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Nursing Students' Knowledge and Attitude Regarding Integration of Artificial Intelligence in Healthcare

Mona M Abd El-Maksoud
Assistant Professor of Community Health Nursing, Nursing College, King Khalid University, Saudi Arabia, and Faculty of Nursing, Helwan University, Egypt

Abstract: - The integration of Artificial intelligence (AI) in healthcare has the potential to revolutionize healthcare delivery, improve patient outcomes, and make healthcare more accessible and effective. This study aims to assess the knowledge and attitude of nursing students regarding the integration of artificial intelligence in health care. Methodology: A cross-sectional design was used in the study. A convenience sample of 220 nursing students was selected from the Nursing College at King Khalid University. The questionnaire link was emailed to nursing students. It captured the participants' sociodemographic data their knowledge about AI, the advantages of AI, Risks of AI, and application of AI in health care, sources of information, barriers to learning AI, as well as their attitudes related to the application of AI in health system. Results: The study results stated that 68.2 % of the nursing students had adequate knowledge about AI, 67.3% of students had a "positive" attitude towards AI, more than 38.6% of students their source of knowledge about Artificial Intelligence was self-taught, while 36.6 % they have no knowledge bout AI. and 40.8% of students described their knowledge about Artificial intelligence as basic understanding. Conclusion and Recommendation: The majority of nursing students who participated in this study had adequate knowledge regarding AI, the main sources of their knowledge were self-taught, and their understanding of AI was basic, as well as they had a positive attitude about integrating AI in health care. Thus, it is essential for integrating AI in the nursing curriculum to develop a good understating of AI to enlighten of its uses in their daily practice.

***Keywords*:** Artificial intelligence, Knowledge, Attitude, Nursing students, Healthcare

1. Introduction

Artificial intelligence (AI) is a broad field that encompasses many technologies, methodologies, and approaches. AI technologies are used in a wide range of applications, from everyday tasks like route finding on Google Maps to complex tasks like diagnosing diseases in healthcare.[2] AI technologies include machine learning, natural language processing, neural networks, and more. AI systems can process data and vast amounts of data, make decisions based on that data, and adapt and improve their performance over time. The development and application of AI continue to evolve rapidly, with ongoing advancements in algorithms, computing power, and data availability driving progress in the field.[2]

The importance of Artificial Intelligence (AI) in healthcare cannot be overstated, as it brings about numerous benefits and advancements in the field. AI is a transformative force in healthcare that can enhance patient care, improve outcomes, increase efficiency, and drive innovation. As technology continues to advance, the role of AI in healthcare is expected to expand further, revolutionizing the way healthcare is delivered and experienced.[3]

Artificial Intelligence (AI) holds significant importance for nurses in various ways enhancing their roles and improving patient care. AI can assist nurses by providing accurate and rapid diagnostic support, helping them make quicker and more accurate assessments of patient conditions. AI can help nurses tailor care plans to individual patients by analyzing patient data and providing insights into personalized treatments and interventions.[4] AI-powered clinical decision support systems can provide real-time information and recommendations to nurses at the bedside, helping them make informed decisions about patient care. AI can

automate routine administrative tasks, such as data entry and documentation, allowing nurses to spend more time with patients and focus on direct care. AI can assist in medication management, including dosage calculations, drug interactions, and medication administration, reducing medication errors. [5]

Nurses can remotely monitor patients with chronic conditions or those in home care settings using AI-enabled wearable devices, ensuring timely interventions, and reducing hospital readmissions. AI-powered chatbots and virtual assistants can help nurses communicate with patients and provide information and support, enhancing patient engagement and education AI can predict patient deterioration or complications, enabling nurses to intervene early and prevent adverse events.[6] Overall, AI empowers nurses to provide higher-quality care, reduces their administrative burden, enhances patient safety, and offers valuable tools for continuous learning and improvement in the healthcare field. As AI continues to evolve, its integration into nursing practice is expected to become increasingly vital for the delivery of efficient and effective healthcare services.[7]

Justification of study

The integration of AI in healthcare is expected to continue to grow, as it has the potential to revolutionize healthcare delivery, improve patient outcomes, and make healthcare more accessible and cost-effective. Integrating AI into healthcare also is necessary for nurses which allows them to acquire new skills, such as understanding and working with AI-driven tools and technologies. So, Nursing students should recognize that their education should include training on AI applications in healthcare to prepare them for the evolving healthcare landscape.

