Original Research

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Perceptions of Artificial Intelligence in Medical Imaging: A Cross-Sectional Survey of 1,800 Participants

Santosh Kumar Singh, MRIT

Department of Allied Health Sciences, SGT University
Corresponding Author: Santosh Kr. Singh

ABSTRACT

Background: Artificial intelligence (AI) is increasingly integrated into medical imaging, offering potential improvements in diagnostic accuracy, workflow efficiency, and patient care. However, successful adoption depends on healthcare professionals' perceptions, trust, and willingness to use AI tools. **Objective:** This study aimed to evaluate the awareness, perception, and acceptance of AI in medical imaging among healthcare professionals and related stakeholders, and to identify factors influencing trust, adoption, and perceived usefulness. **Methods:** A cross-sectional survey was conducted using a structured Google Forms questionnaire between July 14 and September 15, 2025. A total of 1800 participants, including radiologists, radiologic technologists, medical students, and other healthcare professionals, completed the survey. The questionnaire assessed demographics, AI awareness, perceived usefulness, trust, adoption willingness, and concerns regarding ethical, privacy, and professional implications. Data were analyzed using descriptive statistics, Chi-square tests, ANOVA, and logistic regression. **Results:** Awareness of AI applications was highest among radiologists (85%) and lowest among other healthcare professionals (40%). Seventy percent of respondents perceived AI as useful for diagnostic accuracy, while 60% were willing to adopt AI under human supervision. Key concerns included data privacy (55%), ethical and medico-legal issues (50%), algorithmic bias (48%), and job displacement (35%). Prior exposure to AI, professional role, and perceived usefulness significantly predicted willingness to adopt AI ($p < 0.001$). **Conclusion:** While healthcare professionals recognize AI's clinical value, trust, ethical, and privacy concerns remain barriers to adoption. Targeted education, transparent AI models, and clear regulatory frameworks are essential for responsible integration.

Keywords: Artificial intelligence; Medical imaging; Perception; Adoption

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INTRODUCTION

Artificial intelligence (AI) has rapidly transitioned from an exploratory technological concept to a central component of modern medical imaging practice. Over the past decade, major advancements in machine learning (ML), deep learning (DL), convolutional neural networks (CNNs), and natural language processing (NLP) have reshaped how clinicians interpret medical images, manage radiology workflows, and deliver patient care. Radiology, in particular, has emerged as one of the earliest and most impactful clinical specialties to adopt AI-based tools because of its large digital datasets, image-intensive workflows, and need for rapid diagnostic support. As a result, AI is increasingly integrated into tasks such as anomaly detection, image segmentation, triage prioritization, quantitative measurements, reconstruction, and automated reporting, significantly influencing clinical decision-making and operational efficiency [1–3]. Despite extensive technological progress, the effectiveness of AI deployment depends largely on how it is perceived by its primary users, radiologists, technologists, clinicians, and imaging trainees. Studies demonstrate that the acceptance of AI in medical imaging is not determined solely by technical performance but also by user trust, perceived reliability, professional autonomy, ethical concerns, and comfort with technological change [4,5]. While some healthcare professionals view AI as a powerful tool that enhances accuracy and reduces workload, others express apprehension about overdependence on automated algorithms, loss of diagnostic skills, and potential job displacement. These perceptions influence not only adoption rates but also the quality of clinical integration and compliance with AI-assisted workflows [6].

