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Original Research Article

Acceptance, Perception, and Adaptability Toward Artificial Intelligence in Medical Education Among Medical Interns and Faculty: A Longitudinal UTAUT2-Based Study from India

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Abstract:

Background: Artificial Intelligence (AI) is increasingly transforming healthcare delivery and medical education worldwide. Despite rapid technological advancement, the integration of AI into undergraduate medical education in India remains limited. Understanding awareness, acceptance, and adaptability toward AI among medical trainees and faculty is essential for successful curriculum integration.

Objective: To assess the need for integrating AI in medical education and identify factors influencing acceptance and intention to use medical AI using the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) framework.

Methods: A longitudinal interventional study was conducted among 210 participants, including medical interns and faculty members at Pacific Medical College and Hospital, Udaipur, India. Participants underwent five structured workshops on AI applications in medical education. A validated web-based questionnaire was administered before and after intervention. Variables assessed included awareness, ethical concerns, adaptability, and UTAUT2 constructs. Statistical analysis was performed using SPSS v29.0. Paired t-test, chi-square test, Pearson correlation, and multiple regression analyses were used.

Results: Post-intervention awareness scores significantly improved from 2.91 ± 0.72 to 4.08 ± 0.61 ($p < 0.001$). Behavioural intention toward medical AI increased significantly following the workshop sessions (3.02 ± 0.68 vs. 4.11 ± 0.56; $p < 0.001$). Performance expectancy ($\beta = 0.34$, $p < 0.001$), facilitating conditions ($\beta = 0.28$, $p = 0.002$), trust ($\beta = 0.25$, $p = 0.004$), and hedonic motivation ($\beta = 0.19$, $p = 0.01$) were significant predictors of behavioural intention. Technology fear negatively influenced AI adoption ($\beta = -0.21$, $p = 0.006$). Ethical concerns regarding data privacy and bias remained high despite improved acceptance.

Conclusion: Medical interns and faculty demonstrated improved awareness, adaptability, and acceptance of AI following structured educational intervention. UTAUT2 constructs significantly predicted intention to use medical AI. Integration of AI-focused educational modules within medical curricula may enhance future readiness of healthcare professionals in India.

Keywords: Artificial Intelligence, Medical Education, UTAUT2, Medical Students, Technology Acceptance, AI Ethics, Longitudinal Study.

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Introduction

Artificial Intelligence (AI) has emerged as one of the most transformative technologies in healthcare and medical education. AI-based systems can analyse vast clinical datasets, improve diagnostic precision, support decision-making, and optimize healthcare delivery [1]. Recent advances in machine learning, deep learning, and generative AI have accelerated the integration of intelligent systems into clinical practice, research, and educational environments [2].

The growing implementation of AI in healthcare necessitates corresponding reforms in medical

education. Future physicians are expected not only to understand AI applications but also to critically evaluate ethical, legal, and practical implications of these technologies [3]. Previous studies have shown that medical students and healthcare professionals generally perceive AI positively; however, concerns regarding transparency, reliability, privacy, and professional displacement persist [4].

Globally, medical schools have started integrating AI-related competencies into curricula, including machine learning fundamentals, clinical decision support systems, data analytics, and AI ethics [5]. Nevertheless, the Indian medical education system remains in the early stages of AI integration. Limited awareness, lack of formal training, inadequate infrastructure, and uncertainty regarding curricular restructuring pose significant barriers [6].

The Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) model provides a robust framework for understanding technology adoption behaviour [7,8]. The model includes constructs such as performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habit, trust, and behavioural intention [9,10]. Previous studies have demonstrated the utility of UTAUT2 in evaluating acceptance of digital health technologies, yet limited literature exists regarding its application in AI-based medical education in India [11,12].

The present study aimed to assess awareness, perception, adaptability, and acceptance toward AI integration in medical education among medical interns and faculty members using a longitudinal UTAUT2-based approach.

Materials and Methods

Study Design and Setting: A longitudinal interventional study was conducted at Pacific Medical College and Hospital between March 2024 and June 2024.

Participants: The study included medical interns and faculty members willing to participate and provide informed consent. Convenience sampling was employed. A total of 230 participants were approached, of whom 210 completed both pre- and post-intervention assessments (response rate: 91.3%).

