Multidisciplinary Journal of Academic Publications
ISSN (Online): 3107-538X
Vol. 01, Issue 01, September – October 2025

EVALUATING AN EDUCATIONAL STRATEGY TO ENHANCE STAFF NURSES' UNDERSTANDING AND PERCEPTIONS OF ARTIFICIAL INTELLIGENCE IN CLINICAL PRACTICE: EVIDENCE FROM RAIGARH

Punam Patel[1], Dr. Nelson Jewas[2]

Assistant Professor, Medical surgical nursing, Madhya Pradesh, India[1]

Dean, Department of Nursing, Sciences, Mansarovar Global University, Bhopal, Madhya Pradesh, India[2]

Abstract

Healthcare delivery is undergoing a revolution, and the role of Artificial Intelligence (AI) is one of the factors to consider, but nurses in developing countries do not fully understand and accept it. This paper assessed an educational intervention that would promote the knowledge and perceptions of staff nurses regarding AI in clinical practice at Raigarh, Chhattisgarh. The quasi experimental pre-post design was utilized using 120 tertiary care hospital staff nurses. It was proposed that there would be a marked improvement in AI knowledge and positive change in perception after the intervention. It was a four-week educational program, which included lectures, demonstrations, and practical sessions. A validated 30-item knowledge questionnaire and 25-item perception scale were used in the collection of data. Findings showed statistically significant mean knowledge increase of 14.32+ 3.45 to 24.67+ 2.89 (p= 0.001) and perception increase of 78.45+ 12.34 to 102.56+ 10.23 (p= 0.001). The users demonstrated improved knowledge about AI applications such as clinical decision support systems, predictive analytics, and automated documentation. The learning plan was also successful to enhance the AI literacy of nurses and create the positive disposition towards the integration of technology. The nursing workforce in India needs to be prepared to undergo digital transformation in healthcare through continuous professional development with priorities on AI competencies.

Keywords: *Artificial Intelligence[1], Nursing Education[2], Clinical Practice[3], Healthcare Technology[4], Educational Intervention[5].*

1. Introduction

Integration of Artificial Intelligence (AI) in healthcare is a paradigm shift in clinical practice which has provided unprecedented opportunities to provide better care to patients, streamline workflows, and achieve better health outcomes. The AI technologies, such as machine learning algorithms, natural language processing, predictive analytics, and others become increasingly used in different healthcare environments all over the world. Nevertheless, the ability of healthcare professionals to fully integrate AI-powered tools in their practice, accept, and understand them is essential to the successful implementation of these technologies. Nurses represent the most extensive stream of the healthcare workforce and are at the forefront of interaction with patients, which explains why their interaction with AI technologies is the key to successful digital transformation programs.

Although the use of AI application in the clinical environment is on the rise, studies have shown that a large number of nurses have a poor understanding of the AI potential, constraints, and their real-life use. This lack of knowledge adds to resistance, anxiety, and inadequate use of AI-driven systems and may inhibit the fulfillment of the full potential of AI in revolutionizing the healthcare delivery.

The Indian healthcare sector is moving at an increasing pace in the implementation of AI technologies, particularly due to the establishment of the National Digital Health Mission and rising investments in health-tech infrastructure. The district of Raigarh in Chhattisgarh is a special area of location as the old healthcare practices exist alongside the new technology. Medical centers across the area are starting to adopt AI-driven applications to support diagnoses and patient tracking, as well as automate their administration. Nonetheless, there is little research on preparedness and perception of nurses toward integrating AI into semi-urban and rural Indian healthcare facilities. The need to solve this knowledge gap cannot be overestimated. Research has established that attitude of healthcare professionals towards technology is a major factor that affects the rate of adoption and success of implementation. Other negative views based on the misconceptions and the fear of job displacement or unfamiliarity also may cause significant obstacles to AI integration. On the other hand, educated medical personnel aware of the supportive capabilities of AI has a higher chance of adopting these technologies and making use of them to support clinical decision-making and patient care. The educational interventions have become highly important interventions aimed at equipping the nursing workforce to operate well in AI-enhanced healthcare settings. The knowledge gaps, misconceptions, and a positive attitude to AI technologies can be targeted in structured learning programs. Nevertheless, such interventions need to be contextually suited in the way they are designed and delivered, taking into account the nature of technology literacy at the base, the presence of resources, and the cultural predisposition towards automation in healthcare facilities.

This research fills a major gap in the literature by assessing a specially developed education plan that could improve the knowledge and attitudes of the staff nurses regarding AI in clinical practice in the Raigarh district. The study involves the investigation of the possibility of a structured, multi-modal educational intervention successfully enhancing the knowledge of nurses related to AI and changing their attitudes to the creation of more positive and informed attitudes. The implications of the findings to nursing education, hospital administration and policy development are significant with reference to integrating AI within the Indian healthcare setting.

