

Knowledge, Attitude, and Ethical Challenges of Artificial Intelligence Use in Nursing Practice Among Staff Nurses in Selected Hospitals of Lucknow District, Uttar Pradesh: A Mixed-Methods Study

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ABSTRACT

Background: Artificial intelligence (AI) is increasingly being incorporated into healthcare to support clinical decision-making, patient monitoring, documentation, prediction, and healthcare management. Nurses are important end-users of these technologies, making their knowledge, attitudes, and understanding of ethical issues relevant to safe implementation. Objective: To assess knowledge, attitude, and perceived ethical challenges related to AI use among staff nurses in selected hospitals of Lucknow District, Uttar Pradesh, and to examine associations and relationships among these variables. Methods: A mixed-methods, descriptive and analytical study was conducted among 150 registered staff nurses in selected private hospitals of Lucknow District. Participants were selected using stratified random sampling. Data were collected using a demographic proforma, a 25-item structured knowledge questionnaire, a 10-item five-point Likert attitude scale, a 10-item ethical challenges checklist, and a semi-structured interview guide. Descriptive statistics, chi-square tests, and Pearson correlation were used for the quantitative analysis. Results: The mean knowledge score was 21.50 (SD 2.31; range 15–25), the mean attitude score was 38.30 (SD 5.21; range 30–47), and the mean ethical-challenge score was 23.00 (SD 4.33; range 16–30). Significant associations with knowledge were observed for nursing qualification, years of clinical experience, type of hospital, AI/digital-health training, use of AI-based tools, computer-use frequency, and source of AI awareness ($p < 0.05$). Attitude was significantly associated with nursing qualification, type of hospital, AI/digital-health training, use of AI-based tools, computer-use frequency, and source of AI awareness. Ethical-challenge scores were significantly associated with nursing qualification, years of clinical experience, type of hospital, AI/digital-health training, use of AI-based tools, computer-use frequency, and source of AI awareness. Knowledge correlated positively with attitude ($r = 0.68$, $p < 0.001$), knowledge with ethical challenges ($r = 0.54$, $p < 0.001$), and attitude with ethical challenges ($r = 0.61$, $p < 0.001$). Conclusion: Staff nurses demonstrated good knowledge and generally positive attitudes toward AI, while reporting moderate ethical concerns. Structured AI education, digital competency development, ethical guidance, and institutional support are warranted for responsible integration of AI into nursing practice.

Keywords: Artificial intelligence; nursing; staff nurses; knowledge; attitude; ethics; digital health; nursing informatics; Lucknow; India.

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INTRODUCTION

Artificial intelligence is increasingly being integrated into healthcare systems to support clinical decision-making, patient monitoring, risk prediction, documentation, and administrative efficiency. In nursing practice, AI-enabled technologies may include clinical decision-support systems, predictive analytics, electronic health records with advanced analytics, automated monitoring, and triage-related tools. The growing presence of these technologies creates opportunities for improving workflow and patient

care, but it also raises questions about privacy, data security, accountability, transparency, algorithmic bias, and professional autonomy.

Nurses are among the principal healthcare professionals interacting with technology-enabled care. Their preparedness therefore has implications for safe implementation and appropriate human oversight. The study materials identify a gap in evidence concerning the combined assessment of knowledge, attitude, and ethical challenges among nurses in India, particularly in Uttar Pradesh and Lucknow. The

present study was designed to address this local evidence gap and support educational and ethical strategies for responsible AI integration.

1.1 Aim and objectives

1. To assess the level of knowledge of staff nurses regarding artificial intelligence and its applications in nursing practice.
2. To assess the attitude of staff nurses toward the use of artificial intelligence in clinical care.
3. To identify perceived ethical challenges related to AI use in nursing practice.
4. To determine associations and relationships among knowledge, attitude, and ethical concerns regarding AI.
5. To recommend ethical and educational strategies for responsible integration of AI in nursing practice.

2. Conceptual framework

The study used a Modified Knowledge–Attitude–Ethical Perception (KAE) Framework adapted from the Knowledge–Attitude–Practice approach. The framework proposes that demographic and contextual factors influence knowledge, attitude, and ethical perceptions related to AI. Intervening factors identified in the study included institutional support, AI training and education, digital literacy, organizational policies, ethical guidelines, and the work environment.

3. Methods

3.1 Study design and setting

A mixed-methods approach with a descriptive and analytical design was used. The quantitative component was conducted in selected private hospitals of Lucknow District, Uttar Pradesh, among registered staff nurses involved in direct patient care.

3.2 Participants and sampling

The study included registered staff nurses involved in patient care who were available during data collection.

4. Results

A total of 150 staff nurses were included in the reported quantitative analysis.

