FOSTERING AI COMPETENCE:
EDUCATING NURSING STUDENTS FOR THE FUTURE

Author's Name Sunil Bhargava[1], Sharda Choudhary [2]

Affiliation:

1. Principal, K.S. Memorial College of Nursing Jodhpur, Rajasthan, India.

2. Senior Nursing Tutor at K.S. Memorial College of Nursing Jodhpur, Rajasthan, India.

Corresponding Author Name and Email ID: Sunil Bhargav, sunilbhargava1985@gmail.com

ABSTRACT

Introduction: The integration of artificial intelligence (AI) into healthcare systems promises transformative advancements in patient care and management. To effectively utilize AI technologies, healthcare professionals, including nurses, must possess adequate knowledge and skills. This study investigates the impact of an educational intervention on nursing students' understanding of AI applications in healthcare, aiming to address the educational needs essential for future nurses in navigating modern healthcare systems. Method: A pre-experimental one-group pre-test post-test research design was employed to assess the effectiveness of the educational intervention. Sixty-four nursing students from K.S. MEMORIAL College of Nursing, Jodhpur, participated in the study. Convenience sampling was used for participant recruitment. Results: The analysis revealed a significant improvement in knowledge scores post-intervention, with 66.66% of participants achieving adequate knowledge compared to 12.5% pre-intervention. Statistical analysis demonstrated a notable increase in mean knowledge scores from 15.52 to 20.83 (p < 0.001), indicating the effectiveness of the education package in enhancing participants' understanding of AI applications in healthcare. Demographic variables such as year of study and previous exposure to AI were significantly associated with pre-test knowledge scores, suggesting their influence on baseline knowledge levels. Conclusion: The study highlights the effectiveness of educational interventions in enhancing nursing students' knowledge of AI in healthcare. It underscores the importance of incorporating AI education into nursing curricula to prepare future nurses for technological advancements in healthcare delivery. While this study provides valuable insights, further research is needed to explore long-term retention of knowledge post-intervention and optimal strategies for integrating AI education into nursing education programs.

Keywords: Artificial intelligence, Healthcare, Nursing education, Educational intervention, Knowledge enhancement.

INTRODUCTION

In recent years, the integration of artificial intelligence (AI) into healthcare systems has promised to revolutionize patient care, diagnosis, treatment, and management. AI applications range from diagnostic algorithms and predictive analytics to robotic surgery systems, offering potential improvements in efficiency, accuracy, and patient outcomes.[1] Within the nursing profession, understanding and leveraging AI technologies are becoming increasingly important as healthcare systems evolve.[2]

The use of artificial intelligence (AI) in healthcare is transforming the industry by enhancing diagnostic accuracy, optimizing treatment plans, and improving patient outcomes. AI's integration into healthcare leverages machine learning algorithms and natural language processing (NLP) to analyze vast amounts of patient data, identify patterns, and assist in early disease detection, such as Alzheimer's, diabetes, cardiovascular diseases, and various cancers.[3] These technologies enable more personalized medicine, allowing for treatment plans tailored to individual patients' needs. AI applications extend to medical imaging and diagnostics, where algorithms can detect anomalies with high accuracy, reducing unnecessary procedures.[4]

Despite the potential benefits of AI in healthcare, there is a recognized need for healthcare professionals, including nurses, to possess adequate knowledge and skills to effectively utilize these technologies. Nursing students, as future frontline healthcare providers, must be equipped with the necessary knowledge and competencies to adapt to technological advancements in healthcare delivery.[5]

This study aims to investigate the impact of an education package on nursing students' knowledge regarding the use of AI in healthcare. Specifically, the study seeks to assess the effectiveness of the education package in enhancing nursing students' understanding of AI applications, their ethical implications, and their integration into clinical practice. Understanding the educational needs of nursing students in relation to AI in healthcare is crucial for curriculum development and preparing future nurses to navigate the complexities of modern healthcare systems. By evaluating the effectiveness of educational interventions, this study contributes to the ongoing discourse on the integration of AI into nursing education and practice.

METHODOLOGY

Research Design:- A pre-experimental one-group pre-test post-test research design was used.

Setting: The study was conducted at K.S.MEMORIAL College of Nursing, Jodhpur.

