KNOWLEDGE OF ARTIFICIAL INTELLIGENCE AMONG UNDERGRADUATE NURSING STUDENTS AT JINNAH HOSPITAL LAHORE

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Artificial intelligence, nursing students, AI knowledge, nursing education, healthcare technology, Pakistan.

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Abstract

Background: *Artificial intelligence (AI) is increasingly transforming healthcare and nursing practice through applications such as clinical decision support, patient monitoring, documentation, and education. Despite its growing importance, formal AI education in nursing programs remains limited in Pakistan.*

Aim: *To assess the knowledge and perceptions of artificial intelligence among undergraduate nursing students at the College of Nursing, Jinnah Hospital Lahore.*

Methods: *A descriptive cross-sectional study was conducted among 164 BSN students from 2nd, 3rd, and 4th years. Convenience sampling was used, and data were collected through an adopted structured questionnaire. Descriptive statistics and Chi-square tests were applied using SPSS version 26.*

Results: *Most participants were aged 21–22 years (54.9%). Social media was the main source of AI information (79.3%), while 54.3% had not attended formal AI sessions. A high proportion reported understanding AI (89.6%) and its nursing applications (85.4%). Positive attitudes toward AI were common, with 90.9% believing AI would revolutionize nursing and 94.5% agreeing it could improve decision-making. Knowledge level was significantly associated with year of study ($\chi^2 = 21.47$, $p = 0.001$), with 4th-year students showing the highest good knowledge scores.*

Conclusion: *Nursing students demonstrated positive perceptions and moderate-to-good knowledge of AI; however, reliance on informal learning sources and limited formal training indicate a need to integrate structured AI education and ethics into nursing curricula.*

INTRODUCTION

Artificial Intelligence (AI) is one of the most accomplished technological miracles, which has found its way in almost all sectors to change our lives and how we can work. With advancements in the AI area, it certainly has the ability to shift nursing practice, education, and research to a wider extent. Because using an AI application in health care is always at one's own risk, there need to be a disciplined knowledge for health professionals—especially, nurses —concerning what can or cannot be an outcome. . (Martinez-Ortigosa, 2023). Artificial Intelligence (AI) is the process of designing machines programmed to perform human activities —problem-solving, decision making, perception & machine learning etc. (Martinez-Ortigosa, 2023). Information that AI can wield to aid clinical decisions for better health care with evidence-

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based support systems. (Martinez-Ortigosa, 2023).

Technology has invaded every area of modern culture. Advanced technologies are pushing the nursing practice far beyond basic machines and with the use of artificial super intelligence (ASI).(Maria asad, 2022). AI in nurse education is offered in many ways that afford students opportunities to enhance their critical thinking, decision-making, and data analysis in AI realm of healthcare.(Pohane et al., 2024). AI can empower nurses to take on an even more significant role in healthcare delivery by providing advanced tools that support them anytime and anywhere. This enables nurses to fulfill their practitioner responsibilities and deliver care throughout the entire continuum.(Muhammad Mustafa Habib, 2024). It goes without saying that future nurse providers must be well educated on AI to be at par with the changing scenarios of the healthcare sector. There seems, however, to be knowledge gaps in the health and medical sector regarding AI applications.(Li et al., 2024).

The current health scenario in Pakistan is less than complacency because of a lack of resources. Despite increasing health demands and the rapidly growing economic inequality, only 2.8% of the nation's budget is allocated to healthcare. This figure stands in stark contrast to the World Health Organization recommendation of at least 6% of GDP being allocated to healthcare systems in developing countries. At present, there is no specific allocation for the adoption of AI technologies in healthcare in Pakistan. However, the National Health Vision program (2016–2025) has emphasized the need to establish Human Resource for Health (HRH) systems in healthcare facilities and to optimize software to meet the increasing demand for modernized and efficient healthcare services.(Muhammad Mustafa Habib, 2024).

AI can analyze extensive datasets of clinical information to uncover new trends and insights. AI-driven chatbots and virtual assistants are being utilized to offer patients information and support, which helps reduce the workload for nurses and healthcare professionals in Pakistan. Additionally, it is being employed to automate routine administrative tasks, such as managing electronic health records and documenting nursing care plans.(Naveed, 2023). The widespread adoption of AI in healthcare in Lahore is still in its early stages. Challenges like data privacy, ethical considerations, and the need for skilled professionals to develop and implement AI solutions need to be addressed.

Artificial Intelligence (AI) has emerged as a disruptive force in modern healthcare, reshaping clinical workflows, decision-making processes, patient monitoring, and health education. AI is broadly defined as the development of computer systems that can perform tasks normally requiring human intelligence, such as visual perception, language understanding, pattern recognition, and decision-making (Engelmann, 2020) . In the healthcare context, AI is increasingly used in areas such as diagnostic imaging, drug development, clinical decision support systems (CDSS), and predictive analytics for disease prevention.