2. Objective

This study aims to assess the knowledge and attitude of nursing students regarding the integration of artificial intelligence in health care.

3. Methods

Design: Cross-sectional design to explore the Knowledge and attitude of nursing students regarding the integration of artificial intelligence in healthcare

Settings and subjects: A convenience sample of 220 nursing students was selected from the Nursing College at King Khalid University.

Sample size: Based on the number of nursing students in the Nursing College at King Khalid University was 486 students and according to Solvin's formula for sample size calculation the required sample was 220 members. [8]

$n= N/1+N(e)^2= 220$

n= Corrected sample size.

N = Population size.

e = Margin of error, and e = 0.05 based on the research condition at a confidential level of 95%

Instruments: after reviewing past and currently available literature and the different studies related to integrating artificial intelligence in health care to get a clear picture of the research problem and develop the study tools for data collection. The questionnaire included four sections, the first section includes sociodemographic data such as age, sex, and year of study, the second section includes knowledge about AI; the advantages of AI, Risks of AI, and application of AI in health care, sources of information, barriers of learning AI, then the last section include attitude related to the application of AI in the health system. The study tools were tested for validity through the opinions of a panel of experts in different nursing specialties.

Pilot study: A pilot study was done on 10% of the study sample to evaluate tools' clarity, applicability, and feasibility and to estimate the time needed for filling in the tools, and these students were excluded from the sample size.

Ethical consideration: The study was carried out after getting approval from the Research Ethics Committee at King Khalid University (ECM#2023-906), and then obtaining official permission from the Nursing College Dean; the aim and expected outcomes of the study were explained clearly, after that, all students provided electronic informed consent before sharing in the study.

Field of work

Nursing students were invited to participate in the online survey via the Google Forms link. This link, which is sent to all nursing students via their university email, provides detailed information about the aims of the study and asked for consent to participate in the study. Participants had to click to confirm their consent to proceed to the survey and were informed that completion of the survey also implied consent to participate in the study. The survey was completely anonymous, and participants were informed that they could withdraw at any time before submitting. The data were obtained over two months (October to November 2023).

Statistical Design:

The study data was downloaded from Google Forms into Microsoft Excel and then transferred into SPSS software version 22. The researchers examined all variables for missing data and outliers. Descriptive statistics were used such as frequency, and percentage. A Chi-square test was used to detect the relation between the variables. A significant level value was considered when the p-value ≤0.05.

4. Results

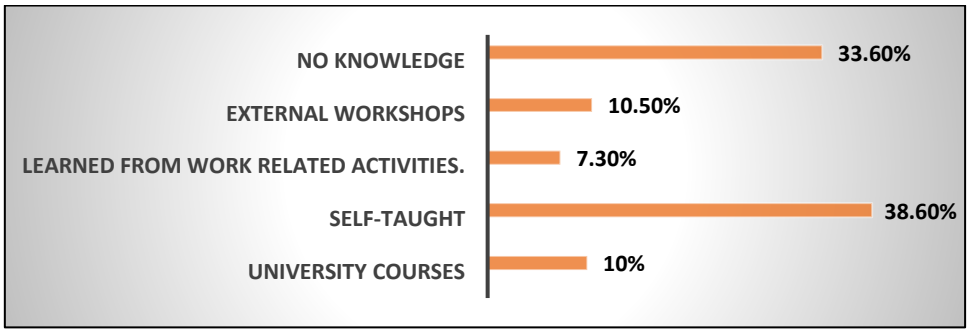

Figure (1): Percentage of Students' Sources of Knowledge about Artificial Intelligence (No. =220).

Figure (1) reflects that the highest percentage in the figure represents students who are self-taught in AI, and who have no knowledge bout AI (38.6%, and 33.6%, respectively). On the other hand, University courses account for 10% of the students' sources of knowledge.