Intervention

Participants underwent five structured module workshops covering:

1. Introduction to AI in healthcare
2. AI-assisted diagnostics
3. Clinical decision-support systems
4. AI ethics and legal considerations
5. Generative AI applications in medical education

Each workshop lasted approximately 90 minutes and included demonstrations, case-based discussions, and practical examples.

Data Collection Tool: A structured questionnaire based on the UTAUT2 model was developed using previously validated studies. The questionnaire consisted of:

- Demographic characteristics
- Awareness and perception toward AI
- Ethical concerns regarding AI integration
- UTAUT2 constructs
- Behavioural intention and adaptability
- Responses were measured on a 5-point Likert scale.

Reliability and Validity: Pilot testing was performed among 25 participants excluded from final analysis. Cronbach's alpha for the overall questionnaire was 0.89, indicating good internal consistency.

Statistical Analysis: Data were analysed using SPSS version 29.0. Continuous variables were presented as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages.

The following analyses were performed:

- Paired t-test for pre- and post-intervention comparison
- Chi-square test for categorical variables
- Pearson correlation analysis
- Multiple linear regression to identify predictors of behavioural intention
- A p-value < 0.05 was considered statistically significant.

Ethical Considerations: Institutional Ethics Committee approval was obtained prior to study initiation. Written informed consent was obtained from all participants. Confidentiality and anonymity were maintained throughout the study.

Results

Demographic Characteristics: Among 210 participants, 132 (62.9%) were interns and 78 (37.1%) were faculty members. The mean age was 27.6 ± 5.8 years. Female participants constituted 54.3% of the sample.

Table 1: Demographic Characteristics of Participants

Variable	Frequency (%)
Interns	132 (62.9)
Faculty	78 (37.1)
Male	96 (45.7)
Female	114 (54.3)
Previous AI Exposure	88 (41.9)
No Prior AI Exposure	122 (58.1)

Awareness and Perception Toward AI: Mean awareness scores significantly improved following workshop intervention.

Table 2: Pre- and Post-Intervention Awareness Scores

Variable	Pre-test Mean ± SD	Post-test Mean ± SD	p-value
Awareness Score	2.91 ± 0.72	4.08 ± 0.61	<0.001
Perception Score	3.12 ± 0.68	4.01 ± 0.57	<0.001
Adaptability Score	2.87 ± 0.75	3.96 ± 0.63	<0.001

Participants reported improved understanding of AI-assisted diagnostics, virtual assistants, and AI-supported research applications.

UTAUT2 Constructs and Behavioural Intentio

Table 3: Predictors of Behavioural Intention Toward Medical AI

Predictor	β Coefficient	p-value
Performance Expectancy	0.34	<0.001
Facilitating Conditions	0.28	0.002
Trust	0.25	0.004
Hedonic Motivation	0.19	0.010
Social Influence	0.17	0.021
Technology Fear	−0.21	0.006

Performance expectancy emerged as the strongest positive predictor of AI acceptance.

Ethical Concerns Regarding AI: Data privacy (82.4%), algorithmic bias (76.1%), and reduction in physician-patient interaction (69.5%) were the most frequently reported concerns.

Table 4: Ethical Concerns Regarding AI Integration

Ethical Concern	Agree/Strongly Agree (%)
Data Privacy and Security	82.4
Algorithmic Bias	76.1
Transparency Issues	73.8
Reliability Concerns	65.2
Increased Unemployment	48.5

Discussion

The present longitudinal study evaluated awareness, perception, adaptability, and acceptance toward artificial intelligence (AI) in medical education among medical interns and faculty members using the UTAUT2 framework. The findings demonstrated significant improvement in participants' awareness and behavioural intention following structured AI module workshops. These findings are consistent with the growing global evidence supporting the integration of AI competencies into undergraduate and professional medical education.

In the current study, awareness scores significantly improved after intervention, indicating that structured educational exposure positively influences understanding and acceptance of AI applications in medicine. Similar findings were reported by Buabbas AJ et al. [1], who observed that medical students demonstrated increased enthusiasm and understanding toward AI after formal educational exposure. Likewise, Chan KS and Zary N [14] reported that targeted AI teaching modules significantly improved digital competency and preparedness among healthcare students.