Nursing, as a dynamic and evidence-based profession, is not immune to the growing influence of AI. AI applications in nursing include real-time patient monitoring, early detection of clinical deterioration, electronic health record (EHR) documentation, telehealth support, and administrative automation (Nagle et al., 2020). AI-powered technologies can ease the workload of nurses, reduce medical errors, and enable personalized care through data-driven insights. For instance, clinical decision support systems assist nurses in choosing interventions based on best practice guidelines and patient data, which improves the quality and consistency of care (Buchanan et al., 2021a). Globally, healthcare systems are integrating AI into nursing education, recognizing the need for digitally literate professionals capable of using technology to improve outcomes. Several developed countries have started incorporating AI, robotics, and health informatics into undergraduate nursing curricula (El Arab et al., 2025). However, in low- and middle-income countries like Pakistan, AI integration remains limited due to infrastructural constraints, lack of faculty expertise, and absence of national digital health policy. While technology adoption in hospitals is increasing in urban centers, formal training on AI for nurses is rare.

The Children Hospital in Lahore, being a leading pediatric facility and training center, provides a relevant setting to assess student

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readiness for technological innovations. Pediatric patients are especially vulnerable and often require advanced monitoring and early intervention—areas where AI has proven beneficial (Krittanawong et al., 2022). However, AI use without adequate training may pose ethical and clinical risks, such as misinterpretation of data or over-reliance on algorithms.

The integration of AI also supports the nursing process—assessment, diagnosis, planning, implementation, and evaluation—by providing real-time alerts, suggesting interventions, and tracking patient progress over time. For example, smart beds can alert nurses when a patient is at risk for falls, or wearable devices can flag signs of heart failure exacerbation. Chatbots are being used to provide medication reminders, health education, and mental health support, reducing the burden on nursing staff and empowering patients.(Fan et al., 2023)

In the context of nursing education, AI offers innovative learning modalities such as virtual simulation, intelligent tutoring systems, and adaptive testing. These methods can personalize education, allow real-time feedback, and provide immersive environments where students can practice complex clinical scenarios safely. Countries like Canada, the United Kingdom, and Singapore have begun integrating AI modules into their undergraduate nursing programs to prepare students for tech-enabled clinical environments.(El Arab et al., 2025)

However, despite global advancements, the landscape in Pakistan remains underdeveloped. The Pakistani healthcare system is plagued by workforce shortages, uneven distribution of services, and outdated infrastructures. According to the World Health Organization, Pakistan falls significantly short of the minimum health workforce density required to deliver essential services (WHO, 2023). In such a context, AI could serve as a powerful tool to improve efficiency and bridge human resource gaps. Yet, a lack of awareness, training, and policy frameworks has hindered its integration into practice.

Despite the rapid development of AI tools in healthcare, there remains a substantial knowledge and training gap among nursing professionals and students. A global survey by Salama et al. (2025) revealed that although nursing students are generally enthusiastic about AI, over 70% reported inadequate formal education on AI applications in clinical practice. This lack of structured AI education risks under-preparedness of future nurses, potentially limiting the successful integration of AI into nursing workflows.(Salama et al., 2025)

The COVID-19 pandemic has accelerated the application of AI in healthcare, particularly in remote monitoring and telehealth services, underscoring the urgent need to prepare nursing students with relevant AI knowledge and skills (Mahalakshmi et al., 2023). This rapid transformation raises complex ethical, professional, and practical challenges that require comprehensive understanding by nursing professionals to ensure AI tools support human-centered care while safeguarding patient privacy and autonomy (Adomat, 2024)

Globally, nursing curricula are only beginning to incorporate AI literacy. (Buchanan et al., 2021b) documented significant variability in AI content within nursing education across North America and Europe, with many programs lacking dedicated modules on AI ethics, data handling, and practical applications. Ensuring nurses are competent in AI tools is critical not only for clinical effectiveness but also for addressing ethical concerns such as bias in AI algorithms and maintaining trust in nurse-patient relationships (Rony et al., 2024b)

Moreover, cultural and socioeconomic factors play a significant role in shaping the awareness and acceptance of AI in nursing across different regions. These findings emphasize the importance of context-sensitive strategies to integrate AI education that consider resource constraints, infrastructural challenges, and existing educational frameworks. Partnerships with technology providers, government support, and international collaborations may facilitate increased accessibility and relevance of AI learning for nursing students in diverse settings.(Rizwan et al., 2025)

Methods

A descriptive cross-sectional study design was employed to assess the knowledge of Artificial Intelligence (AI) among undergraduate nursing students at the College of Nursing, Jinnah Hospital, Lahore, Pakistan. The study was conducted over four months. The target

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population consisted of BSN students enrolled in the second, third, and fourth academic years. A convenience sampling technique was used to recruit eligible participants who were present during data collection and willing to participate. The sample size was calculated using the single population proportion formula, considering a 41.8% estimated proportion, 95% confidence level, and 5% margin of error. After applying the finite population correction for a target population of 293 students, the final sample size was calculated as 164 participants. Students on leave, internship nurses, postgraduate nursing students, and those unwilling to participate were excluded.

Data Collection Procedure

Data were collected using an adopted structured questionnaire based on Habib et al. (2024). Before data collection, participants were informed about the study objectives, procedures, potential risks, and benefits. Informed consent was obtained, and voluntary participation was ensured. The questionnaire consisted of two main sections: demographic characteristics, including age and educational level, and knowledge regarding Artificial Intelligence. Eligible students completed the questionnaire independently. Participants were informed of their right to withdraw at any stage without consequences. Completed questionnaires were checked for completeness, coded, and securely maintained to ensure confidentiality.