Variable	Mean	SD	Range
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The demographic distribution was balanced by sex, with 75 male and 75 female participants. The largest age categories were 26–30 years and 31–35 years, each representing 25.3% of the sample. Nursing qualifications were distributed across GNM, B.Sc Nursing, Post Basic B.Sc Nursing, and M.Sc Nursing groups.

Knowledge: The mean score of 21.50 ± 2.31 indicated

4.1 Associations

Outcome	Significant variables ($p < 0.05$)	Non-significant variables	Reference p-values
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willing to participate, and able to read and understand English or Hindi. Nursing administrators and supervisors not involved in direct care, nursing students and interns, nurses on long leave, and nurses working only in non-clinical departments were excluded. The planned sample was 120–150 nurses; the final reported sample was 150. Stratified random sampling was used across clinical areas.

3.3 Instruments

Data collection used five components: (A) demographic proforma; (B) a 25-item structured knowledge questionnaire; (C) a 10-item five-point Likert attitude scale; (D) a 10-item ethical challenges checklist; and (E) a semi-structured interview guide for the qualitative component. The knowledge questionnaire covered AI concepts, healthcare applications, benefits, limitations, patient safety, privacy, and ethical aspects. The attitude scale assessed usefulness, acceptance, willingness to use AI, and professional-role concerns. The ethical checklist addressed privacy, confidentiality, data security, accountability, transparency, algorithmic bias, informed consent, professional autonomy, and human oversight.

3.4 Data analysis

Descriptive statistics were used to summarize participant characteristics and study-variable scores. Chi-square tests were used to examine associations between selected demographic characteristics and study variables. Pearson correlation coefficients were used to examine relationships among knowledge, attitude, and ethical-challenge scores. Statistical significance was interpreted at $p < 0.05$.

3.5 Ethical considerations

The dissertation materials include administrative permission, ethical clearance, participant information, informed consent, and other research appendices.

Knowledge	21.50	2.31	15–25
Attitude	38.30	5.21	30–47
Ethical challenges	23.00	4.33	16–30

a relatively high level of knowledge.

Attitude: The mean score of 38.30 ± 5.21 indicated a generally positive attitude toward AI use in nursing practice.

Ethical challenges: The mean score of 23.00 ± 4.33 indicated moderate ethical concerns, particularly concerning privacy, accountability, and data security.

Knowledge	Qualification; clinical experience; hospital type;	Age; gender; working area	0.005, 0.022, 0.033, 0.001, 0.001,
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	AI/digital-health training; AI-tool use; computer-use frequency; AI-awareness source		0.010, 0.006
Attitude	Qualification; hospital type; AI/digital-health training; AI-tool use; computer-use frequency; AI-awareness source	Age; gender; clinical experience; working area	0.015, 0.019, 0.001, 0.001, 0.018, 0.023
Ethical challenges	Qualification; clinical experience; hospital	Age; gender; working area	0.011, 0.034, 0.016, 0.001,

5. Discussion

The study found that staff nurses had a relatively high knowledge score and a generally favorable attitude toward AI. This suggests that exposure to digital technologies may be accompanied by increasing awareness of AI-related applications in healthcare. At the same time, the moderate ethical-challenge score indicates that acceptance of AI does not eliminate concerns about privacy, accountability, transparency, data security, algorithmic bias, and professional autonomy.

The observed associations with nursing qualification, AI-related training, use of AI tools, computer-use frequency, and source of AI awareness indicate that educational and technological exposure may be important correlates of AI preparedness. Because the design is observational, these associations should not be interpreted as evidence that training causes improved knowledge or attitudes.

The positive correlation between knowledge and attitude, and the positive relationships of both variables with ethical-challenge scores, are consistent with the study's KAE framework. These findings support the need to combine technical AI literacy with ethical reasoning rather than treating AI training as a purely technological competency.

WHO guidance emphasizes human autonomy, safety, transparency, accountability, inclusiveness, equity, and responsible governance in AI for health. The

	type; AI/digital-health training; AI-tool use; computer-use frequency; AI-awareness source		0.001, 0.031, 0.044
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4.2 Correlations

Variables	Pearson r	p-value
Knowledge vs attitude	0.68	<0.001
Knowledge vs ethical challenges	0.54	<0.001
Attitude vs ethical challenges	0.61	<0.001

All three correlations were statistically significant and positive, indicating that higher knowledge scores were associated with more positive attitudes and greater awareness of ethical challenges.

ethical concerns identified by nurses in this study therefore align with internationally recognized governance priorities.

6. Implications for nursing

Nursing practice

AI implementation should preserve human clinical judgment, patient privacy, accountability, and patient-centered communication.

