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“Knowledge and Challenges Faced by Nurses in integrating Artificial Intelligence into Routine Clinical Practices”

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ABSTRACT

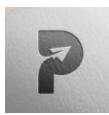
Background: Artificial intelligence (AI) is emerging as an important innovation in healthcare, influencing clinical decision-making, patient monitoring, and quality of care. Nurses play a crucial role in implementing AI-based technologies in clinical settings. Adequate knowledge and preparedness among nurses are essential for the effective and ethical integration of artificial intelligence into nursing practice. However, limited training and multiple challenges may hinder its successful adoption.

Objective: To assess the knowledge and challenges faced by the staff nurses regarding artificial intelligence and its integration into clinical nursing practice.

Methodology: A descriptive research design was adopted for the study. The study was conducted among staff nurses working at selected hospital. A sample of 100 staff nurses was selected using an appropriate sampling technique. Data were collected using an structured questionnaire consisting of three sections: Demographic variables, Knowledge regarding Artificial Intelligence, and Challenges faced in integrating AI into routine clinical practice. The collected data were coded, tabulated, and analysed using descriptive statistics, namely frequency and percentage distribution.

Results: The findings revealed that the majority of staff nurses (62%) were in the age group of 21-30 years, (74%) female and (58%) possessed diploma or basic degree level nursing qualifications. Most nurses (82%) were aware of AI in healthcare, however, only (28%) had received formal training related to AI, and (32%) had used AI based tools in their clinical practice. Regarding knowledge levels, (56%) of nurses had moderately adequate knowledge, (24%) had good knowledge, (20%) had poor knowledge regarding AI. Lower knowledge scores were observed in areas related to ethical issues (64%), data privacy and security (61%), health informatics knowledge (59%), and limitations of artificial intelligence (57%). Major challenges face by nurses in integrating AI included lack of training (78%), lack of technical support (72%), high cost of AI system (69%), ethical and privacy concerns (66%), poor infrastructure (64%), and time constant (61%).

Conclusion: The study concludes that although staff nurses possess basic awareness and moderately adequate knowledge regarding artificial intelligence, several challenges hinder its effective integration into clinical nursing practice. There is a strong need for structured education, hands-on training, organizational



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support, adequate infrastructure, and clear ethical guidelines to facilitate the successful adoption of artificial intelligence in nursing practice.

Keywords: Artificial Intelligence, Nursing Practice, Knowledge, Challenges, Staff Nurses, Clinical Decision Making, Healthcare Technology.

BACKGROUND

The healthcare system has undergone significant transformation due to rapid technological advancements. Artificial intelligence is one of the most promising innovations that has the potential to revolutionize healthcare delivery. AI technologies are increasingly being applied in areas such as disease prediction, diagnostic imaging, patient monitoring, treatment planning, and hospital management.¹

In nursing practice, artificial intelligence can support nurses by reducing workload, improving accuracy, and enhancing patient safety. AI-based systems can help in early identification of patient deterioration, prevention of medication errors, and efficient documentation. Smart monitoring devices and predictive alert systems can assist nurses in providing timely interventions, especially in critical care settings.²

Globally, developed countries have already started implementing artificial intelligence in healthcare institutions. However, in developing countries like India, the integration of AI into clinical practice is still in the early stages. Limited infrastructure, lack of training programs, and inadequate exposure to advanced technologies are some of the barriers to AI adoption.³

Nursing education in many institutions does not adequately cover artificial intelligence and its applications. As a result, nurses may feel unprepared or hesitant to use AI-based systems. Additionally, concerns related to ethical issues, data privacy, job security, and dependence on machines further contribute to resistance toward AI integration.⁴

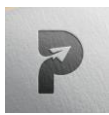
NEED FOR THE STUDY

The need for the present study arises from the growing importance of artificial intelligence in healthcare and the critical role of nurses in its implementation. Without adequate knowledge and skills, the benefits of artificial intelligence cannot be fully utilized. Several challenges such as lack of training, insufficient technical support, fear of job replacement, ethical concerns, and resistance to change can negatively affect the integration of artificial intelligence in nursing practice.