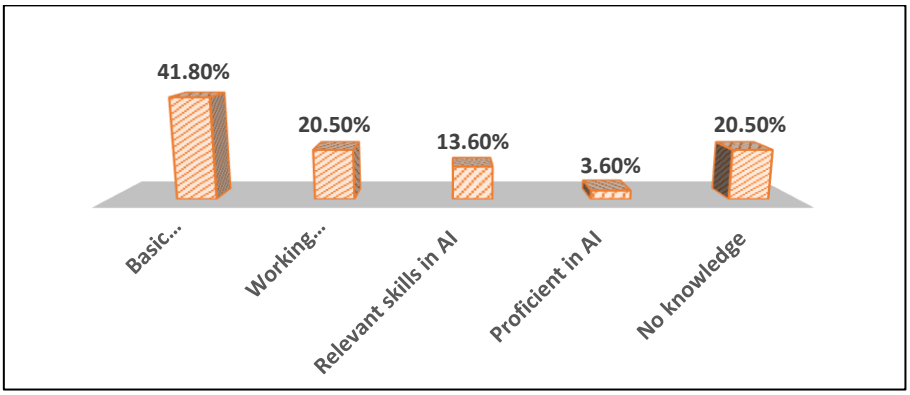

Figure (2): Percentage of Student own descriptions of their knowledge about Artificial intelligence (No. =220).

Figure (2) shows 41.80%, which corresponds to the category "Basic understanding." On the other hand, the lowest result is 3.60%, which corresponds to the category "Proficient in AI."

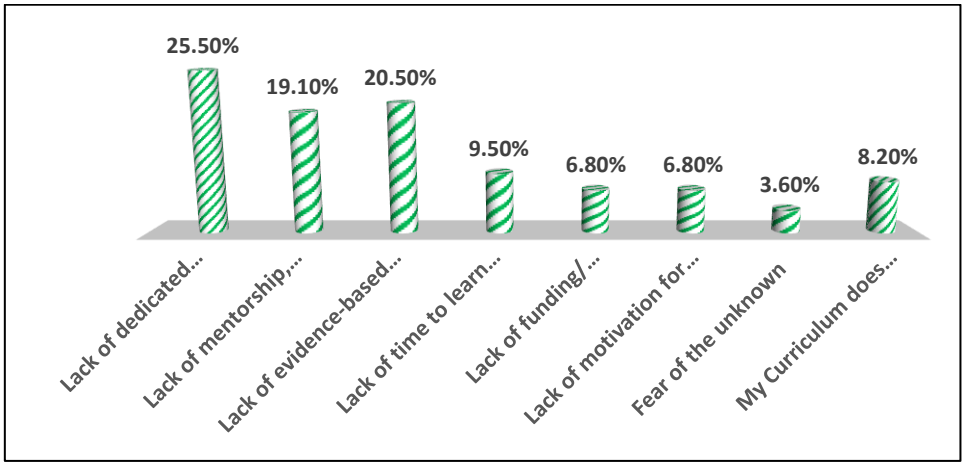

Figure (3): Percentage of Students' Main Barriers Preventing them from Learning about Artificial Intelligence (No. =220).

Figure (3) shows that about a quarter of students correspond to the barrier "Lack of dedicated courses and learning materials." lack of mentorship, and lack of evidence-based (25.50%, 19.10%, and 20.20%, respectively), Otherwise, the lowest percentage in Figure (3) is 3.60%, which corresponds to the barrier "Fear of the unknown."

Table (1): Total Score of Students' Knowledge, and Attitude regarding AI. (No. =220).

Domain	No.	%
Knowledge		
- Adequate	150	68.2
- Inadequate	70	31.8
Attitude		
- Positive	148	67.3
- Negative	72	32.7

Table (1) reflects the percentages that provide a snapshot of the distribution of knowledge, Perception attitude, and practice within the studied sample. It is worth noting that more than half 68.2 % of the sample displayed adequate knowledge about AI, and 67.3% of students have a "positive" attitude towards AI.

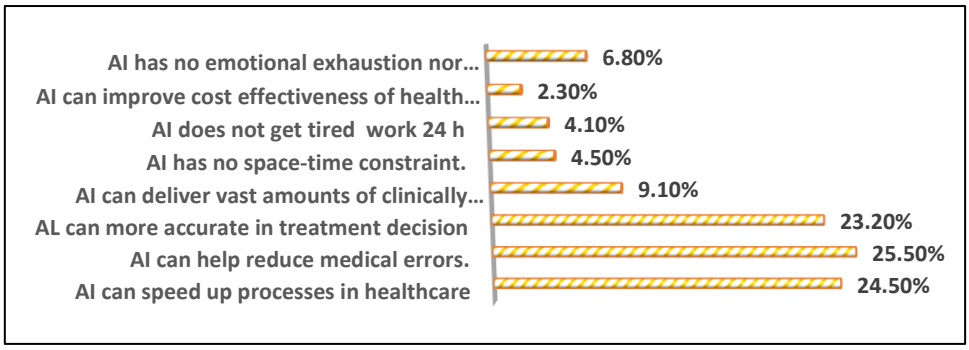

Figure (4): Percentage of Students' opinions about the Advantages of Using Artificial Intelligence (No. =220).