Data Analysis Procedure

The collected data were entered, cleaned, coded, and analyzed using the Statistical Package for Social Sciences (SPSS), version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize demographic characteristics and AI knowledge scores. Participants' knowledge levels were categorized as poor, moderate, or good according to the predefined scoring criteria. Inferential statistics, particularly the Chi-square test, were applied to examine associations between demographic characteristics and knowledge levels. A p-value of less than 0.05 was considered statistically significant.

Results

Demographic Analysis

Table 1 shows the demographics and AI-related features of the study participants. About half of the respondents were aged 21-22 years (54.9%, n = 90), and 41.5% (n = 68) were aged 19-20 years. Thus, the participants in this study were predominantly young adult nursing students.

Most participants were in the 4th Year BSN (37.2%, n = 61), 2nd Year BSN (35.4%, n = 58), and 3rd Year BSN (27.4%, n = 45) programs. Social media was the primary source of information on artificial intelligence as indicated by 79.3% (n = 130) of the participants. Other sources included media (6.7%, n = 11), university/workplace (6.0%, n = 10), web browsing (4.3%, n = 7), friends and family (3.7%, n = 6) and other sources. In addition, more than half of the participants (54.3%, n = 89) had not participated in any AI-related formal sessions, and 45.7% (n = 75) had participated in formal artificial intelligence sessions while in the course of their studies.

Table 1 Demographic and Artificial Intelligence-Related Characteristics of Participants

Variable	Category	Frequency (n)	Percentage (%)
Age (Years)	19–20	68	41.5
	21–22	90	54.9
Year of Study	BSN 2nd Year	58	35.4
	BSN 3rd Year	45	27.4
	BSN 4th Year	61	37.2
Source of Information About AI	Social media	130	79.3
	Media	11	6.7
	Web Browsing	7	4.3
	Friends/Family	6	3.7
	University/Workplace	10	6.0
Attendance of Formal AI Sessions	Yes	75	45.7

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	No	89	54.3

The age distribution showed that more than half of the participants (54.9%, n=90) were between 21–22 years, while 41.5% (n=68) were aged 19–20 years. This indicates that the majority of respondents were young adult nursing students. The results showed nursing students had different levels of knowledge and understanding of AI. They reported that less than half (45.7%, n=75) had been to an AI-related formal session. In comparison, 54.3% (n=89) had not been formally trained. 79.3% (n=130) considered themselves skilled at using technology. More than half (52.4%, n=86) were knowledgeable about AI and self-reported knowledge of related concepts, machine learning and deep learning. 89.0% (n=146) reported knowledge of at least one of the AI tools that they experienced, 89.6% (n=147) had a general knowledge of AI, and 85.4% (n=140) were knowledgeable of the AI tools that can be used in nursing. In addition, 66.5% (n=109) reported knowledge of the ongoing research and AI in the nursing field. The reported familiarity and knowledge of AI tools imply that nursing students are knowledgeable of AI, but have not been formally trained.

Table 4.2 Knowledge and Awareness of Artificial Intelligence Among Nursing Students

Variable	Yes n (%)	No n (%)
Attended formal AI sessions	75 (45.7)	89 (54.3)
Technologically adept	130 (79.3)	34 (20.7)
Aware of AI-related technical terms	86 (52.4)	78 (47.6)
Familiar with everyday AI applications	146 (89.0)	18 (11.0)
Understand artificial intelligence	147 (89.6)	17 (10.4)
Understand AI applications in nursing	140 (85.4)	24 (14.6)
Aware of current AI developments in nursing	109 (66.5)	55 (33.5)

As indicated in Fig 1, a substantial majority of participants (79.3%, n = 130) considered themselves technologically adept, demonstrating confidence and proficiency in using modern technology. In contrast, 20.7% (n = 34) reported not feeling technologically proficient. This positive self-assessment suggests a favorable foundation among nursing students for adopting and engaging with artificial intelligence tools in both academic and clinical contexts.