OBJECTIVES

1. To assess the knowledge regarding artificial intelligence among nurses working at Narayan Medical College and Hospital (NMCH), Jamuhar.
2. To identify the challenges faced by nurses in integrating artificial intelligence into routine clinical practices.
3. To determine the association between the level of knowledge and challenges faced regarding artificial intelligence and selected demographic variables of nurses

METHODOLOGY RESEARCH APPROACH

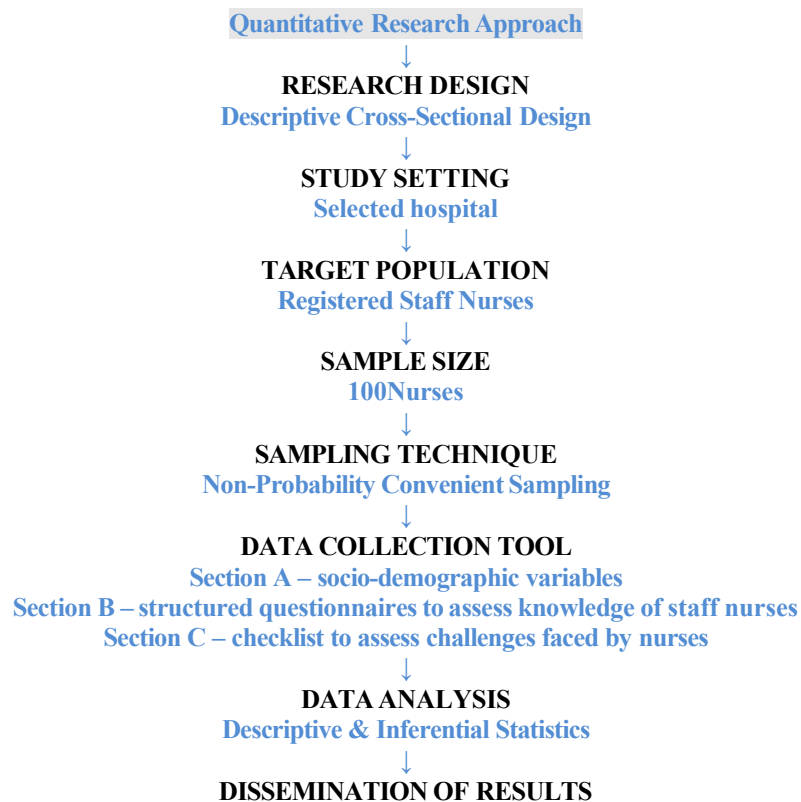


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SCHEMATIC REPRESENTATION OF METHODOLOGY

DESCRIPTION OF THE TOOL

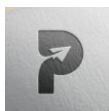
Section A: Socio demographic variables such as age, gender, educational qualification, years of experience, area of work, and previous AI training.

Section B: A structured questionnaire consisting of **25 multiple-choice questions** to assess knowledge regarding artificial intelligence

- Knowledge regarding Artificial Intelligence(5items).
- Knowledge regarding AI in healthcare.(10 items).
- Knowledge to assess integration of AI in clinical practice(10 items).

Scoring: Good (18-25), Average (9-17), Poor (0-8)

Table 1: Scoring And Interpretation of knowledge



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N =100

Knowledge Level	Score Range
Good	18-25
Average	9-17
Poor	0-8

Section C: A structured **checklist** consisting of **15 items** to assess challenges faced by nurses in integrating artificial intelligence into clinical practice.

Table 2: Scoring & Interpretation of Challenges

Response	Score Range
Yes	1 mark
No	0 mark

MAJOR FINDINGS

SECTION A: Socio demographic variables The workforce is primarily female (**72%**), young (majority aged **21–30**), and married (**60%**). Almost half (**46%**) of the study subjects hold a GNM diploma, and (**58%**) have less than 4 years of clinical experience. While awareness of AI is relatively high (**70%**), actual clinical utilization is low (**22%**). A significant majority (**85%**) lack formal AI training. Of those trained, most received short-duration sessions (**1–3 days**). While (**68%**) use computers, a substantial portion (**38%**) still lacks internet access at their workplace, posing a barrier to digital health integration.