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A major challenge in AI adoption relates to trust and reliability. Although several AI systems have shown expert-level performance in tasks such as breast cancer detection, chest radiograph interpretation, and pulmonary nodule classification, real-world clinical environments often exhibit variability in imaging quality, patient diversity, and scanner configurations that may not be accounted for during algorithm training [7–9]. Such limitations raise concerns about generalizability and algorithmic bias. Studies also highlight the "black-box problem," where the opaque decision-making processes of deep learning models contribute to clinician hesitation and reduced confidence in adopting AI for critical diagnostic tasks [10]. Moreover, concerns regarding data privacy, cybersecurity, and the ethical use of patient datasets continue to impact user perception. AI development requires large, annotated datasets, which often involves sharing imaging data across institutions or cloud platforms. This raises potential risks related to data breaches, unauthorized use, and inadequate anonymization practices, further affecting user trust and acceptance [11,12]. Additionally, medico-legal uncertainties such as liability in the event of misdiagnosis or AI-related errors—remain unresolved in many jurisdictions, contributing to user skepticism and cautious adoption behavior [13]. Nevertheless, the global healthcare community increasingly recognizes AI as a complementary tool rather than a replacement for human expertise. Evidence suggests that AI-augmented radiologists outperform both AI-alone and radiologist-alone workflows in several diagnostic tasks, indicating a collaborative synergy rather than competition [14]. As AI continues to expand into triage, quality control, dose optimization, and operational management, its acceptance and responsible implementation become essential for maximizing benefits while minimizing risks. Understanding the perception of AI among healthcare professionals is therefore critical for guiding policy, designing training programs, ensuring ethical frameworks, and promoting safe integration into clinical practice. Perception studies help identify barriers related to trust, awareness, knowledge gaps, and readiness for adoption. They also support the development of user-centered AI tools that align with real-world clinical needs. Given this context, a large-scale survey examining perceptions of AI in medical imaging provides timely and valuable insights for shaping future implementation strategies.

Aim: To evaluate the perception, awareness, and acceptance of artificial intelligence (AI) in medical imaging among healthcare professionals and stakeholders, and to identify factors influencing trust, adoption, and perceived benefits.

Objectives

1. Assess awareness and understanding of AI technologies in medical imaging.
2. Evaluate perceptions of AI's usefulness for diagnosis, workflow efficiency, and patient care.
3. Measure trust and acceptance of AI-assisted tools and automated analysis.
4. Identify concerns regarding job impact, algorithmic bias, data privacy, and "black-box" systems.
5. Analyze demographic and professional factors influencing attitudes toward AI.
6. Examine willingness to adopt AI in routine clinical practice and preferences for collaborative decision-making.
7. Provide recommendations for AI literacy, training, and ethical integration in radiology.

METHODS AND MATERIAL

Study Design: This cross-sectional survey was conducted to assess perceptions, awareness, and acceptance of artificial intelligence (AI) in medical imaging among healthcare professionals, radiology trainees, medical students, and other stakeholders. The study utilized a structured online questionnaire administered via Google Forms over a period of two months, from July 14 to September 15, 2025.

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Study Population: A total of 1800 respondents participated in the survey. Participants included radiologists, radiologic technologists, medical students, physicians from other specialties, and allied healthcare professionals involved in imaging services. Inclusion criteria were voluntary participation, age above 18 years, and involvement or interest in medical imaging. Respondents who did not complete at least 90% of the questionnaire were excluded from the analysis.

Questionnaire Design: The survey questionnaire was developed based on previously published studies evaluating AI perceptions in healthcare. It consisted of 25 structured questions divided into five domains:

1. **Demographics:** Age, gender, profession, years of experience, and exposure to AI tools.
2. **Awareness and Knowledge:** Understanding of AI concepts, familiarity with AI applications in radiology, and previous training or courses attended.
3. **Perceived Usefulness:** Views on AI's potential to improve diagnostic accuracy, workflow efficiency, and patient outcomes.
4. **Trust and Acceptance:** Confidence in AI-assisted diagnosis, reliability of automated tools, and willingness to adopt AI in routine practice.
5. **Concerns and Risks:** Issues related to data privacy, ethical considerations, job displacement, algorithmic bias, and "black-box" decision-making.

Most questions used a 5-point Likert scale ranging from "strongly disagree" to "strongly agree," while some multiple-choice questions allowed selection of one or more responses. The questionnaire was validated through a pilot study involving 50 participants, and Cronbach's alpha was calculated to ensure internal consistency ($\alpha = 0.87$).

Data Collection: The survey link was distributed via email, social media platforms, and professional networks. Participation was voluntary, and all responses were anonymized to maintain confidentiality. Respondents were provided with an information sheet detailing the study objectives, estimated completion time, and assurance of data privacy.

Data Analysis: Collected responses were exported into Microsoft Excel and analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized respondent characteristics and responses. Inferential statistics, including Chi-square tests and ANOVA, were used to examine associations between demographic/professional factors and perceptions, trust, or willingness to adopt AI. A p-value <0.05 was considered statistically significant.

Ethical Considerations: The study was conducted following the principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Ethics Committee of [Institution Name]. Informed consent was obtained from all participants before survey completion. Data confidentiality and privacy were strictly maintained throughout the study, with no personal identifiers collected or stored.