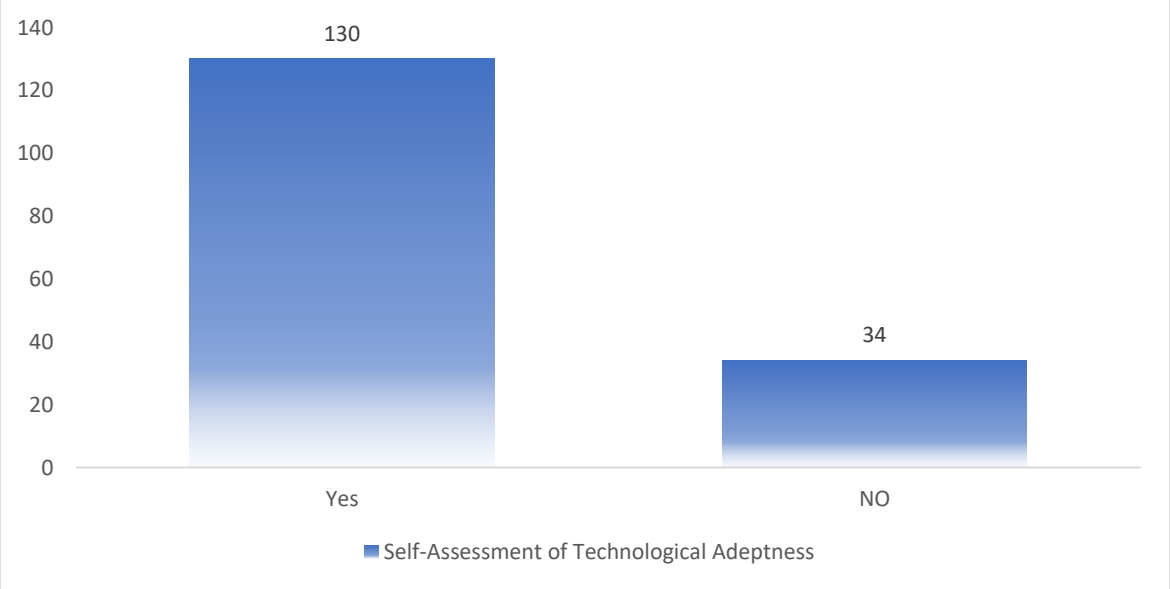


Fig 1 Self-Assessment of Technological Adeptness

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As shown in Fig 4.6, just over half of the participants (52.4%, n = 86) reported being aware of technical terms related to artificial intelligence, such as machine learning and deep neural networks, while 47.6% (n = 78) indicated a lack of familiarity with these concepts.

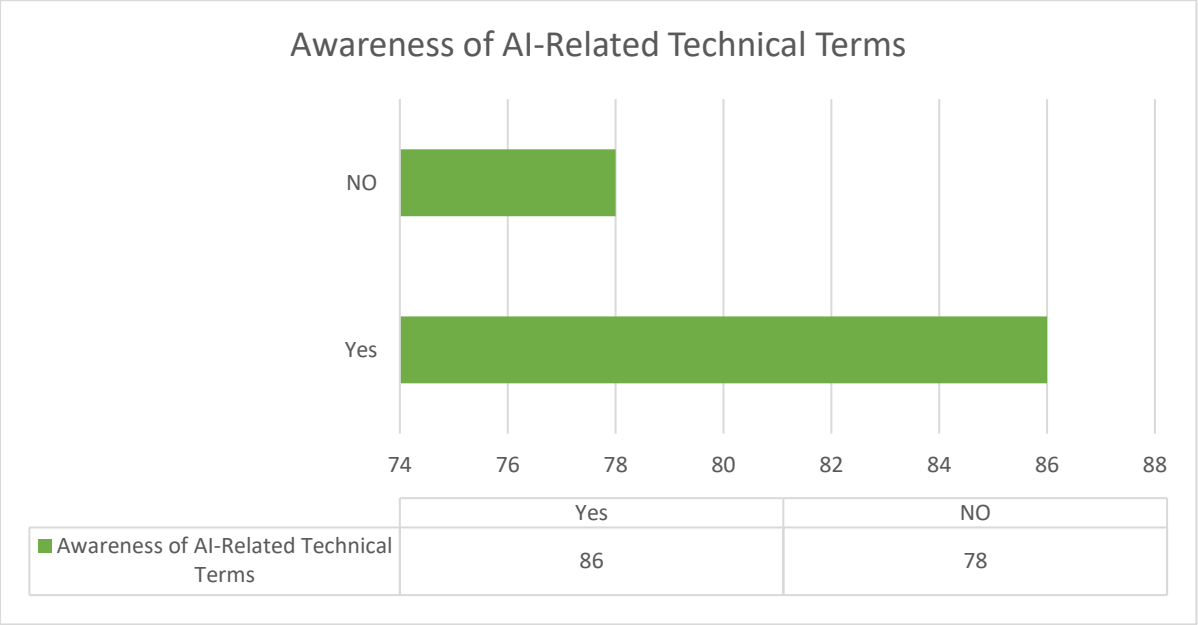


Fig 2Awareness of AI-Related Technical Term

As presented in Fig 3, a vast majority of participants (89.0%, n = 146) reported familiarity with everyday applications of artificial intelligence, such as speech or text recognition and email spam filters. Conversely, 11.0% (n = 18) were not familiar with these AI applications commonly encountered in daily life. This high level of familiarity indicates that most nursing students recognize the practical presence of AI technologies in their everyday environments.