Participants: Participants were recruited from undergraduate nursing programs at K.S.MEMORIAL College of Nursing, Jodhpur, using convenience sampling methods. A total of

64 nursing students participated in the study. Demographic characteristics of participants, including age, gender, year of study, and previous exposure to AI in healthcare, were collected.

Data collection tool: The data collection tool was a structured questionnaire designed to assess participants' knowledge of AI in healthcare. The questionnaire consisted of multiple-choice questions covering various aspects of AI applications in healthcare. The questionnaire was pre-tested for reliability, yielding a coefficient of around 0.83. Additionally, it was validated by seven experts from the research area.

Data Analysis: Quantitative data collected from the pre-test and post-test questionnaires were analyzed using descriptive statistics (e.g., mean, standard deviation) and inferential statistics (e.g., paired t-tests & chi square test).

RESULT

Table 1: demographic characteristics of the study participants   n=64

Demographic Characteristic	Frequency	Percentage (%)
Age (years)		
- 18-20	21	32.81
- 21-23	29	45.31
- 24-26	9	14.06
- 27 and above	5	7.81
Gender		
- Male	25	39.06
- Female	39	60.94
Year of Study		
- First Year	18	28.13
- Second Year	20	31.25
- Third Year	18	28.13
- Fourth Year	8	12.50
Residential Area		
- Urban	45	70.31
- Rural	19	29.69
Previous Exposure to AI		

Universe International Journal of Interdisciplinary Research
(International Peer Reviewed Refereed Journal)
DOI No. – 08.2020-25662434

© UIJIR | ISSN (O) – 2582-6417
MAY 2024 | Vol. 4 Issue 12
www.uijir.com

- Yes	28	43.75
- No	36	56.25

Table no 1 shows majority of participants fell within the 18-23, constituting 77.12% of the sample. Additionally, the study predominantly comprised female participants, representing 60.94% of the total. In terms of academic progression, a substantial portion of participants were in their first or second year of study, collectively making up 59.38% of the sample. Geographically, urban areas housed the majority of participants, with 70.31% residing in such locales. A notable finding was that a significant portion of participants had no prior exposure to artificial intelligence (56.25%).

Table 2: knowledge scores into pre-test and post-test categories

Test	Category	Percentage	Frequency
Pre	Inadequate	51.56%	33
	Moderately Adequate	35.93%	8
	Adequate	12.5%	23
Post	Inadequate	18.33%	11
	Moderately Adequate	21.66%	40
	Adequate	66.66%	13

Table 2. shows that higher percentage of inadequate knowledge (51.56%) compared to moderately adequate (35.93%) and adequate (12.5%). In contrast, the post-test results demonstrate a significant improvement, with 66.66% achieving adequate knowledge and a smaller percentage categorized as moderately adequate (21.66%) or inadequate (18.33%).
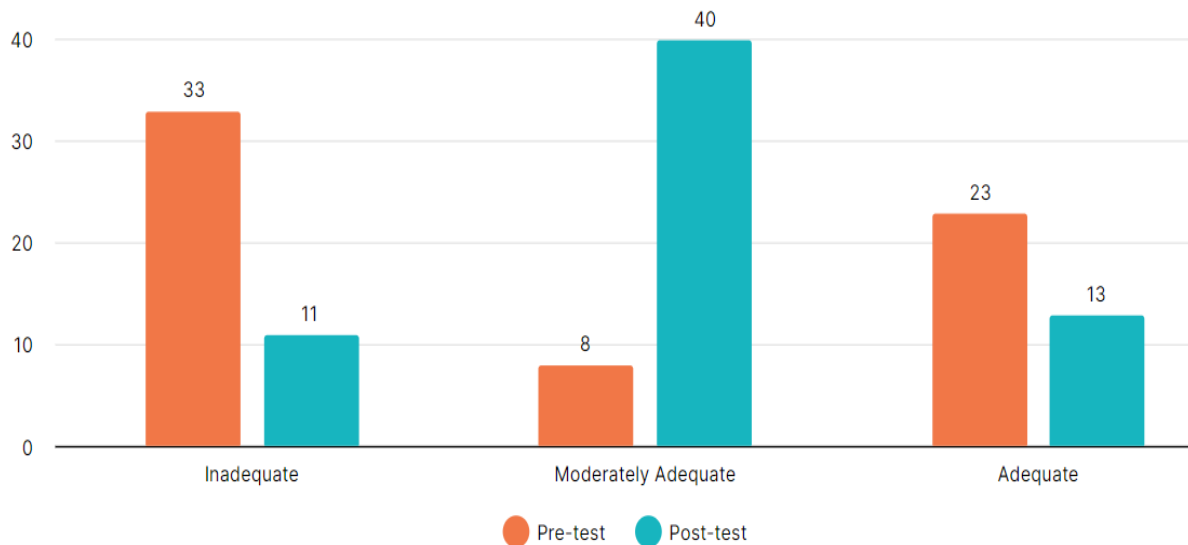
Pretest – Posttest knowledge score