SECTION B: Level of knowledge regarding integration of Artificial Intelligence into clinical practices

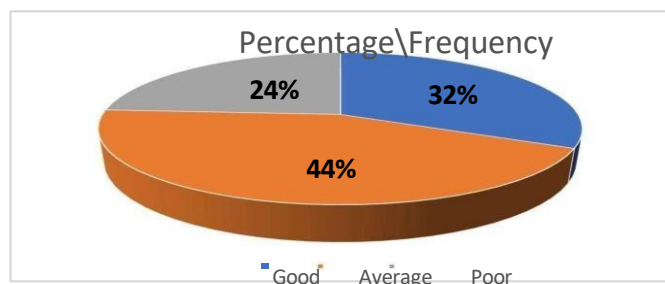
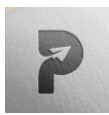


FIG 1:- Frequency and Percentage Distribution of Study Subjects on the basis of their knowledge score related to Artificial Intelligence. FIG 1 depicts that majority of nurses 44% have good knowledge, 32% had Average



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knowledge, and 24% had Poor knowledge regarding artificial intelligence.

SECTION – C : Challenges faced by nurses

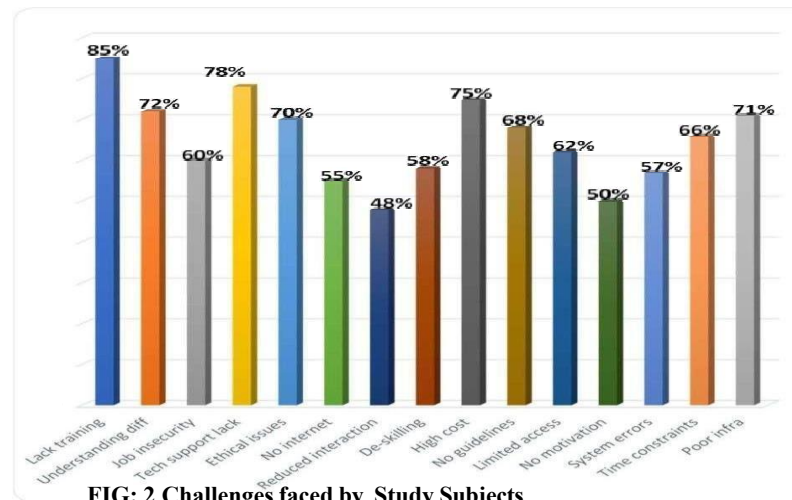


FIG: 2 Challenges faced by Study Subjects

FIG 2 Represents that the major challenges reported by nurses were **lack of training and knowledge (85%)**, **lack of technical support (78%)**, **high cost of AI systems (75%)**, **difficulty in understanding AI (72%)**, **poor infrastructure (71%)** and **ethical and privacy issues (70%)**. Other significant challenges included **time constraints (66%)**.

SECTION D : Association between socio demographic variables and knowledge of study subjects

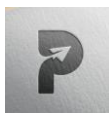
Findings: In this specific dataset, most of the p-values are significantly higher than 0.05. This indicates that there is **no statistically significant association** between most of the demographic variables (Age, Gender, Education, etc.) and the knowledge levels of the nurses. However, **formal training related to AI ($p < 0.05$)** shows a **statistically significant association** with knowledge level

DISCUSSION

A. Objective 1: To assess the knowledge regarding artificial intelligence and its integration into clinical nursing practice

The present study findings revealed that **44% of staff nurses had average knowledge**, **32% had good knowledge**, and **24% had poor knowledge** regarding artificial intelligence. The **mean knowledge score was**

61.16%, which indicates that the **majority of nurses possessed moderate knowledge** regarding AI concepts, clinical applications, and decision-support systems. However, lower scores were noted in ethical issues, informatics



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knowledge, and AI limitations.