Figure (4) indicates that the highest percentage is 25.50%, which corresponds to the advantage of "AI can help reduce medical errors." AI can speed up processes in health care (24.5%), and AI can be more accurate in treatment decisions (23.20%). The lowest percentage is 2.30%, which corresponds to the advantage of "AI can improve the cost-effectiveness of healthcare."

Table (2): Percentage Distribution of the Studied Sample Attitude Scores Integration of Artificial intelligence in Health Care (No. =220).

Attitudes Items	Agree	Disagree	X^2 P-value
1. AI has useful applications in the medical field	31(14.1)	30(13.6)	53.299 0.000**
2. Do you think AI should be included in the nursing curriculum as well as specialist training	41(18.6)	29(13.2)	143.342 0.000**
3. Do you agree that the diagnosis and assessment ability of AI is superior to the clinical experience of a health practitioner	41(18.6)	29(13.2)	40.929 0.001**
4. Do you think AI aids health practitioners in the diagnosis and assessment of patients	45(20.5)	48(21.8)	82.443 0.000**
5. AI could replace your job	33(15.0)	66(30.0)	41.065 0.000**
6. AI in healthcare is reliable.	25(11.4)	64(29.1)	41.349 0.000**
7. AI can help relieve healthcare workers' stress.	43(19.5)	42(19.1)	149.960 0.000**
8. AI increases the value of the health profession	31(14.1)	44(20.0)	80.128 0.000**
9. AI reduces errors in medical practice.	33(15.0)	39(17.7)	51.151 0.000**
10. AI enables healthcare professionals to make more accurate decisions.	36(16.4)	44(20.0)	61.303 0.000**
11. AI facilitates patients' access to the service.	47(21.4)	27(12.3)	57.924 0.000**
12. AI facilitates healthcare professionals' access to information.	60(27.3)	26(11.8)	66.701 0.000**
13. AI increases patients' confidence in healthcare	62(28.2)	26(11.8)	73.739 0.000**
14. AI facilitates patient education.	48(21.8)	16(7.3)	98.498 0.000**
15. AI affects the relationship between healthcare professionals and the patient in a positive way	2(0.9)	17(7.7)	148.909 0.000**
16. AI allows the patient to increase his control over his health	53(24.1)	28(12.7)	99.293 0.000**

A statistically significant p-value >0.001**

On the term of attitude overall, Table (2) indicates that a mix of positive and negative attitudes towards AI in healthcare. While there is general agreement on certain aspects, such as the potential for AI to aid healthcare practitioners, reduce errors, and facilitate access to information and services, there are also areas of disagreement, such as the reliability of AI and the potential for job replacement.

5. Discussion

Generally, the healthcare system faces challenges limited of resources and a shortage of trained manpower, because of these challenges, the countries achieved significant progress in the healthcare indicators, thus Healthcare organizations are using AI to improve the efficiency of all kinds of processes, from back-office tasks to patient care.[9]. Nursing plays a crucial role in the healthcare system by providing direct care to patients and supporting the effectiveness of diagnostic and treatment plans as well as performing daily tasks such as taking vital signs, recording, assessing in physical examination, administering medication, and performing administration works. Therefore, this study explores the perception of nursing students regarding the integration of artificial intelligence in health care.[10]

Our study results stated that more than one-third of students' sources of knowledge about Artificial Intelligence were self-taught. This suggests that a significant portion of the students in the sample have taken the initiative to learn about AI on their own, possibly through online resources, books, or other self-study methods. Also, this may be due to the easy accessibility of the internet and smartphones at hand. On the other hand, University courses account for 10% of the students' sources of knowledge. This suggests that a smaller proportion of students have acquired knowledge about AI through formal education within their university curriculum. The previous results were similar to our results by Abuzaid, et al. [11]; Jindal and Bansal [12] studies found that the majority of students' sources of knowledge about applying AI in health care through the internet and social media. So, from the researchers' point of view, there is a need to enhance the university curriculum to include more comprehensive and up-to-date AI courses. This can help bridge the gap between self-taught knowledge and formal education.