Table 3 Mean, Standard Deviation (SD), t-test Of Knowledge Scores For Both The Pre-Test And Post-Test Conditions.

	Pre-test	Post-test
Mean	15.52	20.83
SD	2.91	3.13
t-test	**7.028,** *(df=63), p-value <0.001*	

Table 3 shows Comparing pre-test and post-test scores, there is a notable increase in mean knowledge scores from 15.52 to 20.83. Additionally, the standard deviation (SD) slightly increased from 2.91 to 3.13. The t-test results (t=7.028, df=63, p < 0.001) indicate a statistically significant difference between pre-test and post-test scores, suggesting that the intervention led to a significant improvement in knowledge.

Table 4 Chi-Square Test showing Demographic Variables vs. Pre-test Knowledge Scores

Demographic Variable	Chi-Square Value	Degrees of Freedom	*p*-value
Age	10.32	6	0.112
Gender	1.93	2	0.380
Year of Study	15.23	6	**0.018**[*]
Residential Area	0.89	2	0.640
Previous Exposure to AI	7.54	2	**0.023**[*]

Table 4. shows the relationship between demographic variables and pre-test knowledge scores. Age (χ^2=10.32, df=6, p=0.112), gender (χ^2=1.93, df=2, p=0.380), and residential area (χ^2=0.89, df=2, p=0.640) did not show significant associations with pre-test knowledge scores. However, year of study (χ^2=15.23, df=6, p=0.018) and previous exposure to AI (χ^2=7.54, df=2, p=0.023) were significantly associated with pre-test knowledge scores.

DISCUSSION

AI knowledge is increasingly considered essential for students, as it provides foundational skills relevant to various fields, including technology, science, and business. Understanding AI concepts and applications prepares students for future careers and enables them to navigate the complexities of an AI-driven world. The utilization of AI in healthcare empowers workers with enhanced diagnostic precision and streamlined administrative processes, saving valuable time and optimizing patient care. Additionally, AI-driven analytics enable personalized treatment plans, evidence-based decision-making, and remote patient monitoring, ultimately improving patient outcomes and healthcare delivery.

In our study pre-test knowledge of use of AI in healthcare workers was poor among healthcare workers. Similarly, a study conducted by Castagno et al. (2020) & Chang (2022) found the pre-test knowledge of healthcare workers regarding the use of Artificial Intelligence (AI) in healthcare appears to be limited, highlighting a need for educational interventions to enhance understanding

Universe International Journal of Interdisciplinary Research
(International Peer Reviewed Refereed Journal)
DOI No. – 08.2020-25662434

© UIJIR | ISSN (O) – 2582-6417
MAY 2024 | Vol. 4 Issue 12
www.uijir.com

and application of AI technologies in the healthcare sector.[6] [7]

Consistent with existing research, our study demonstrates that educational interventions effectively improve knowledge among healthcare workers regarding the use of Artificial Intelligence (AI) in healthcare, indicating the efficacy of targeted educational programs in enhancing understanding and application of AI technologies in the healthcare sector. Both our study and the Study conducted by Mohamed et al. (2023) demonstrate the effectiveness of educational interventions in significantly enhancing nursing students' and nurses' knowledge regarding the utilization of Artificial Intelligence (AI) in healthcare.[8] Similarly, study conducted by Kulju et al. (2024) also highlights the statistically significant improvements achieved through educational interventions in enhancing participants' knowledge levels.[9]