2. Literature Review

The integration of artificial intelligence with nursing practice has spawned a significant scholarly interest over the last few years. Buchanan et al. (2020) conducted an overview of AI use in healthcare with a focus on the transformative potential of machine learning algorithms in clinical decision support, diagnostic imaging and in personalized treatment planning. Their work emphasized the idea that the implementation of AI cannot only be successful through the use of the technological infrastructure but also that the workforce needs to be prepared and accepting. In the same vein, Davenport and Kalakota (2019) have reviewed the state of AI in healthcare, pointing to the following main areas of application, such as administrative workflow, clinical decision-support, patient engagement, and precision medicine. Their discussion has highlighted the decisive contribution of healthcare providers in transforming AI abilities into better patient outcomes. The studies dedicated to nurses and their knowledge and attitudes towards AI have provided a significant amount of diversity in various settings. Pepito and Locsin (2019) performed a literature review on the topic of perceptions towards intelligent healthcare systems by the nurses and discovered that knowledge level, previous exposure to technologies, and organizational support were important factors contributing to acceptance and adoption. Their results indicated that interventions based on education on these factors may help the process of AI integration to become easier.

Similarly, Robert (2019) examined how nurses understood their roles as they interact with AI technologies and found issues with autonomy and professional identity and the human aspects of care that could be eroded with the help of technologies.

Several researchers have discussed the significance of specific educational interventions to train nurses to collaborate with AI. McGrow (2019) suggested that the current nursing curricula should be updated to include digital health literacy and AI competencies, which will equip future nurses with technology-enhanced practice settings. This view is in line with the suggestion by nursing education institutions that advocate adoption of informatics and newer technologies in mainstream nursing coursework. Risling (2020) also discussed which competencies nurses need to deliver in their work with AI systems effectively and offered a framework that would be based on the technical knowledge, the ability to think in an ethical way, and the ability to critically assess the information. Research that has assessed educational intervention on AI knowledge has exhibited overall positive results. Loftus et al. (2020) provided healthcare professionals with a workshop-based intervention, as a result of which they stated a significant positive change in the AI knowledge scores and more informed perception of the capabilities and limitations of AI. On the same note, Kim and Oh (2020) tested an online nurse education program, and the researchers conclude that substantial knowledge retention and transition to less negative attitudes were achieved. Nevertheless, such studies were largely undertaken in high resource environment where healthcare systems were technologically advanced and it is questionable whether it would be applicable to resource constrained settings.

The Indian healthcare context is limited in the number of researches, yet it is increasing. In a study conducted by Sharma et al. (2020), the adoption of AI among healthcare professionals was investigated in Indian hospitals, with the main obstacles to AI adoption being knowledge gaps and inadequate infrastructure. Their research pointed to the necessity of context-specific educational programs, which can respond to the features of challenges and opportunities in Indian healthcare contexts. Reddy et al. (2019) researched the attitude of Indian nurses towards health information technology and discovered that attitude and organizational support toward technology greatly determined the acceptance and utilization rates. The technology acceptance frameworks like the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology have had a massive theoretical basis on the understanding of technology acceptance. In these models, the perceived usefulness and ease of use are always cited to be the determinants of technology adoption. Educational programs that increase AI capabilities awareness and overcome the usability issues have proven to be effective in improving the two aspects of perception. Even with the emerging literature, there are major gaps in knowledge that could be used to prepare nurses in the developing healthcare systems on how to integrate AI. Majority of the available literature has been done in the Western healthcare settings where the resource profiles, technology infrastructure and cultural background are vastly different than those occurring in India. Besides, there is a lack of research that specifically focuses on the effectiveness of educational interventions to improve knowledge and perceptions simultaneously in the case of practicing nurses. This paper will help fill these gaps by implementing an evaluation of an overall educational intervention specifically aimed at the Indian healthcare environment, including staff nurses in the Raigarh district, which is the frontline workforce in semi-urban and rural healthcare delivery.

3. Objectives

1. To assess the baseline knowledge and perceptions of staff nurses regarding artificial intelligence applications in clinical practice in Raigarh district hospitals.
2. To implement a structured educational intervention program designed to enhance staff nurses' understanding of AI technologies, their clinical applications, and potential impacts on nursing practice.

3. To evaluate the effectiveness of the educational strategy by measuring pre- and post-intervention changes in nurses' knowledge scores and perception ratings regarding AI in clinical practice.
4. To identify specific areas of AI knowledge and perception that demonstrate significant improvement following the educational intervention and areas requiring additional focus in future training initiatives.