Sharma P, Gupta R (2024) conducted a descriptive cross-sectional study among staff nurses working in tertiary care hospitals in North India to assess knowledge and awareness regarding artificial intelligence in nursing practice. The findings revealed that **46%** of nurses had **average knowledge**, **29%** had **good knowledge** and **25%** had **poor knowledge** related to Artificial Intelligence.⁵

B. Objective 2: Objective 2: To identify challenges faced by nurses in integrating artificial intelligence into clinical practice

The present study findings revealed that the major challenges faced by nurses in integrating artificial intelligence into clinical nursing practice were lack of training and knowledge (**85%**), lack of technical support (**78%**), high cost of AI systems (**75%**), difficulty in understanding AI (**72%**), poor infrastructure (**71%**), and ethical and privacy issues (**70%**). These findings indicate that educational, organizational, technical, and ethical barriers significantly affect successful AI implementation among staff nurses.

Nair S, Thomas L, Joseph M. et al. (2024) conducted a qualitative study among nurses working in government hospitals in Kerala, India to explore challenges in AI adoption. The authors concluded that institutional readiness and nurse empowerment are critical for AI integration. These findings strongly support the present study results, where lack of training (**85%**), poor infrastructure (**71%**), and ethical issues (**70%**) were reported as major challenges.⁶

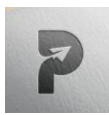
C. Objective 3: To find association between knowledge score and selected demographic variables.

The present study revealed that there was **Only One variable statistically significant association** between selected demographic variables and knowledge level among staff nurses. Variables such as age, gender, education, clinical experience, and department were found to be non-significant at **P value** more than **0.05 level**, indicating that AI knowledge gaps were widely distributed across all nurse groups while, variable such as AI training is found to be significant at **P value** of **0.04 level**.

Mishra N, Roy A. (2025) conducted a correlational study among staff nurses in teaching hospitals in Eastern India to determine the association between demographic variables and digital health knowledge, including AI. The study findings revealed **no statistically significant association** between age, gender, educational qualification, or years of experience and AI knowledge scores. However, prior exposure to training programs showed a significant influence. These findings were consistent with the present study, where no selected demographic variables were significantly associated with knowledge level.⁷

CONCLUSION

The study concludes that the staff nurses possess **basic awareness and moderate knowledge** regarding Artificial Intelligence, but lack of adequate training and practical exposure required for effective integration into clinical nursing practice. The major challenges identified include insufficient training, lack of technical



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and organizational support, ethical concerns, high cost, and inadequate infrastructure. These challenges highlight the need for systematic planning, educational initiatives, and institutional support to facilitate successful integration of artificial intelligence in nursing practice. In this specific dataset **no statistically significant association** between most of the demographic variables and the knowledge levels of the nurses. However, **formal training related to AI ($p < 0.05$)** shows a **statistically significant association** with knowledge level.

Overall, the findings emphasize that **artificial intelligence can be effectively utilized in nursing practice only when nurses are adequately trained, supported, and guided through clear policies and ethical frameworks.**

IMPLICATIONS OF THE STUDY

Based on the findings of the study, the following recommendations are suggested:

Nursing Practice

- Regular in-service education and training programs on artificial intelligence should be organized for staff nurses.
- Hands-on training should be provided to enhance practical skills in using AI-based tools.
- Hospitals should ensure availability of adequate infrastructure, computers, and internet facilities.

Nursing Education

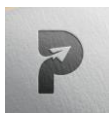
- Artificial intelligence concepts should be included in the nursing curriculum at GNM, B.Sc, and M.Sc levels.
- Workshops, seminars, and continuing nursing education (CNE) programs on AI should be encouraged.

Nursing Administration

- Nurse administrators should promote positive attitude towards AI adoption.
- Institutional policies and clear guidelines should be developed for ethical and safe use of AI in clinical practice.
- Adequate technical support should be made available to nurse.

Nursing Research

- Similar studies can be conducted on a larger sample for better generalization.
- Experimental studies can be undertaken to evaluate the effectiveness of AI training programs.
- Comparative studies can be conducted between different hospitals or healthcare settings



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RECOMMENDATIONS

- The study highlights the need for capacity building among nurses to adapt to technologically advanced healthcare systems.
- Findings may assist policymakers in formulating guidelines for the integration of artificial intelligence in nursing practice.
- The study emphasizes the role of leadership in promoting acceptance and utilization of artificial intelligence.
- Results may serve as baseline data for future studies related to AI in nursing g.
- The findings encourage interdisciplinary collaboration between nurses, physicians, and IT professionals.

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