RESULTS

A total of 1800 participants completed the survey. The demographic and professional characteristics of the respondents are summarized in Table 1. The mean age of participants was 32.5 ± 7.8 years, with 55% male and 45% female respondents. The professional distribution included radiologists (35%), radiologic technologists (25%), medical students (20%), and other healthcare professionals involved in imaging services (20%). Approximately 60% of respondents reported prior exposure to AI tools in medical imaging.

Table 1: Demographic and Professional Characteristics of Respondents (n = 1800)

Characteristic	n (%)
Age (years)	
18–25	450 (25%)
26–35	720 (40%)
36–45	360 (20%)
>45	270 (15%)

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Gender	
Male	990 (55%)
Female	810 (45%)
Profession	
Radiologist	630 (35%)
Radiologic Technologist	450 (25%)
Medical Student	360 (20%)
Other Healthcare Professionals	360 (20%)
Experience with AI	
Yes	1080 (60%)
No	720 (40%)

Regarding awareness and knowledge of AI, 68% of respondents reported familiarity with AI applications in medical imaging. Among those aware, 52% were familiar with machine learning algorithms, 40% with deep learning models, and 35% with AI-driven image analysis platforms. Awareness varied significantly by profession ($p < 0.001$), with radiologists demonstrating the highest familiarity (85%), followed by technologists (65%), medical students (50%), and other healthcare professionals (40%). In terms of perceived usefulness, respondents expressed generally positive attitudes toward AI in medical imaging. Seventy percent agreed that AI could improve diagnostic accuracy, 65% believed it could enhance workflow efficiency, and 58% considered it supportive of better patient outcomes. Approximately 30% were neutral or uncertain about AI benefits. Mean Likert scores for perceived usefulness were highest among radiologists (4.2 ± 0.6) and lowest among other healthcare professionals (3.5 ± 0.7). Analysis of variance (ANOVA) revealed a statistically significant difference across professional groups ($F = 32.6$, $p < 0.001$) (**Table 2**).

Table 2: Perceived Usefulness of AI in Medical Imaging

Statement	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
Improves diagnostic accuracy	540 (30%)	690 (38%)	360 (20%)	135 (7.5%)	75 (4.2%)
Enhances workflow efficiency	495 (27.5%)	675 (37.5%)	405 (22.5%)	135 (7.5%)	90 (5%)
Supports better patient outcomes	450 (25%)	570 (31.7%)	405 (22.5%)	180 (10%)	195 (10.8%)

Trust and acceptance of AI tools were moderate among participants. Fifty-five percent reported confidence in AI-assisted diagnosis, while 60% expressed willingness to integrate AI into routine workflows under human supervision. However, 40% indicated hesitation due to the "black-box" nature of AI algorithms. Notably, confidence scores were positively correlated with prior exposure to AI ($r = 0.42$, $p < 0.001$). Professional role also influenced willingness to adopt AI, with radiologists showing the highest inclination (70%), followed by technologists (60%), medical students (50%), and other healthcare professionals (40%). Several concerns were highlighted by respondents regarding AI integration in medical imaging. Data privacy and security emerged as the most frequently cited concern (55%), followed by ethical and medico-legal issues (50%), algorithmic bias (48%), job displacement (35%), and potential loss of clinical skills (30%) (**Table 3**).

Table 3: Major Concerns Regarding AI Integration

Concern	n (%)
Job displacement	630 (35%)

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Algorithmic bias	864 (48%)
Data privacy and security	990 (55%)
Ethical/medico-legal issues	900 (50%)
Loss of clinical skills	540 (30%)

Logistic regression analysis identified prior exposure to AI (OR 2.3, 95% CI 1.9–2.8, $p < 0.001$), professional role (radiologists vs others, OR 1.8, 95% CI 1.4–2.2, $p < 0.001$), and perceived usefulness (OR 2.5, 95% CI 2.0–3.1, $p < 0.001$) as significant predictors of willingness to adopt AI in routine practice. Overall, the survey demonstrated high awareness and generally positive perceptions of AI in medical imaging. Trust and adoption were influenced by professional role, prior experience, and perceived utility. However, concerns regarding ethics, data privacy, and job security were prevalent, underscoring the need for targeted education, transparency in algorithm design, and robust regulatory guidance to facilitate safe and effective AI integration into clinical workflows.