4. Methodology

This research assumed the quasi-experimental single-group pre-test-post-test design to determine the efficacy of a structured educational intervention in staff nurses in the fields of knowledge and attitude towards artificial intelligence (AI) use in clinical practice. The study was conducted between January and April 2024 in three tertiary care hospitals in the district of Raigarh, Chhattisgarh, India. These hospitals were chosen specifically because of their active efforts in implementing AI-based technologies, both in clinical and administrative spheres, which will give a relevant setting in which nurses can be assessed regarding their readiness to implement AI. The population sample was comprised of staff nurses at a medical and surgical ward, at an intensive care unit, at an emergency department, and in an outpatient unit. Convenience sampling was used, whereby nurses who had one year of clinical experience, permanent or contract employment status, as well as, agreed to participate in all the stages of the study were included. Nurses who have an advanced degree in health informatics or had prior formal training in AI or health technologies, and those on a long leave throughout the study period were not considered. The final sample was comprised of 120 staff nurses who went through pre- and post-intervention tests. Two instruments developed by two researchers based on an in-depth literature review and a consultation with experts were used to collect data. The AI-related knowledge was assessed through a 30-item structured questionnaire through the AI concepts, AI applications in the healthcare setting, clinical applications, benefits, and limitations of AI, and the limitations of AI, as well as the ethical concerns of AI, each correct answer scored one point. The attitudes towards AI were measured based on a 25-item five-point Likert scale that compared the attitudes towards the adoption of AI, perceived usefulness, patient safety issue, job security, and willingness to adopt technology. A panel of five experts was used to determine the content validity of the two tools, and required changes were implemented according to the feedback of these experts. Clarity and feasibility were guaranteed by pilot testing among nurses in a non-participating hospital. The reliability analysis revealed that there was decent internal consistency in the questionnaire of knowledge and the perception scale with Cronbach alpha of 0.84 and 0.87 respectively.

The instructional intervention was a four-week, multimodal program comprising of twelve hours of instruction, structured into six modules of instruction on AI basics, clinical decision support, diagnostic use, predictive analytics, automated documentation and ethical issues. Informatics specialists, AI consultants, nursing faculty, and experienced nurses, provided the teaching strategies in the form of lectures, demonstrations, discussions based on cases, hands-on simulation, and group work. Pre-intervention data was determined prior to the launch of the program and two weeks following the completion of the program, post-intervention assessment was done utilizing the same tools again. The data were interpreted with SPSS version 26.0 with descriptive statistics, paired t-tests, McNemar test, and Cohen d, the significance level of which is $p<0.05$. Informed consent and ethical approval were properly obtained.

Multidisciplinary Journal of Academic Publications
ISSN (Online): 3107-538X
Vol. 01, Issue 01, September – October 2025

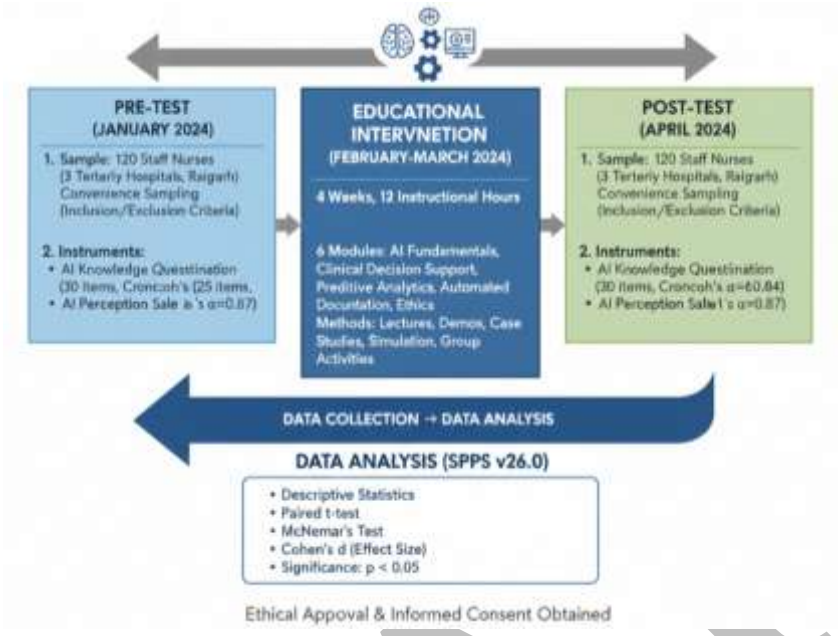

Figure 1: Conceptual Framework of the Quasi-Experimental Single-Group Pre-test–Post-test Design for AI Educational Intervention.

5. Results

Demographic profile of the research subjects indicated that there was a wide range of sample of staff nurses serving in different clinical areas in the hospitals in the Raigarh district. Amongst the 120 respondents 78.3% were of female gender and 21.7% were of male gender which represented gender ratio that could be expected in the Indian nursing workforce. The age distribution presented 32.5 per cent of the respondents in the 25-30 years, 41.7 per cent between 31-40 years, 20.0 per cent between 41-50 years, and 5.8 per cent years above 50 years. In terms of clinical experience 35.0% had 1-5 years' experience, 38.3% had 6-10 years' experience, 20.0% had 11-15 years' experience and 6.7% had experience of over 15 years. The educational levels were 45.0% with diploma in nursing, 43.3% in Bachelor of Science in Nursing and 11.7% in Master of Science in Nursing. Distribution of departments was 28.3% in medical wards, 23.3% in surgical units, 20.0% in outpatient services, intensive care unit, and emergency departments.

