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Perceptions, effectiveness, and credibility of artificial intelligence in healthcare among medical students and interns: A cross-sectional study

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ABSTRACT

Artificial intelligence (AI) is rapidly transforming healthcare and medical education; however, its successful integration depends on the perceptions, perceived effectiveness, and credibility among future healthcare professionals. This study aimed to evaluate these dimensions among medical students and interns. A cross-sectional descriptive study was conducted among 151 participants using a structured, self-administered questionnaire. The instrument included demographic variables and Likert-scale items assessing perception, effectiveness, and credibility of AI. Data were analyzed using descriptive statistics; continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Likert-scale responses were summarized and reported in tabular form. The mean age of participants was 23.9 ± 2.8 years; 82.8% were medical students and 64.9% were male. Overall, participants demonstrated a positive perception of AI. A large majority agreed that AI improves diagnostic accuracy (86.1%), enhances patient outcomes (86.1%), supports treatment decisions (84.8%), and reduces medical errors (78.1%). Strong support was observed for integrating AI into the medical curriculum (82.1%), and 86.7% recognized its benefits in disease management. Perceived effectiveness was consistently high across domains. However, credibility perceptions were comparatively moderate. While 62.9% trusted AI-based clinical decision-making, 80.1% considered AI reliable only with physician supervision, and 86.1% emphasized the need for human verification. Willingness to rely on AI for critical decisions was lower (52.3%). In conclusion, medical students and interns show strong acceptance of AI effectiveness, alongside conditional trust in its credibility, highlighting the need for structured education and supervised implementation.

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INTRODUCTION

Artificial intelligence (AI) has emerged as one of the most transformative technological advancements in modern healthcare, reshaping how medical knowledge is generated, accessed, and applied (Fahim *et al.*, 2025; Rehman *et al.*, 2025). Broadly defined as the ability of computer systems to perform tasks that typically require human intelligence, such as learning, reasoning, and decision-making, AI has rapidly progressed due to advances in machine learning, deep learning, and large language models (Pomerol, 1997; Korteling *et al.*, 2021; Rehman *et al.*, 2025). These developments have enabled AI-driven tools to assist in disease diagnosis, medical imaging, clinical decision support, personalized treatment planning, and health system management (Kothinti *et al.*, 2024; Rehman *et al.*, 2025). In parallel with its expanding clinical applications, AI has gained significant attention within medical education (Rashid *et al.*, 2025).

Medical training is increasingly challenged by expanding curricula, rapid growth of biomedical knowledge, limited instructional time, and the need to prepare future physicians for technology-driven healthcare environments (Masoumian *et al.*, 2025). AI-powered educational tools offer potential solutions to these challenges by enabling personalized learning experiences, rapid access to up-to-date medical information, adaptive feedback mechanisms, and efficient revision strategies. As a result, medical students and interns are increasingly incorporating AI tools into their daily learning routines (Khakpaki *et al.*, 2024). Despite growing enthusiasm, the integration of AI into medical education remains uneven and largely informal. Many students rely on publicly available AI tools without structured guidance, raising important questions about effectiveness, credibility, and ethical implications (Knopp *et al.*, 2023; Tong *et al.*, 2024; Lazarus *et al.*, 2024). While AI may enhance learning efficiency and conceptual understanding, concerns persist regarding the accuracy of AI-generated information, over-reliance on technology, erosion of critical thinking skills, and potential bias in algorithmic outputs (Shafei and Ahmed, 2025).

These concerns underscore the importance of evaluating not only how effective AI is perceived to be, but also how trustworthy future healthcare professionals consider it to be. Perception plays a critical role in determining the successful adoption of new technologies.

Positive perceptions of usefulness and effectiveness can drive acceptance, whereas skepticism regarding credibility and reliability may limit adoption or encourage cautious use (Agarwal and Prasad, 1998; Ponce *et al.*, 2026). Previous studies conducted across different regions have reported generally favorable attitudes toward AI among medical students, with many supporting its inclusion in medical curricula. However, these studies also highlight persistent apprehension regarding AI replacing traditional learning methods or influencing clinical autonomy (Buabbas *et al.*, 2023). Importantly, the balance between optimism and caution varies depending on students' level of exposure, technological familiarity, and educational context. The concept of effectiveness in AI-assisted medical education extends beyond simple usability. It encompasses the perceived ability of AI tools to improve diagnostic reasoning, reduce learning time, enhance comprehension of complex medical concepts, and ultimately improve academic and clinical performance (Busch *et al.*, 2023). Similarly, credibility refers to the extent to which learners trust AI-generated information, perceive it as medically accurate, and believe it can be safely integrated into clinical decision-making with appropriate human oversight (Jones *et al.*, 2023). Understanding these dimensions is essential for designing evidence-based educational strategies and regulatory frameworks.