As well as the findings reported that more than forty percent of students describe their knowledge about Artificial intelligence as "Basic understanding." This indicates that a significant number of students have some level of familiarity or foundational knowledge about AI concepts and principles. On the same line, a study done in the United Arab Emirates (UAE) by Abuzaid, et al. [11] reported that most of the nurses who participated in the study their knowledge about Al through self-taught, and 40% of them, their knowledge is basic understanding. Similarly, Sur et al. [13] found that 42% of Indian students had a basic understanding of the integration of AI into health care in dentistry. So, the researchers suggest offering specialized training programs focused on AI applications in healthcare can be beneficial. These programs can cover topics such as AI in diagnostics, treatment planning, patient care, and healthcare management.

Moreover, our results show the fact that 33.6% of nursing students are in the dark about the knowledge and prospects of AI in health care. This result is similar to the findings of Jindal and Bansal [12] study reported that 37. 4% of medical students did not show any knowledge about AI in the medical field. This may explain why the majority of students had not heard about the uses of AI in health care, maybe due to the lack of university courses, workshops, and conferences related to AI. For that researchers recommend organizing workshops and conferences focused on AI in healthcare, inviting experts and professionals to share their knowledge and experiences and introduce dedicated modules that cover the basics of AI, and its applications in healthcare.

Furthermore, our results also found that about a quarter of students correspond that the main barriers preventing them from learning about Artificial Intelligence are a lack of dedicated courses and learning evidence materials and a lack of mentorship and guidance. Similarly, the students from Quarter stated that a lack of mentorship from experts and a lack of dedicated courses are the main barriers to obtaining knowledge about AI.[14] On the other hand, in the Turkish study, participants had more learning materials through attending workshops and scientific conferences related to the uses of AI in health care.[15]. This might be explained by the importance of the academic curriculum of nursing students who had lectures about applied AI in health care practice. Other studies mentioned that the biggest challenges of learning AI among medical students are digitalization and lack of computer knowledge.[16];[12] So, to overcome this problem University can establish a mentorship program that connects students with AI experts connecting students with alumni or industry professionals who have expertise in AI can be highly beneficial and can provide guidance, share insights, and offer career advice in the field of AI.

It is worth noting that more than two-thirds of the sample displayed adequate knowledge and a positive attitude about AI. Similarly, Jindal and Bansal [12] reported that the majority of the students (62.5%) responded that they had some knowledge about AI and were optimistic attitude about the scope of integration of AI in medicine Inconsistences, a previous study done in Pakistan among medical students, by Abid et al.[17] found that the majority of them did not know AI, while they had a positive attitude about integrating it into their curriculums. Indeed, Qatar health science students had adequate knowledge about the significance of using AI in healthcare and most of them had positive attitudes regarding the implementation of AI in healthcare.[14] As well as a study done in Croatia among nursing students in their first year showed that most of them had slightly positive attitudes toward artificial intelligence in nursing.[18] It is worthwhile for nursing students to recognize and embrace the implementation of AI in the health system, which should make it important for nursing colleges to develop strategies to teach AI to nursing students.

In the present study, most of the students indicated that the advantages of using Artificial Intelligence in health care are reduced medical errors, sped up processes in healthcare, and AI can be more accurate in treatment decisions, these findings are in concordance with previous findings of studies done by Ahmed et al.[14]; Hussein et al.[19] stated that artificial intelligence can speed up the healthcare process, and reduce the number of medical errors. The contribution of AI in individual patient care is well recognized in the literature, which involves diagnosis and treatment as well as reducing medical errors and improving health service providers' productivity and efficiency.[20];[21] Emerging AI in nursing practice helps nurses to complete their work and make good clinical decisions, thus improving the quality of patient care. Hence, nurses need to learn deeply how to deal with technology and interact with machine learning to provide efficacy and quality of health care.

Conclusion and Recommendations

Based on the results of this study, it concluded that the majority of nursing students who participated in this study had adequate knowledge regarding AI, and main sources were self-taught their understanding of AI was basic understanding, as well as they had a positive attitude about integrating AI in health care. Develop workshops and training programs about AI and encourage students to attend conferences related to AI, these increase their knowledge and understanding of the integration of AI in health care and nursing practice. Integrate AI in the nursing curriculum to develop a good understating of AI to enlighten of its uses in their daily practice.

Limitation of study: The results could have been different if the study involved more institutions and clinical nurses in addition to using qualitative methods for in-depth information.

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