Table 1: Comparison of Pre- and Post-Intervention Knowledge Scores

Knowledge Domain	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	Mean Difference	t-value	p-value	Cohen's d
AI Fundamentals	3.45±1.23	5.78±0.89	2.33	18.42	<0.001	2.15
Clinical Applications	2.89±1.45	5.34±1.02	2.45	16.87	<0.001	1.95
Decision Support	2.67±1.34	5.12±0.98	2.45	17.23	<0.001	2.05
Diagnostic AI	2.34±1.28	4.89±1.12	2.55	16.45	<0.001	2.10
Predictive Analytics	1.98±1.12	4.67±1.08	2.69	19.34	<0.001	2.43
Ethical Considerations	2.99±1.38	4.87±1.15	1.88	13.67	<0.001	1.45
Overall Knowledge	**14.32±3.45**	**24.67±2.89**	**10.35**	**28.56**	**<0.001**	**3.25**

According to the results of knowledge assessment, which are provided in Table 1, all of the measured areas improved significantly after the educational intervention. The general level of knowledge improved with a baseline mean of 14.32 with a standard deviation of 3.45 increasing to 24.67 with a standard deviation of 2.89 which is statistically significant ($t=28.56$, $p<0.001$). Such a high effect size (Cohen=3.25) demonstrates that the educational intervention was very effective to improve the knowledge of nurses on AI in clinical practice. The most significant advancement was made in predictive analytics knowledge with the improvement in the scores by 2.69, which implies that this particular area was notably lacking at the baseline but was responsive to a specific kind of education. In the same way, diagnostic AI and clinical applications recorded significant improvements of 2.55 and 2.45 points respectively. Although the improvement was very high in each of the domains, the area concerning ethical considerations had comparatively low scores (1.88 points) which could be explained by the fact that the nurses had a relatively high level of background knowledge about these issues or that teaching this content area is best achieved with different instructional strategies.

Table 2: Changes in Perception Scores Across Dimensions

Perception Dimension	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	Mean Difference	t-value	p-value	Cohen's d
Perceived Usefulness	14.56±3.45	19.87±2.34	5.31	15.67	<0.001	1.76
Ease of Learning	13.45±3.78	18.34±2.67	4.89	13.45	<0.001	1.48
Job Security Concerns	18.67±2.89	15.23±2.45	-3.44	11.23	<0.001	1.27
Patient Safety Views	15.34±3.23	20.45±2.56	5.11	14.89	<0.001	1.72
Implementation Readiness	16.43±3.67	21.67±2.89	5.24	13.78	<0.001	1.56
Professional Development	14.78±3.12	19.89±2.45	5.11	15.34	<0.001	1.82
Total Perception Score	**78.45±12.34**	**102.56±10.23**	**24.11**	**19.45**	**<0.001**	**2.12**

The outcomes of the perception assessment provided in Table 2 indicate that the attitudes of nurses to AI were greatly positively changed after the educational intervention. The overall perception score rose by 24.11 points ($t=19.45$, $p<0.001$) to a total of 102.56+10.23 (large effect size) between the pre-intervention and post-intervention scores (102.56). This significant shift shows that the educational program was able to overcome attitudinal obstacles and lead to a more favorable opinion of AI implementation into clinical practice. The most notable one is the 5.31-point rise in the scores of perceived usefulness where it can be implied that the respondents began to value AI potential contribution to clinical care more because they are aware of the specific applications and capabilities. Likewise, the safety of patients increased by 5.11 points which suggests that education enabled nurses to realize that AI can improve patient safety instead of jeopardizing it when implemented appropriately. Interestingly, the issue of job security dropped by 3.44 points (with negative mean difference), which shows that the educational intervention was efficient in discussing the fears of AI taking over the nursing role explaining the supportive and augmentative roles of AI and not its substitutive characteristics.

Table 3: Knowledge Improvement by Demographic Subgroups

Demographic Variable	Category	n	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	Mean Gain	F/t-value	p-value
Age Group	25-30 years	39	15.23±3.12	25.34±2.67	10.11	2.34	0.076
	31-40 years	50	14.67±3.45	24.89±2.89	10.22		
	41-50 years	24	13.45±3.78	23.67±3.12	10.22		
	>50 years	7	12.89±4.12	23.14±3.45	10.25		
Clinical Experience	1-5 years	42	15.67±2.89	25.45±2.45	9.78	1.89	0.134
	6-10 years	46	14.34±3.45	24.67±2.89	10.33		
	11-15 years	24	13.12±3.89	23.89±3.23	10.77		
	>15 years	8	12.45±4.23	23.34±3.67	10.89		
Educational Level	Diploma	54	13.45±3.67	23.89±3.12	10.44	0.87	0.421
	BSc Nursing	52	14.89±3.23	25.23±2.67	10.34		
	MSc Nursing	14	15.67±2.89	25.89±2.34	10.22		