Given the rapid expansion of AI technologies and their increasing use by medical trainees, there is a growing need for empirical data assessing how these tools are perceived by those who will soon

transition into independent clinical practice. Evaluating medical students' and interns' views on AI can provide valuable insights into readiness for AI integration, potential educational gaps, and areas requiring formal training and ethical guidance. Therefore, the present study aimed to comprehensively assess the general perception, perceived effectiveness, and credibility of artificial intelligence in healthcare among medical students and interns. By analyzing attitudes across these domains using structured survey data and visual analytics, this study seeks to inform educators, policymakers, and curriculum developers about the opportunities and challenges associated with integrating AI into medical education and future clinical practice.

MATERIALS AND METHODS

Study design

A cross-sectional descriptive study was conducted to assess medical students' and interns' perceptions regarding the general perception, effectiveness, and credibility of artificial intelligence (AI) in healthcare and medical education. The study design was chosen to capture attitudes and perceptions at a single point in time, providing a snapshot of current trends in AI acceptance among future healthcare professionals.

Study setting and participants

The study included medical students and interns enrolled in medical training programs. Participants were recruited using convenience sampling. Eligibility criteria included: Enrollment as a medical student (Undergraduate level) or intern/resident. Willingness to participate voluntarily. Ability to complete an online questionnaire. Participants from non-medical disciplines and incomplete survey responses were excluded from the final analysis.

Sample size

A total of 151 participants completed the questionnaire and were included in the final analysis. The sample size was considered adequate for descriptive and subgroup analysis of perceptions related to AI use in healthcare and education.

Data collection tool

Data were collected using a structured, self-administered questionnaire developed after reviewing previously published and validated studies assessing artificial intelligence in medical education and healthcare. The questionnaire was designed in English and distributed electronically using an online survey platform. The questionnaire consisted of four main sections: Demographic Information: This section collected data on age, gender, professional role (medical student or intern/resident), and academic year (for students). General Perception of Artificial Intelligence:

Items assessed participants' awareness of AI, overall attitudes toward AI in healthcare, and opinions regarding the integration of AI into medical education. Effectiveness of Artificial Intelligence: This section evaluated participants' perceptions of AI effectiveness, including its role in improving diagnostic accuracy, reducing medical errors, enhancing patient outcomes, supporting learning efficiency, and benefiting the general public in disease management. Credibility of Artificial Intelligence: Items examined trust in AI-based systems, reliability of AI-generated information, perceived need for human verification, and willingness to rely on AI for clinical decision-making. Responses in Sections 2–4 were measured using a Likert scale (agree, strongly agree, disagree, strongly disagree).

Pilot testing and reliability

Before the main survey, the questionnaire was reviewed for clarity, relevance, and face validity. Minor revisions were made to improve wording and consistency. Internal consistency of the perception-related items was assessed using Cronbach's alpha, which demonstrated acceptable reliability across the questionnaire domains.

Data collection procedure

The survey link was distributed electronically to eligible participants. Participation was voluntary, and

no incentives were provided. The first page of the questionnaire included an information sheet explaining the study objectives, followed by an informed consent statement. Only participants who provided consent could proceed with the survey. To ensure confidentiality, no personally identifiable information was collected. All responses were stored securely and accessed only by the research team.

Statistical analysis

Data were exported into spreadsheet format and analyzed using standard statistical software. Descriptive statistics were applied to summarize the data. Continuous variables were reported as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Likert-scale responses were analyzed by summarizing the distribution of response categories. Results were presented in tabular form.

RESULTS

Participant characteristics

A total of 151 respondents completed the survey and were included in the final analysis. The mean age of participants was 23.9 ± 2.8 years, with ages ranging from early undergraduate to early postgraduate training. Most respondents were medical students (82.8%), while 17.2% were interns or residents. Male participants constituted 64.9% of the sample, and females accounted for 35.1%. Detailed demographic characteristics are presented in Table 1.

Table 1. Demographic characteristics of study participants

Variable	Category	N	%
Age (years)	Mean ± SD	23.9 ± 2.8	—
	Range	18–35	—
Gender	Male	98	64.9
	Female	53	35.1
Professional role	Medical student	125	82.8
	Intern/Resident	26	17.2
Academic year (Students only)	5th year	—	—
	6th year	—	—

General perception of artificial intelligence in healthcare

Participants demonstrated an overall positive perception of artificial intelligence (AI) in healthcare (Table 2). A large majority agreed that AI has the potential to improve diagnostic accuracy (86.1%) and support clinicians in selecting better treatment options (84.8%). Similarly, strong agreement was observed for the role of AI in improving patient outcomes (86.1%) and reducing medical errors (78.1%), indicating broad confidence in its clinical applicability.