The present study found that performance expectancy was the strongest predictor of behavioural intention toward medical AI. Participants believed that AI could improve diagnostic accuracy, reduce medical errors, and enhance efficiency in clinical practice. This observation aligns with the findings of Pinto Dos

Santos D et al. [13], who reported that medical students perceived AI as a supportive technology capable of improving clinical decision-making rather than replacing physicians. Similarly, Topol EJ [18] emphasized that AI has the potential to augment human intelligence and improve healthcare outcomes through enhanced precision and personalized medicine.

Facilitating conditions and trust also emerged as significant positive predictors of AI acceptance in the present study. Participants expressed greater willingness to adopt AI when adequate technical infrastructure, institutional support, and training opportunities were available. Comparable findings were observed by Paranjape K et al. [17], who highlighted that availability of institutional support and technical guidance substantially improved AI readiness among medical learners. Additionally, studies by Ho MT et al. [5] demonstrated that trust in AI systems significantly influences user acceptance and long-term adoption within healthcare settings.

Technology fear negatively affected behavioural intention in the current study [15]. Participants expressed concerns regarding dependence on AI, fear of making irreversible diagnostic errors, and reduction of clinical reasoning abilities. These findings are consistent with previous studies by Quinn TP and Coghlan S [6], who reported that healthcare professionals frequently perceive AI as a potential threat to professional autonomy and clinical judgment. Similarly, McCoy LG et al. [20] noted that uncertainty regarding AI functioning and lack of technical familiarity contribute substantially to anxiety and resistance toward AI implementation.

The present study also identified persistent ethical concerns related to data privacy, algorithmic bias, transparency, and reduction in physician–patient interaction. Although workshop-based education improved awareness and adaptability, ethical apprehensions remained high among participants [19]. Similar observations were made by Wartman SA and Combs CD [16], who argued that AI integration into medical curricula must include ethical governance, accountability, and bias mitigation strategies. Furthermore, Gilson A et al. [10] emphasized that large language models and generative AI systems may produce inaccurate or misleading outputs, reinforcing the need for critical appraisal skills among future physicians.

Interestingly, the current study demonstrated greater acceptance of AI among younger participants and interns compared to senior faculty members. This trend has also been documented in studies conducted by Ahmad MN et al. [4], where younger healthcare learners exhibited higher digital adaptability and openness toward AI-assisted learning environments. The higher adaptability among interns in the present study may be attributable to greater familiarity with digital technologies and increased exposure to technology-driven educational platforms [21].

The findings of the present study have important implications for medical curriculum restructuring in India. Existing medical curricula primarily focus on traditional clinical competencies with limited emphasis on digital health technologies. Similar to recommendations proposed by Frommeyer TC et al. [8], the current study supports the inclusion of AI literacy, machine learning fundamentals, clinical decision-support systems, and AI ethics as essential components of undergraduate medical training.

A major strength of this study was its longitudinal interventional design, which enabled assessment of changes in awareness and behavioural intention before and after educational intervention. Additionally, the use of the UTAUT2 framework provided a comprehensive theoretical basis for understanding determinants of AI acceptance. However, the study was limited by its single-centre setting, convenience sampling, and relatively short duration of follow-up. Future multicentric studies involving larger and more diverse populations are required to validate these findings and assess long-term implementation outcomes.

Overall, the present findings strongly suggest that structured educational interventions can significantly improve AI readiness among medical professionals. However, successful integration of AI into medical education will require balanced incorporation of technical competencies, ethical training, and institutional support systems to ensure responsible and effective utilization of AI technologies in healthcare practice.

Conclusion

Structured AI educational workshops significantly improved awareness, perception, and adaptability toward AI among medical interns and faculty members. UTAUT2 constructs, particularly performance expectancy, facilitating conditions, and trust, positively influenced behavioural intention toward medical AI.

The findings support the inclusion of AI-focused educational modules within Indian medical curricula to prepare future healthcare professionals for evolving digital healthcare ecosystems.

Strengths and Limitations

Strengths

- Longitudinal interventional design
- Use of validated UTAUT2 framework
- Inclusion of both interns and faculty
- Comprehensive assessment of ethical concerns

Limitations

- Single-centre study
- Convenience sampling
- Short intervention duration
- Self-reported measures may introduce bias

Future Recommendations

- Multicentric national studies
- Inclusion of postgraduate trainees
- Integration of practical AI training modules
- Development of standardized AI competency frameworks
- Long-term follow-up studies assessing clinical implementation

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