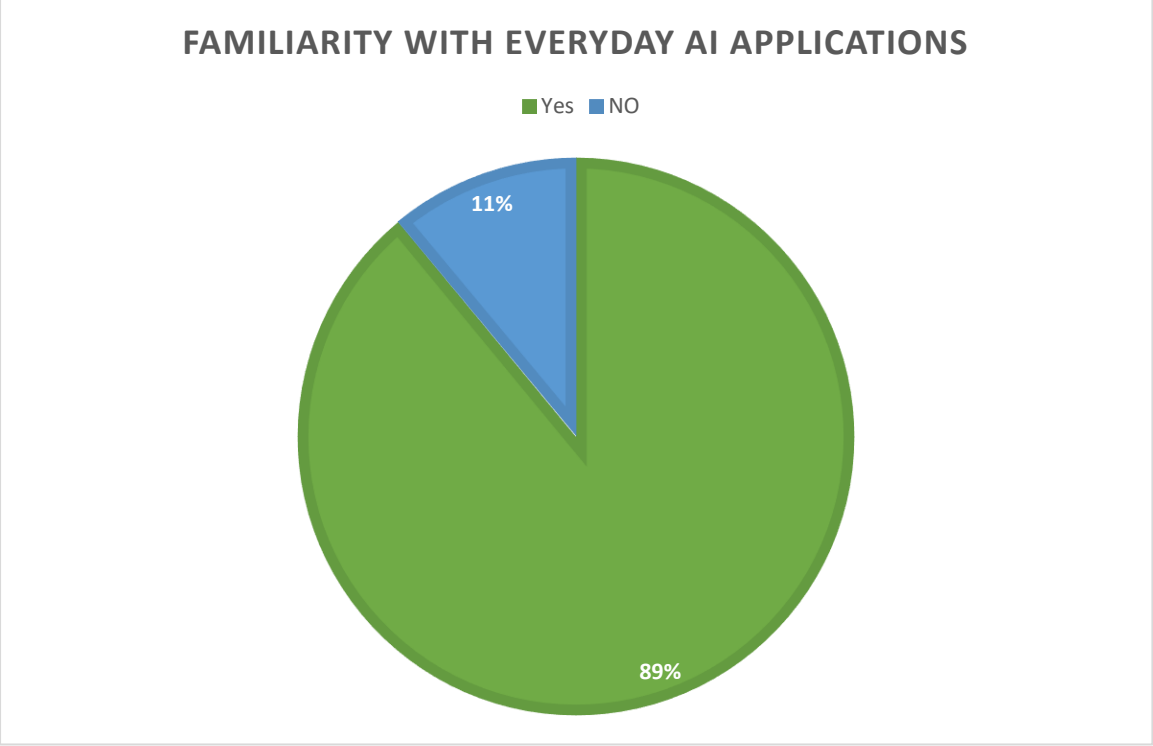


Fig 3 Familiarity with Everyday AI Applications

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As indicated in Fig 4., a significant majority of participants (89.6%, n = 147) reported that they understand artificial intelligence, while 10.4% (n = 17) indicated a lack of understanding. This high level of self-reported understanding suggests a solid foundational knowledge of AI among the nursing students surveyed.

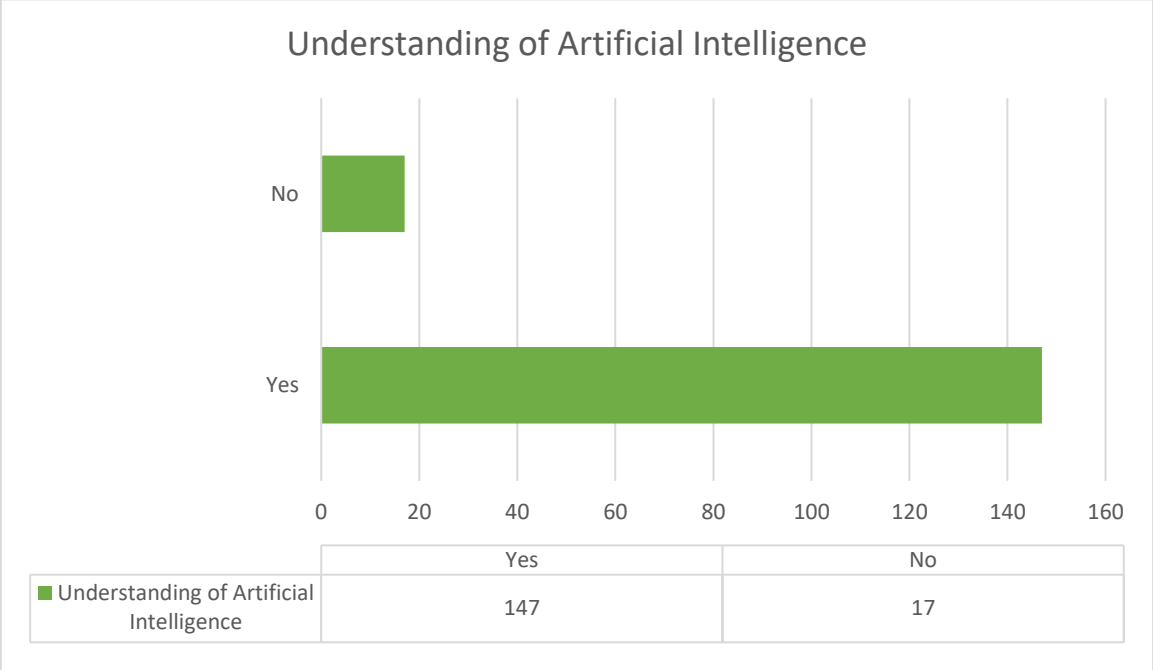


Fig 4. Understanding of Artificial Intelligence

The results showed that nursing students had favorable views and attitudes towards artificial intelligence. The largest group of respondents believed that AI will change nursing practice (90.9%, n=149), will change the way we care for patients (81.1%, n=133), will change the way nurses make decisions (94.5%, n=155), and will change the health of populations (91.5%, n=150). Also, 87.8% (n=144) thought AI could potentially lower the financial costs of healthcare. Acceptance of the usage of AI in nursing practice was found in the majority of the sample (89.0%, n=146). An even larger group (92.1%, n=151) thought that the development of medical AI ethics will safeguard the use of AI in medical care. From the data, there is an overall belief, approval, and hope that AI will support and strengthen nursing.