In our study, both the year of study and previous exposure to AI were significantly associated with pre-test knowledge scores, indicating their influence on participants' knowledge levels. Similarly, study conducted by Hadithy et al. (2023) reported that a majority of students had no prior exposure to AI in healthcare, suggesting a potential impact on their knowledge acquisition.[10] Conversely, study conducted by Hamedani et al. (2023) found a statistically significant relationship between the acceptance of AI and the participant's level of education, indicating a different aspect of AI engagement among participants.[11]

The study hypothesizes that education intervention will lead to an improvement in nursing students' knowledge regarding the use of AI in healthcare. Its purpose is to assess the effectiveness of an educational package in enhancing understanding in this domain. The significance of the study lies in addressing the growing integration of AI in healthcare and the need to equip future nurses with relevant knowledge and skills. However, unanswered questions persist regarding the long-term retention of knowledge post-intervention and the optimal methods for incorporating AI education into nursing curricula. Future research could explore these aspects further to refine educational strategies and assess the sustained impact of AI education on nursing practice.

REFERENCES

1. Adenubi A, Oduroye A, Akanni A. ARTIFICIAL INTELLIGENCE (AI) IN HEALTHCARE: TRANSFORMING DIAGNOSIS AND TREATMENT. 2024 Mar 14;

2. Vasquez BrianA, Moreno-Lacalle R, Soriano GP, Juntasoopeepun P, Locsin RC, Evangelista LS. Technological machines and artificial intelligence in nursing practice. Nurs Health Sci. 2023 Sep;25(3):474–81.

3. Gala D, Behl H, Shah M, Makaryus AN. The Role of Artificial Intelligence in Improving Patient Outcomes and Future of Healthcare Delivery in Cardiology: A Narrative Review of the Literature. Healthcare (Basel). 2024 Feb 16;12(4):481.

4. Parekh ADE, Shaikh OA, Simran, Manan S, Hasibuzzaman MdA. Artificial intelligence (AI) in personalized medicine: AI-generated personalized therapy regimens based on genetic and medical history: short communication. Ann Med Surg (Lond). 2023 Sep 13;85(11):5831–3.

5. Rony MKK, Kayesh I, Bala SD, Akter F, Parvin MstR. Artificial intelligence in future nursing care: Exploring perspectives of nursing professionals - A descriptive qualitative study. Heliyon. 2024 Feb 8;10(4):e25718.

6. Castagno S, Khalifa M. Perceptions of Artificial Intelligence Among Healthcare Staff: A Qualitative Survey Study. Front Artif Intell [Internet]. 2020 Oct 21 [cited 2024 May 8];3. Available from: https://www.frontiersin.org/articles/10.3389/frai.2020.578983

7. Chang EY. Knowledge-Guided Data-Centric AI in Healthcare: Progress, Shortcomings, and Future Directions [Internet]. arXiv; 2023 [cited 2024 May 8]. Available from: http://arxiv.org/abs/2212.13591

8. Hussein Mohamed S, Abed El-Rahman Mohamed M, Farouk Mahmoud S, HessienYousef Heggy E. The Effect of Educational Program on Nurses' Knowledge and Attitude Regarding Artificial Intelligence. Egyptian Journal of Health Care. 2023 Jun 1;14(2):1110–28.

9. Kulju E, Jarva E, Oikarinen A, Hammarén M, Kanste O, Mikkonen K. Educational interventions and their effects on healthcare professionals' digital competence development: A systematic review. International Journal of Medical Informatics. 2024 May 1;185:105396.

10. Al Hadithy ZA, Al Lawati A, Al-Zadjali R, Al Sinawi H. Knowledge, Attitudes, and Perceptions of Artificial Intelligence in Healthcare Among Medical Students at Sultan Qaboos University. Cureus. 15(9):e44887.

11. Hamedani Z, Moradi M, Kalroozi F, Manafi Anari A, Jalalifar E, Ansari A, et al. Evaluation of acceptance, attitude, and knowledge towards artificial intelligence and its application from the point of view of physicians and nurses: A provincial survey study in Iran: A cross-sectional descriptive-analytical study. Health Sci Rep. 2023 Sep 4;6(9):e1543.