Table 3 shows the knowledge improvement analysis by the various subgroups of the population to determine whether the educational intervention was equally effective or it had varied effects depending on the participant characteristics. The findings suggest that the increase in knowledge was highly consistent more or less across all demographic groups and no statistically significant differences were noted. The age group analysis indicated an average increase of 10.11-10.25 points with four groups ($F=2.34$, $p=0.076$), which indicated that the educational strategy was equally adequate irrespective of the age of the participants. In the same manner, no significant difference was found in knowledge acquisition with clinical experience with a gain of between 9.78 to 10.89 ($F=1.89$, $p=0.134$). Interestingly, even those participants that have had over 15 years' experience (and should be assumed to have done more practice patterns and potentially have more resistance to new technologies) also demonstrated significant knowledge gains as much as the less experienced nurses did. The level of education did not lead to any significant impact on gaining knowledge ($F=0.87$, $p=0.421$), and all the diploma, BSc, and MSc prepared nurses showed improvement in the range of about 10 points. These results indicate that the learning intervention was properly constructed to address the education requirements of participants with diverse profiles using the instructional methods, which could be easily and effectively adopted by participants of various profiles despite their underlying educational preparation background and demographic factors.

Table 4: Item-Level Analysis of Knowledge Questions with Largest Improvements

Knowledge Item	Pre-Intervention Correct %	Post-Intervention Correct %	Percentage Point Gain	McNemar χ^2	p-value
AI definition and core concepts	42.5%	92.5%	50.0%	58.67	<0.001
Machine learning applications in healthcare	38.3%	89.2%	50.9%	61.23	<0.001
Clinical decision support systems function	35.8%	87.5%	51.7%	63.45	<0.001

AI in medical imaging interpretation	32.5%	86.7%	54.2%	68.92	<0.001
Predictive algorithms for patient deterioration	28.3%	84.2%	55.9%	73.56	<0.001
Natural language processing in documentation	31.7%	81.7%	50.0%	59.78	<0.001
Limitations and potential biases in AI systems	45.8%	78.3%	32.5%	32.45	<0.001
Ethical principles governing AI use in healthcare	51.7%	82.5%	30.8%	28.67	<0.001

The item-level knowledge analysis in Table 4 shows particular content areas that the educational intervention had the most significant impact. Such an in-depth analysis shows that the participants demonstrated significantly significant changes in their knowledge regarding technical aspects of AI with questions on predictive algorithms of patient deterioration demonstrating a significant percentage point change of 55.9 (28.3% correct before the intervention and 84.2% correct after) (McNemar 2× 73.56, p= 0.001). This significant gain implies that predictive analytics was a knowledge gap area that was vast at baseline that was successfully fulfilled with specific training. Likewise, the AI knowledge in medical imaging increased by 54.2 percentage points, meaning that practical presentations and illustrations of the AI-assisted diagnostic interpretation were especially useful learning materials. The gains of clinical decision support systems and machine learning applications were also in excess of 50 percentage points, proving that the educational program managed to demystify these complicated technologies and make them understandable to the practicing nurses with no technical background. It is important to note that products that touched upon ethical values and AI restrictions had smaller yet significant improvements of about 30 percentage points. The comparatively less significant gains in these areas could be attributed to two issues: subjects in the conceptual areas needed not necessarily the same instructions as the more technical ones which can be demonstrated and practiced.

Table 5: Perception Changes on Key Attitudinal Dimensions

Perception Statement	Pre-Intervention Mean±SD	Post-Intervention Mean±SD	Mean Change	t-value	p-value
"AI will improve the quality of patient care"	3.12±1.23	4.34±0.78	+1.22	10.45	<0.001
"I am confident I can learn to use AI tools"	2.89±1.34	4.23±0.89	+1.34	11.23	<0.001
"AI will replace nursing jobs" (reverse scored)	2.34±1.12	3.89±0.98	+1.55	12.67	<0.001
"AI systems can help prevent medical errors"	3.23±1.18	4.45±0.76	+1.22	10.89	<0.001
"Our hospital should invest in AI technologies"	2.98±1.28	4.12±0.87	+1.14	9.87	<0.001
"I feel anxious about working with AI" (reverse scored)	2.67±1.23	3.78±1.02	+1.11	8.95	<0.001
"AI can support clinical decision-making"	3.34±1.15	4.56±0.72	+1.22	11.34	<0.001
"Training in AI should be mandatory for nurses"	3.12±1.26	4.38±0.81	+1.26	10.56	<0.001

Table 5 goes further to analyze the change in perceptions on each attitudinal statement in details, and this offers information on the particular beliefs and concerns that were targeted by the educational intervention. The statistically significant improvement in all measured aspects of perception ($p<0.001$) had a mean point change of between 1.11 to 1.55 points on the 5-point Likert scale. The most significant change in attitudes was the change in the beliefs regarding AI as a replacement to the nursing job with the 1.55-point change in the inverted-coded item ($t=12.67$, $p<0.001$), which revealed considerable decrease in job displacement fears. This result is especially significant because job security issues are one of the biggest psychological impediments to technology acceptance that may dismantle the implementation activities despite the true possibilities of AI. The educational intervention seemingly managed to make it clear that AI is used to complement and not to substitute nursing skills, perform routine duties and offer decision support whilst nurses are still responsible to assess patients, formulate care plans, and interact with them in a caring manner. The belief in individual ability to master AI tools was enhanced by a 1.34-point ($t=11.23$, $p<0.001$) value, and it is reasonable to assume that the practice sessions and demonstrations demystified AI technologies and increased the self-efficacy of the participants in embracing technology. The need to support the idea of AI enhancing the quality of care and avoiding medical errors also grew by 1.22 points, which means that the information about the particular clinical uses made the participants aware of the definite benefits that AI could bring in practice.