Table 4.3 Perceptions and Attitudes Toward Artificial Intelligence in Nursing

Statement	Agree n (%)	Disagree n (%)
AI will revolutionize nursing	149 (90.9)	15 (9.1)
AI can improve patient care	133 (81.1)	31 (18.9)
AI can improve nursing decision-making	155 (94.5)	9 (5.5)
AI can improve population health	150 (91.5)	14 (8.5)
AI will reduce healthcare costs	144 (87.8)	20 (12.2)
Acceptance of AI in nursing	146 (89.0)	18 (11.0)
Medical ethics toward AI are necessary	151 (92.1)	13 (7.9)

Knowledge of artificial intelligence among nursing students by year of study was assessed using the Chi-square test. It was found that the highest good knowledge of artificial intelligence was among the BSN 4th year (65.6%, n=40), followed by BSN 3rd year (44.5%, n=20), and BSN 2nd year (29.3%, n=17) students. On the other hand, BSN 2nd year students (24.1%, n=14) had the highest poor knowledge of artificial intelligence, compared to BSN 3rd year

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(13.3%, n=6) and BSN 4th year students (4.9%, n=3). The Chi-square test indicated a statistically significant relationship between the year of study and the knowledge level of artificial intelligence (χ^2 = 21.47, df = 4, p = 0.001). This means that students in the higher academic year were more knowledgeable of artificial intelligence than those in the lower academic year.

Table 3 Association Between Year of Study and Knowledge Level of Artificial Intelligence Among Nursing Students

Year of Study	Poor Knowledge n (%)	Moderate Knowledge n (%)	Good Knowledge n (%)	Total n (%)
BSN 2nd Year (n=58)	14 (24.1)	27 (46.6)	17 (29.3)	58 (100)
BSN 3rd Year (n=45)	6 (13.3)	19 (42.2)	20 (44.5)	45 (100)
BSN 4th Year (n=61)	3 (4.9)	18 (29.5)	40 (65.6)	61 (100)
Total	23 (14.0)	64 (39.0)	77 (47.0)	164 (100)

χ^2 = 21.47
df = 4
p = 0.001

Discussion

Nursing students between the ages of 18 and 22 made up the study's sample, indicating that the participants were early-stage learners. These findings are consistent with the study conducted by Abd El-Maksoud (2024) We also assessed the attitudes and knowledge of undergraduate nursing students, mostly those between the ages of 18 and 23. The significance of comparing knowledge levels across student populations in both research is supported by this age group similarity.
(Abd El-Maksoud, 2024)

Similarly, a study by Habib et al. (2024) found that most of their participants were medical students between the ages of 18 and 25. According to their findings, which are consistent with the demographics of the current sample, young, early-career people are becoming more familiar with conversations on artificial intelligence in healthcare revealed that the bulk of their participants were 18–25-year-old healthcare students. Their findings, which are consistent with the demographics of the current sample, highlight how young, early-career people are becoming more familiar with conversations on artificial intelligence in healthcare..(Habib et al., 2024)

Only female individuals were included in this study. On the other hand, Tuncer examined nurses' opinions regarding ChatGPT and AI in a sample that had both male and female participants, with roughly 40% of the sample being male. Because of the more balanced perspective this gender variety provides, the results are less directly comparable to the current cohort of only women.(Tuncer and Tuncer, 2024).

According to the results of the current study, every participant came from the public sector College of Nursing at UCHS Lahore. Though it may restrict generalizability to students from private or diverse institutional backgrounds, this uniform affiliation provides targeted insights into a particular academic environment. Buchanan et al. (2021a) , on the other hand, included research from both public and private universities in North America and Europe in their scoping review of AI in nursing education. In contrast to the current study's single-institution sample, the diversity of institutional affiliation introduces larger variability in AI exposure and resources.
(Buchanan et al., 2021a)

With little assistance from official academic or professional settings, the majority of survey participants stated that social media was their main source of information about artificial intelligence. This demonstrates the limited institutional integration of AI education and emphasizes the expanding influence of unofficial internet platforms in influencing student nurses' awareness of AI. These results are in line with Habib et al. (2024) research

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showing that the majority of Pakistani healthcare participants (78.7%) have never attended any official sessions or training in artificial intelligence during their academic or professional careers. According to the survey, rather than through official educational programs, AI expertise was mostly learned informally through internet platforms..(Habib et al., 2024)