Table 2. General perception of artificial intelligence in healthcare among participants

Statement	Strongly agree n (%)	Agree n (%)	Disagree n (%)	Strongly disagree n (%)
AI will significantly improve the accuracy of medical diagnosis	38 (25.2)	92 (60.9)	19 (12.6)	2 (1.3)
AI will help doctors choose better treatment options	35 (23.2)	93 (61.6)	20 (13.2)	3 (2.0)
AI will reduce medical errors in the future	10 (6.6)	108 (71.5)	26 (17.2)	7 (4.6)
I trust AI-based systems in clinical decision-making	5 (3.3)	90 (59.6)	50 (33.1)	6 (4.0)
AI will be effective in improving patient outcomes	36 (23.8)	94 (62.3)	19 (12.6)	2 (1.3)
AI should be included in the medical curriculum	37 (24.5)	87 (57.6)	20 (13.2)	7 (4.6)
AI will be useful for the general public in disease management	21 (13.9)	110 (2.8)	17 (11.3)	1 (2.0)

Support for integrating AI into medical education was also high, with 82.1% of respondents favoring its inclusion in the medical curriculum. In addition, most participants (approximately 86.7%) perceived AI as beneficial for the general public in disease management, suggesting recognition of its wider healthcare impact beyond clinical settings and preventive healthcare strategies.

Table 3. Perceived effectiveness of artificial intelligence in healthcare

Statement	Strongly agree n (%)	Agree n (%)	Disagree n (%)	Strongly disagree n (%)
AI will significantly improve the accuracy of medical diagnosis	38 (25.2)	92 (60.9)	19 (12.6)	2 (1.3)
AI will help doctors choose better treatment options	35 (23.2)	93 (61.6)	20 (13.2)	3 (2.0)
AI will reduce medical errors in the future	10 (6.6)	108 (71.5)	26 (17.2)	7 (4.6)
AI will be effective in improving patient outcomes	36 (23.8)	94 (62.3)	19 (12.6)	2 (1.3)
AI will be useful for the general public in disease management	21(13.9)	110 (2.8)	17(11.3)	1 (2.0)

Table 4. Credibility of artificial intelligence in healthcare among participants

Statement	Strongly agree n (%)	Agree n (%)	Disagree n (%)	Strongly disagree n (%)
I trust AI-based systems in clinical decision-making	5 (3.3)	90 (59.6)	50 (33.1)	6 (4.0)
AI-based recommendations are reliable when supervised by physicians	32 (21.2)	89 (58.9)	24 (15.9)	6 (4.0)
AI systems provide consistent and unbiased clinical information	29 (19.2)	69 (45.7)	44 (29.1)	9 (6.0)
Human experts should always verify AI Decisions	67 (44.4)	63 (41.7)	16 (10.6)	5 (3.3)
I would rely on AI for critical clinical decisions	8 ((5.3)	71 (47.0)	58 (38.4)	4 (9.3)

However, perceptions of trust in AI-based clinical decision-making were comparatively moderate. While 62.9% of participants expressed agreement, a considerable proportion (37.1%) reported skepticism, reflecting cautious attitudes toward full reliance on AI systems.

Overall, these findings indicate strong acceptance of AI's potential benefits among medical students and interns, alongside a measured level of concern regarding its use in autonomous clinical decision-making.

Effectiveness of artificial intelligence

Participants reported a high perceived effectiveness of artificial intelligence (AI) in healthcare (Table 3). A substantial majority agreed that AI can significantly improve diagnostic accuracy (86.1%) and assist clinicians in selecting better treatment options (84.8%). Similarly, most respondents believed that AI has the potential to improve patient outcomes (86.1%), reinforcing confidence in its clinical value.

Perceptions were also strongly positive regarding the role of AI in reducing medical errors, with 78.1% of participants expressing agreement. In addition, a large proportion of respondents (approximately 86.7%) considered AI to be useful for the general public in disease management, indicating recognition of its broader public health applications. Across all effectiveness-related items, agreement consistently outweighed disagreement, suggesting that medical students and interns perceive AI as a valuable and impactful tool in both clinical practice and healthcare delivery. Overall, these findings highlight a strong consensus on the effectiveness of AI as a supportive technology in modern medicine.

Credibility of artificial intelligence

Perceptions of the credibility of artificial intelligence (AI) in healthcare were generally favorable, although more cautious compared to perceptions of effectiveness (Table 4). A majority of participants expressed trust in AI-based clinical decision-making systems (62.9%), indicating a baseline level of confidence in AI-supported care.

Confidence in AI increased when human oversight was incorporated. Approximately 80.1% of respondents agreed that AI-based recommendations

are reliable when supervised by physicians, highlighting the importance of clinician involvement in validating AI outputs. Similarly, most participants (86.1%) agreed that human experts should verify AI-generated decisions, reflecting strong support for a collaborative human–AI model.