Table 6: Correlation Between Knowledge Gains and Perception Changes

Variable	Knowledge Gain	Perceived Usefulness Change	Job Security Change	Patient Safety Change	Overall Perception Change
Knowledge Gain	1.000	0.542**	0.478**	0.512**	0.589**
Perceived Usefulness Change	0.542**	1.000	0.423**	0.567**	0.678**
Job Security Change	0.478**	0.423**	1.000	0.398**	0.621**
Patient Safety Change	0.512**	0.567**	0.398**	1.000	0.645**
Overall Perception Change	0.589**	0.678**	0.621**	0.645**	1.000

Note: ** indicates $p<0.01$ (two-tailed)

Correlation analysis provided in Table 6 investigates dependencies between knowledge gains and different aspects of perception changes to get insight into the processes by which the educational intervention affected the outcomes of the participants. The findings indicate that there is a large positive correlation between knowledge gains and all the dimensions of perception change with correlation coefficients of 0.478-0.589 (all $p<0.01$). It was found that knowledge gain and overall perception change had the strongest correlation ($r=0.589$, $p<0.01$), indicating that more the AI knowledge was improved in participants, the more positive attitudes they developed towards AI integration. This result confirms the theoretical hypothesis that learning is a major channel to attitude adjustment on the adoption of technology. The association between the knowledge of the change in the perceived usefulness ($r=0.542$, $p<0.01$) indicates that acquiring information about the AI capabilities and applications assisted the participants in understanding that there are tangible advantages that the technologies might offer in their practice environments. Interestingly, the association between the knowledge acquisition and job security issue are changing ($r=0.478$, $p<0.01$) means that the more people know about the reality of AI performance, the more it soothed fears of job-replacement. Of the perception dimension, the perceived usefulness had the most significant correlations with other attitudinal changes, specifically overall perception ($r=0.678$, $p<0.01$) and patient safety views ($r=0.567$, $p<0.01$). These relations imply that making nurses aware of the practical utility of AI is the key to achieving holistic attitude change and possibly the most potent handle in encouraging technology acceptance in the clinical environment.

6. Discussion

The results of the current research prove that a multi-modal educational intervention of the structured type can significantly improve the knowledge and perceptions of the staff nurses towards artificial intelligence in clinical care within the Indian healthcare environment. The dramatic changes experienced in all dimensions measured can be empirically justified through the target educational strategies as effective tools to train the nursing workforce to operate in the more technology-enhanced healthcare settings. The findings are consistent with other studies, which have been carried out in more developed health care systems but they extend the body of evidence about these studies to semi-urban and rural Indian contexts where very little research has been carried out earlier. The fact that overall knowledge scores are dramatically improved, with the mean change of 10.35 points that is a 72.3 percent increase since the baseline is even greater than the improvements of a few previous studies assessing AI education among healthcare professionals. Loftus et al. (2020) found that the level of knowledge increased by about 45 percent after a workshop intervention, whereas Kim and Oh (2020) found an improvement of 58 percent after an online program. The high results in this study can be explained by a number of factors such as the length of intervention of four weeks as compared to the short programs in the past research, the multi-modal method of instruction that incorporates lectures, demonstrations and practical learning, and the sanctified time to be spent in learning activities without the interference of other clinical tasks. The enormous effect size (Cohen's d=3.25) is another indicator of the effectiveness of the intervention and shows that an appropriately planned educational interventions can close the knowledge gap even in nurses who have no previous formal training on the AI concepts.

The resulting changes in perceptions identified during this study are especially interesting considering that the struggles of the attitude shift towards appearance of the new technologies in healthcare facilities are well-documented. The subsequent increase in the overall perception scores (30.7 percent) with the significant positive changes in all of the measured dimensions shows that the educational intervention was able to tackle several psychological and attitudinal obstacles to AI acceptance. The significant decrease in job security is one of the aspects that should be mentioned as an exceptionally significant result, and the fear of being replaced by AI is revealed as one of the main barriers to its implementation among healthcare professionals (Robert, 2019). The focus of the educational program on AI as the augmentative tool, which complements nursing skills but does not substitute them, seemingly appealed to participants and allowed rebranding AI as a friend instead of an enemy in providing the high-quality care to patients. The correlation tests that show that there were significant relationships between knowledge gains and change in perception give valuable insights into the processes by which educational interventions have impacts on technology acceptance. These results reinforce the cognitive theories of attitude formation which opine that beliefs and attitudes are indeed related whereby factual knowledge can be used as back-bone in forming informed opinions and preferences. The moderate-strong level of correlations observed (between 0.478 and 0.589) means that raising AI knowledge is still a requirement but not totally sufficient to change the attitude, and thus effective educational programs should also directly cover the emotional and psychological aspects of technology acceptance such as anxiety, self-efficacy, or perceived threat to the identity.