According to our findings, a significant number of survey participants (76.8%) thought that undergraduate artificial intelligence instruction should be offered, underscoring the idea that early exposure would better prepare aspiring nurses for clinical practice including technology. This desire is a reflection of nursing practitioners' and trainees' increased understanding of the need to adapt the curriculum to satisfy changing healthcare demands. Amiri et al. (2024) systematic review, which looked at the opinions of more than 5,700 healthcare students, including those with backgrounds in nursing, medicine, and dentistry, about the use of AI in the classroom, revealed a similar trend. Students' strong support for the early integration of AI concepts into their academic curriculum was highlighted by the study, demonstrating a shared understanding of the potential application of AI in clinical decision-making..(Amiri et al., 2024)

According to our survey, 54.3% of participants received no structured training, whereas 45.7% of participants said they had attended formal AI sessions when they were enrolled in school or working. This identifies a significant gap in formal AI education and emphasizes how important it is to improve curriculum design by including organized, expert training opportunities. Although 84.5% of nursing students at Palestinian institutions were aware of AI technology, almost 70% had not gotten any official training on ChatGPT or artificial intelligence, according to a closely connected study. Additionally, according to the Palestinian survey, 79% of students supported the inclusion of AI in courses, indicating a similar sense of optimism and recognition of AI's increasing significance in healthcare..(Salama et al., 2025).

The study by (Habib et al., 2024) revealed a substantially lower exposure rate among healthcare professionals and students in Pakistan, in contrast to the current study, which discovered that 45.7% of participants had attended official AI training sessions. An even more significant gap in AI education is indicated by their findings, which show that a startling 78.7% of participants had never received any official AI training throughout their studies or work..(Habib et al., 2024).

According to our study's findings, a sizable majority of participants (79.3%) thought of themselves as technologically literate, exhibiting competence and confidence when utilizing contemporary technology. On the other hand, 20.7% said they didn't feel tech-savvy. According to this positive self-evaluation, nursing students have a good basis for implementing and using AI techniques in both academic and clinical settings. The results of our study are consistent with a study by Labrague et al. (2023) that found that 79.3% of participants had a favorable self-assessment of technical adeptness, indicating strength in digital confidence. Additionally, same study showed that preparedness to interact with AI was significantly predicted by self-rated technological skill ($\beta = 0.170$, $p = 0.014$). This bolsters the notion that a key component of a successful AI adoption in nursing is students' confidence in their fundamental technological abilities.(Labrague et al., 2023).

According to our research, the overwhelming majority of participants (89.0%) said they were familiar with commonplace AI applications like email spam filters and speech or text recognition. On the other hand, 11.0% of respondents were unfamiliar with these AI apps that are frequently used in daily life. This high degree of familiarity suggests that the majority of nursing students are aware of the usefulness of AI technologies in their daily lives. Similar to your finding that 89.0% of nursing students were familiar with common AI tools like speech recognition and spam filters, a study by . Sami et al. (2025) found that 84.7% of participants were aware of AI and its applications in medicine, indicating a widespread recognition of AI's presence in daily routines. (Sami et al., 2025)

According to our survey, the vast majority of participants 96.3% agreed that discussing and learning about artificial intelligence is beneficial, while only 3.7% disagreed. This overwhelmingly positive outlook demonstrates how nursing students understand the value of AI knowledge for both their academic and professional growth.

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Similarly, a study by Migdadi et al. (2024) revealed that 83.3% of participants recognized the growing significance of AI in healthcare systems, while 74.2% of participants thought that learning about AI will help them advance professionally. (Migdadi et al., 2024).

According to our survey, the vast majority of participants (89.6%) said they understood artificial intelligence, while 10.4% said they didn't. This high degree of self-reported comprehension indicates that the nursing students assessed had a strong fundamental understanding of AI. In contrast, the majority of participants in the study Amiri et al. (2024) only showed basic or moderate acquaintance with artificial intelligence, with only 44% demonstrating medium to high knowledge. (Amiri et al., 2024). However, just 19.3% of undergraduate participants in Wang et al. (2024) study felt confident about AI's particular applications in nursing, and only 35.1% reported having a complete or almost complete" comprehension of AI (Wang et al., 2024).

The vast majority of participants in our study (85.4%) said they understood how AI is used in nursing, demonstrating a high level of awareness regarding the ways in which these technologies are incorporated into clinical care. However, Wang et al. (2024) found that among students and healthcare professionals, just 19.3% of undergraduate nursing students comprehended the nursing applications of AI, and only 35.1% of them reported having a complete or almost complete comprehension of the technology. (Wang et al., 2024)

Our study's results showed that most participants had a positive view of the profession's adoption of technology, with the majority perceiving AI as revolutionary in nursing (90.9%) and considering its use to improve patient care (81.1%). Similarly, even though just 25.2% of nurses considered themselves AI specialists, a research by Sommer et al. (2024) revealed that 65.7% of nurses saw AI as an opportunity, especially for applications like patient monitoring and documentation (Sommer et al., 2024)

According to the findings of our study, 91.5% of participants thought AI might improve population health outcomes, and 94.5% of participants agreed that AI could improve nurse decision-making. These results show that nursing students have a high level of faith in AI's potential for both clinical and public health applications. According to a research by Rony et al. (2024a) , many people appreciated AI as a tool to assist patient-centered care, improve diagnostic accuracy, and strengthen clinical judgment. AI-enhanced electronic health records were highlighted. This consistency implies that AI's ability to improve clinical judgments and public health outcomes is anticipated by both novice and seasoned nurses (Rony et al., 2024a).