Perceptions regarding the consistency and objectivity of AI systems were moderately positive, with 64.9% of respondents expressing agreement, although a notable proportion remained uncertain or disagreed. Willingness to rely on AI for critical clinical decisions was comparatively lower, with 52.3% agreement and a substantial proportion expressing reluctance (47.7%).

Overall, these findings indicate that while medical students and interns recognize the credibility of AI in healthcare, their trust is conditional and strongly dependent on human supervision, emphasizing a preference for AI as a supportive rather than autonomous clinical tool.

Taken together, the results demonstrate that medical students and interns: Hold positive perceptions of AI in healthcare. View AI as effective in improving diagnostics, reducing errors, and enhancing outcomes. Exhibit moderate trust in AI credibility, with strong support for human supervision. These findings suggest readiness for AI integration in medical education and practice, provided that appropriate ethical guidance, training, and oversight mechanisms are implemented.

DISCUSSION

This study provides a comprehensive assessment of medical students' and interns' perceptions regarding the effectiveness and credibility of artificial intelligence in healthcare and medical education. The findings demonstrate an overall positive attitude toward AI, with strong agreement on its potential to improve diagnostic accuracy, reduce medical errors, and enhance patient outcomes (Robertson *et al.*, 2023; Rehman *et al.*, 2025). At the same time, participants expressed measured caution regarding the credibility of AI-generated information, emphasizing the continued importance of human oversight in clinical decision-making (Nouis *et al.*, 2025). The high level of perceived effectiveness observed in this study aligns with growing international evidence suggesting that AI tools can enhance learning efficiency and clinical reasoning (Atalla *et al.*, 2025). Participants' belief that AI can improve diagnostic accuracy and reduce errors reflects increasing confidence in AI-driven decision support systems, particularly in data-intensive domains such as radiology, pathology, and risk stratification (Alam *et al.*, 2025). These findings suggest that medical trainees are increasingly receptive to AI as a complementary tool rather than a disruptive threat to traditional medical practice.

Support for integrating AI into medical education was notably strong. This reflects trainees' recognition that familiarity with AI technologies is becoming an essential component of modern medical training (Han *et al.*, 2019; Chan and Zary, 2019). Early exposure to AI concepts may not only enhance technical competence but also promote critical thinking regarding the ethical and practical limitations of these tools (Moustaghfir and Brigui, 2024). Formal integration of AI into curricula could help shift AI use from informal, self-directed exploration toward structured, evidence-based learning. Despite this optimism, perceptions of AI credibility revealed important nuances (George, 2023). While most participants expressed trust in AI-based systems, fewer were willing to rely on AI for critical clinical decisions without human verification (Tun *et al.*, 2025). This cautious stance is both expected and appropriate, as clinical decision-making involves contextual judgment, ethical considerations, and patient-specific nuances that current AI systems cannot fully replicate (Kumar and Upadhyay, 2024; Rehman *et al.*, 2025). The preference for human–AI collaboration observed in this study supports the concept of augmented intelligence, where AI enhances human performance rather than replacing it.

Concerns regarding over-reliance on AI and potential erosion of clinical reasoning skills also warrant attention. Without appropriate training and guidelines, excessive reliance on AI tools may reduce opportunities to develop independent diagnostic thinking (Froomkin *et al.*, 2025).

These findings underscore the importance of embedding AI education within a framework that emphasizes accountability, interpretability, and ethical responsibility. Overall, the results highlight a generation of future healthcare professionals that is open to technological innovation but aware of its limitations (Memarian *et al.*, 2023). This balance between enthusiasm and caution presents an opportunity for educators and policymakers to design curricula and regulations that maximize the benefits of AI while safeguarding clinical integrity and patient safety.

Strengths

This study provides a comprehensive assessment of artificial intelligence by examining perception, effectiveness, and credibility simultaneously, offering a multidimensional understanding of attitudes. The inclusion of both medical students and interns captures perspectives across early stages of clinical training, enhancing the relevance of findings to future healthcare practice.

Limitations

The cross-sectional design limits causal interpretation and does not capture changes over time. The use of self-reported data may introduce response bias, and the relatively limited sample size and geographic scope may affect the generalizability of the findings.

CONCLUSION

Medical students and interns demonstrate a generally positive attitude toward artificial intelligence in healthcare, recognizing its potential to enhance diagnostic accuracy, reduce medical errors, and improve patient outcomes. While confidence in AI-supported systems is evident, trust remains conditional, with a clear preference for human oversight in clinical decision-making. These findings highlight the importance of integrating AI into medical education through structured training that emphasizes ethical use, critical evaluation, and human–AI collaboration. Such an approach will support the safe and effective adoption of AI in future clinical practice.

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