The fact that the knowledge and perception changes were significantly similar among the various demographic subgroups of the population have significant practical implications in the design and implementation of the programs. In contrast to other technology training programs that have demonstrated a difference in effectiveness in accordance with age or experience (Pepito & Locsin, 2019), the intervention was shown to be useful irrespective of the demographic features of participants. This consistency can also be due to the state of the baseline where nearly everyone possessed little prior AI knowledge, and it provided a fairly level start point wherein everyone could be helped through entry-level education. Alternatively, the multi-modal instructional process might have been adequately varied to allow various forms of learning and preferences so that everyone

could learn the content that they could best contribute to their specific needs. The content areas that have the most improvements are used to guide the curriculum development in nursing education and the continuing professional development. These large gains in knowledge of predictive analytics, clinical decision support systems, and AI applications in diagnostic imaging indicate that the topics have high priorities with knowledge gaps most severe and where educational interventions can make the biggest contributions. The fact that the ethical knowledge improvement is relatively smaller and yet significant shows that the content area should be given constant attention, perhaps using case-based learning methods, which involve exposure to realistic ethical dilemmas that need critical analysis and debate.

Some limitations need to be recognized when taking these findings. The quasi-experimental design can not be used to make causal conclusions due to the lack of the control group because the progress will not be unambiguously explained by the intervention, but by other processes, including maturation, simultaneous experiences, or testing effects. The convenience sampling method and relatively small sample size based on one district are potential limitations on generalization to other settings in which resources, organization culture, or technology exposure are different. The 2 weeks period between the end of the intervention and the time of post-assessment might not be sufficient in terms of long-term retention or use of the learning in real clinical practice. Future studies using randomized controlled designs, more prolonged follow-up, and objective assessments of AI use in practice would enrich the evidence base and offer information on whether the changes in knowledge and perception are reflected in the behavioral change. In spite of these shortcomings, this study can contribute significantly to the knowledge of how the educational interventions can equip nurses to deliver healthcare that is enhanced by AI in resource-constrained environments. The results indicate that in the contexts where the technology infrastructure can be relatively insufficient and the minimum level of digital literacy can be inconsistent, nevertheless, the educational programs of high quality can be successfully used to develop the knowledge and positive attitudes required to achieve the successful implementation of AI. The paper also illustrates how it is possible to introduce comprehensive technology education in the hospital organization in terms of a mixture of both internal and external expertise in the existing hospital structure.

7. Conclusion

The given research is a good indication that properly designed educational solutions may profoundly increase the level of knowledge and attitude of staff nurses towards artificial intelligence in the clinical process with regard to the Indian healthcare environment. The drastic changes in knowledge scores and attitudinal aspects indicate that targeted education is one of the viable and useful methods of equipping the nursing workforce to operate in the technology-enhanced healthcare setting. The results are especially important in the context of Indian healthcare facilities where the use of AI is rapidly increasing, and nurses are the key participants as the primary consumers of clinical technologies and the proponents of patient-centered care delivery. The effectiveness of this educational intervention can be used as a case to emulate in other healthcare organizations aiming at establishing a workforce capacity to transform to digital health. The multi-modal strategy of combining didactic training, demonstrations, practical application, and interactive discussions turned out to be efficient in the case of a variety of participants, which can be a hint at its possibility to be generalized. The issues that healthcare organizations that consider AI implementation need to consider first is that parallel investments in the workforce education and advancement should be made to make sure that technological capabilities correspond to human readiness and acceptance.

Since healthcare systems all over the globe are going through a complicated shift to the AI-based care delivery, the training of healthcare professionals becomes one of the priorities, just like the development of technological infrastructure. Nurses, who are the greatest number of healthcare workers and the initial contacts with the patients, should be empowered with technical knowledge on AI systems not to mention the ability of critical

thinking to analyze AI recommendations, ethical frameworks to manage problematic situations, and the assurance that they remain relevant and valuable in the technology-enhanced practice settings. Colleges/universities and health facilities have a role to play in making sure that future and present nurses have acquired the competencies needed to practice efficiently in the digital health age.