The majority of participants (62.2%) perceive AI as reducing the burdens of healthcare workers, although a sizable minority are still doubtful. The majority of participants (87.8%) think AI can lower healthcare expenses. These opinions show hope for AI's financial effectiveness and ability to assist workloads, but they also provide cautious details about its real-world applications. Students' opinions of AI reducing expenses and easing strain were also supported by Eanes (2025) study, which found that note-taking time was decreased by 20% and after-hours work was lowered by 30% .(Eanes, 2025)

According to our study's findings, 42.1% of participants disagreed with the idea that AI will alter nursing jobs, while more than half (57.9%) agreed, suggesting a moderate level of openness to changing professional obligations as a result of AI integration. However, a research by Almagharbeh et al. (2025) revealed that although many practicing nurses acknowledged AI as a way to increase efficiency, their optimism was tempered by ethical concerns, worries about losing their jobs, a lack of training, and a poor match with workflow design. In one of the study sites, some even observed that AI "added work rather than reducing it." (Almagharbeh et al., 2025)

The majority of participants (75.6%) disputed that AI will replace nursing occupations, according to our study's findings, indicating trust in preserving crucial human traits like empathy and critical thinking. Nonetheless, a sizable minority (24.4%) expressed worry about losing their jobs, underscoring the complex viewpoints of aspiring nurses. The study by Mohanasundari et al. (2023) comes to the conclusion that although AI can assist with clinical tasks it cannot take the place of their position as patient advocates and caretakers.

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While acknowledging that AI can increase efficiency, it maintains that human-specific duties such as empathy, critical thinking, and patient advocacy still exist (Mohanasundari et al., 2023)

The vast majority of participants (89.0%) indicated that they were in favor of incorporating technological advancements into their future careers and that they accepted AI in nursing. This indicates that UCHS Lahore student nurses are highly responsive. According to a study by , Al Omari et al. (2024) over 65% of participants had favorable opinions on the use of AI in healthcare and education. These students highlighted how AI may help with clinical decision-making, improve healthcare delivery, and improve diagnostics.(Al Omari et al., 2024)

The majority of participants (58.5%) recognized that AI in nursing carries medical ethical issues, indicating that they are aware of both the potential drawbacks and the exciting potential advantages. The larger scoping review, on the other hand, outlines significantly more systemic and depth-level issues, such as regulatory errors, privacy risks, and possible loss of clinical autonomy, according to Botha et al. (2024b). These findings suggest that deeper, systemic problems require crucial attention in educational and policy contexts, and that students' ethical awareness may reflect superficial worries.(Botha et al., 2024b).

As a sign of the ethical urgency surrounding AI integration in healthcare, a substantial proportion of participants (70.7%) think that medical ethical issues pertaining to AI in nursing "are waiting to be addressed." Likewise, a study by Botha et al. (2024a) revealed serious worries regarding prejudice or discrimination in clinical AI use, insufficient regulation, data security and privacy problems, and unanticipated AI failures. (Botha et al., 2024a).

Conclusion

This study assessed the knowledge and perceptions of artificial intelligence (AI) among nursing students at Jenah Hospital Lahore. The findings indicate that the majority of nursing students, particularly those aged 20 to 22 years, have a positive attitude towards AI and its potential to revolutionize nursing practice. A significant portion of students recognizes the importance of learning about AI, with most expressing the view that early integration of AI into nursing education would be beneficial. Despite their general enthusiasm, the students demonstrated varying levels of knowledge about AI, with most relying on informal sources like social media for information. The study also highlighted the perceived necessity of medical ethics in AI applications within nursing, with many students acknowledging potential ethical risks. These results underscore the need for enhancing formal AI education within nursing curricula to better prepare students for future healthcare environments

RECOMMENDATIONS

1. **Integration of AI in Nursing Curriculum**: Nursing education programs should incorporate AI training from the undergraduate level, ensuring that students develop the necessary knowledge and skills to work effectively in an AI-driven healthcare environment. Early exposure to AI concepts, tools, and applications will better equip future nurses to integrate these technologies into patient care.
2. **Enhanced Formal AI Education**: Institutions should focus on increasing the availability of formal training in AI technologies through workshops, seminars, and integrated coursework. Collaborations with AI experts and healthcare technology providers could be valuable in designing comprehensive educational modules.
3. **Ethics Training**: Given the ethical concerns raised by participants, nursing programs should prioritize training on the ethical implications of AI in healthcare. This would include addressing issues related to privacy, security, decision-making, and the potential for bias in AI algorithms.
4. **Further Research**: Future studies should expand the sample to include male nursing students and those from various healthcare institutions. Longitudinal studies are also recommended to track the development of AI knowledge and attitudes over time, as well as its practical applications in nursing practice.
5. **Fostering AI Awareness through Social Media**: Given the widespread use of social media as a source of information, nursing schools and healthcare organizations should

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leverage these platforms to raise awareness about the benefits and challenges of AI in healthcare, providing accurate and credible content.

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