Nursing education

AI concepts, digital health, nursing informatics, data privacy, algorithmic bias, transparency, and ethical decision-making should be incorporated into continuing and formal nursing education.

Nursing administration

Hospitals should establish clear institutional guidance for responsible AI use and provide continuing education and digital-support mechanisms.

Nursing research

Future studies should evaluate AI training interventions, multicenter samples, patient outcomes, AI competency, and ethical governance models.

7. Strengths and limitations

A strength of the study is the combined assessment of knowledge, attitude, and ethical challenges among practicing staff nurses in a local Indian hospital context, together with a mixed-methods design and stratified sampling. Limitations reported in the dissertation include the selected-hospital setting, a sample of 150 nurses, self-reported responses, limited

generalizability beyond the selected setting, and assessment at a single point in time.

8. Conclusion

Staff nurses in the selected hospitals demonstrated good knowledge and generally positive attitudes toward AI use in nursing practice, while reporting moderate ethical concerns. Educational preparation, digital literacy, and exposure to AI-related technologies were associated with study outcomes. The findings support structured AI education, ethical guidance, and institutional support to promote safe and responsible AI integration into nursing practice.

9. Recommendations

6. Develop structured AI and digital-health education for nursing professionals.
7. Integrate AI ethics, privacy, data security, algorithmic bias, transparency, and human oversight into nursing curricula and continuing education.
8. Develop institutional policies governing responsible use of AI in clinical nursing practice.
9. Conduct larger multicenter studies to improve generalizability.
10. Evaluate the effectiveness of AI training programs using experimental or quasi-experimental designs.
11. Conduct longitudinal research on changes in AI knowledge, attitudes, ethical perceptions, and clinical outcomes.

10. Declarations

Ethics Approval

Ethical approval was obtained from the appropriate Institutional Ethics Committee before commencement of the study. Administrative permission was obtained from the concerned hospital authorities. All participants were informed about the purpose and procedures of the study, and written informed consent was obtained before participation. Participation was voluntary, and participants were informed of their right to withdraw from the study at any time without penalty.

Availability of Data and Materials

The datasets generated and analyzed during the current study are not publicly available because they contain participant-level research information. Data may be made available from the corresponding author on reasonable request, subject to institutional ethical requirements and applicable data-protection provisions.

Competing Interests

The authors declare that they have no competing interests.

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Author Contributions

Dr. Mohd Danish Rizvi: Conceptualization, methodology, data collection, data analysis and interpretation, manuscript preparation, and critical revision of the manuscript.

Dr. Ravindra H. N. (Guide): Supervision, guidance in study design and methodology, academic guidance, review of the research work, interpretation of findings, and critical revision of the manuscript.

Dr. Kinjal Mistry (Co-Guide): Co-supervision, methodological and academic guidance, review of the research work and manuscript, interpretation of findings, and critical revision of the manuscript.

All authors: Reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

11. References

1. World Health Organization. Ethics and governance of artificial intelligence for health: WHO guidance. Geneva: World Health Organization; 2021.
2. World Health Organization. Ethics and governance of artificial intelligence for health: guidance on large multi-modal models. Geneva: World Health Organization; 2025.
3. O'Connor S, Yan Y, Thilo FJS. Artificial intelligence in nursing and midwifery: a systematic review. *J Clin Nurs*. 2022;31(3-4):295-310.
4. Ronquillo C, Peltonen LM, Prunelli L, Chu CH, Bakken S, Beduschi A, et al. Artificial intelligence in nursing: priorities and opportunities from an international invitational think-tank. *J Adv Nurs*. 2021;77(9):3707-3717.
5. Booth RG, Strudwick G, McBride S, O'Connor S, López ALS. How the nursing profession should adapt for a digital future. *BMJ*. 2021;373:n1190.
6. Morley J, Machado CCV, Burr C, Cows J, Joshi I, Taddeo M, Floridi L. The ethics of AI in health care: a mapping review. *Soc Sci Med*. 2020;260:113172.
7. Davenport T, Kalakota R. The potential for artificial intelligence in healthcare. *Future Healthc J*. 2019;6(2):94-98.
8. Yu KH, Beam AL, Kohane IS. Artificial intelligence in healthcare. *Nat Biomed Eng*. 2018;2(10):719-731.
9. Jiang F, Jiang Y, Zhi H, Dong Y, Li H, Ma S, et al. Artificial intelligence in healthcare: past, present and future. *Stroke Vasc Neurol*. 2017;2(4):230-243.
10. Vandembroucke JP, von Elm E, Altman DG, Gøtzsche PC, Mulrow CD, Pocock SJ, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. *PLoS Med*. 2007;4(10):e297.