8. References

1. Buchanan, C., Howitt, M. L., Wilson, R., Booth, R. G., Risling, T., & Bamford, M. (2020). Predicted influences of artificial intelligence on nursing education: Scoping review. *JMIR Nursing*, *3*(1), e23933. https://doi.org/10.2196/23933
2. Davenport, T., & Kalakota, R. (2019). The potential for artificial intelligence in healthcare. *Future Healthcare Journal*, *6*(2), 94-98. https://doi.org/10.7861/futurehosp.6-2-94
3. Kim, E., & Oh, S. (2020). Nursing students' perception of artificial intelligence and their educational needs. *Journal of Korean Academy of Nursing Administration*, *26*(5), 594-604. https://doi.org/10.11111/jkana.2020.26.5.594
4. Loftus, T. J., Tighe, P. J., Filiberto, A. C., Efron, P. A., Brakenridge, S. C., Mohr, A. M., Rashidi, P., Upchurch Jr, G. R., & Bihorac, A. (2020). Artificial intelligence and surgical decision-making. *JAMA Surgery*, *155*(2), 148-158. https://doi.org/10.1001/jamasurg.2019.4917
5. McGrow, K. (2019). Artificial intelligence: Essentials for nursing. *Nursing*, *49*(9), 46-49. https://doi.org/10.1097/01.NURSE.0000577716.57052.8d
6. Pepito, J. A., & Locsin, R. (2019). Can nurses remain relevant in a technologically advanced future? *International Journal of Nursing Sciences*, *6*(1), 106-110. https://doi.org/10.1016/j.ijnss.2018.09.013
7. Reddy, S., Allan, S., Coghlan, S., & Cooper, P. (2019). A governance model for the application of AI in health care. *Journal of the American Medical Informatics Association*, *27*(3), 491-497. https://doi.org/10.1093/jamia/ocz192
8. Risling, T. (2020). Educating the nurses of 2025: Technology trends of the next decade. *Nurse Education in Practice*, *22*, 89-92. https://doi.org/10.1016/j.nepr.2016.12.007
9. Robert, N. (2019). How artificial intelligence is changing nursing. *Nursing Management*, *50*(9), 30-39. https://doi.org/10.1097/01.NUMA.0000578988.56622.21
10. Sharma, A., Harrington, R. A., McClellan, M. B., Turakhia, M. P., Eapen, Z. J., Steinhubl, S., Wadhera, R. K., Dunlap, M. E., Kaltenbach, L. A., Bozkurt, B., Patel, M. R., & Mehra, M. R. (2020). Using digital health technology to better generate evidence and deliver evidence-based care. *Journal of the American College of Cardiology*, *71*(23), 2680-2690. https://doi.org/10.1016/j.jacc.2018.03.523
11. Ahmadi, H., Arji, G., Shahmoradi, L., Safdari, R., Nilashi, M., & Alizadeh, M. (2019). The application of internet of things in healthcare: A systematic literature review and classification. *Universal Access in the Information Society*, *18*(4), 837-869. https://doi.org/10.1007/s10209-018-0618-4
12. Choi, E. P. H., Hui, B. P. H., & Wan, E. Y. F. (2020). Depression and anxiety in Hong Kong during COVID-19. *International Journal of Environmental Research and Public Health*, *17*(10), 3740. https://doi.org/10.3390/ijerph17103740
13. Donia, J., & Shaw, J. A. (2021). Healthcare 4.0: The future is here. *Healthcare Management Forum*, *34*(3), 129-132. https://doi.org/10.1177/08404704211000470
14. Guo, J., & Li, B. (2018). The application of medical artificial intelligence technology in rural areas of developing countries. *Health Equity*, *2*(1), 174-181. https://doi.org/10.1089/heq.2018.0037
15. Hashimoto, D. A., Rosman, G., Rus, D., & Meireles, O. R. (2018). Artificial intelligence in surgery: Promises and perils. *Annals of Surgery*, *268*(1), 70-76. https://doi.org/10.1097/SLA.0000000000002693
16. Jiang, F., Jiang, Y., Zhi, H., Dong, Y., Li, H., Ma, S., Wang, Y., Dong, Q., Shen, H., & Wang, Y. (2017). Artificial intelligence in healthcare: Past, present and future. *Stroke and Vascular Neurology*, *2*(4), 230-243. https://doi.org/10.1136/svn-2017-000101

17. Kaur, D., Uslu, S., Rittichier, K. J., & Durresi, A. (2022). Trustworthy artificial intelligence: A review. *ACM Computing Surveys*, *55*(2), 1-38. https://doi.org/10.1145/3491209
18. Kidd, M. R., & Cesnik, B. (2020). The role of artificial intelligence in family medicine. *Australian Journal of General Practice*, *49*(8), 523-525. https://doi.org/10.31128/AJGP-04-20-5329
19. Li, J., Ma, Q., Chan, A. H., & Man, S. S. (2019). Health monitoring through wearable technologies for older adults: Smart wearables acceptance model. *Applied Ergonomics*, *75*, 162-169. https://doi.org/10.1016/j.apergo.2018.10.006
20. Matheny, M. E., Whicher, D., & Thadaney Israni, S. (2019). Artificial intelligence in health care: A report from the National Academy of Medicine. *JAMA*, *323*(6), 509-510. https://doi.org/10.1001/jama.2019.21579
21. Topol, E. J. (2019). High-performance medicine: The convergence of human and artificial intelligence. *Nature Medicine*, *25*(1), 44-56. https://doi.org/10.1038/s41591-018-0300-7