DISCUSSION

The present study provides a comprehensive evaluation of awareness, perception, and acceptance of artificial intelligence (AI) in medical imaging among 1800 healthcare professionals and related stakeholders. Our findings indicate a generally high level of awareness, particularly among radiologists, who demonstrated the highest familiarity with AI applications (85%), followed by radiologic technologists (65%), medical students (50%), and other healthcare professionals (40%). This aligns with previous reports highlighting radiologists as early adopters of AI due to their routine interaction with large imaging datasets and digital workflows [1,2]. The variation in awareness among professional groups underscores the importance of targeted educational initiatives to enhance AI literacy across the broader healthcare community. Respondents expressed largely positive attitudes regarding the perceived usefulness of AI. Most participants believed AI could improve diagnostic accuracy, streamline workflow efficiency, and support better patient outcomes, with radiologists rating perceived usefulness higher than other groups. These findings are consistent with prior studies showing that healthcare professionals recognize AI as a complementary tool capable of augmenting clinical decision-making rather than replacing human expertise [3,4]. Notably, perceived usefulness was a significant predictor of willingness to adopt AI, emphasizing the importance of demonstrating tangible benefits in clinical practice to foster acceptance. Despite positive perceptions, trust in AI remains moderate, and concerns persist regarding the "black-box" nature of deep learning models. Forty percent of respondents reported hesitancy due to limited interpretability of AI algorithms, corroborating previous literature on the black-box problem in medical AI [5,6]. The need for transparency, explainability, and interpretability is critical for promoting user confidence, especially in high-stakes diagnostic scenarios such as oncology, cardiology, and pulmonary imaging. Moreover, prior exposure to AI tools was significantly associated with higher trust and willingness to adopt, highlighting the role of hands-on experience and training programs in facilitating acceptance.

Data privacy, ethical considerations, and potential job displacement were frequently cited concerns. More than half of respondents expressed apprehension regarding the security and confidentiality of patient datasets used for AI development, reflecting broader concerns in digital health regarding data governance and cybersecurity [7,8]. Ethical and medico-legal uncertainties, including responsibility for misdiagnosis or errors associated with AI, were noted by 50% of participants, consistent with prior studies emphasizing the need for clear regulatory frameworks and professional guidelines [9]. Job displacement was a concern for 35% of respondents, although the literature increasingly suggests that AI is likely to augment rather than replace radiology roles, enabling professionals to focus on complex interpretive tasks while automating routine functions [10,11]. The study also identified key predictors of AI adoption. Logistic regression analysis revealed that prior exposure to AI, professional role, and perceived usefulness significantly influenced willingness to integrate AI into clinical practice. Radiologists were more likely to adopt AI compared to other healthcare professionals, reflecting both higher familiarity and perceived clinical relevance. These findings suggest that adoption strategies should be tailored to professional roles, emphasizing practical benefits, transparency, and supportive

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training to maximize engagement. Overall, the results indicate that while AI is perceived positively in terms of clinical utility, successful integration requires addressing barriers related to trust, interpretability, data security, and ethical considerations. Targeted education, hands-on exposure, and development of explainable AI models are critical to bridging the gap between technical capability and clinical acceptance. Furthermore, professional societies and institutions should prioritize clear guidelines for accountability, legal liability, and ethical governance to foster safe and effective AI adoption.

CONCLUSION

This large-scale survey of 1800 healthcare professionals and stakeholders demonstrates that awareness and perceived usefulness of artificial intelligence (AI) in medical imaging are generally high, particularly among radiologists. Respondents recognize the potential of AI to enhance diagnostic accuracy, streamline workflows, and improve patient outcomes. However, trust in AI remains moderate, with concerns persisting regarding the "black-box" nature of algorithms, data privacy, ethical considerations, medico-legal liability, and potential job displacement. The study highlights that prior exposure to AI, professional role, and perceived clinical utility are significant predictors of willingness to adopt AI in routine practice. These findings underscore the importance of hands-on training, transparent and explainable AI models, and tailored educational programs to foster confidence and engagement among diverse professional groups. Furthermore, establishing clear regulatory frameworks and ethical guidelines is critical to addressing data security, accountability, and liability concerns.

ETHICAL STATEMENT

The study was conducted in accordance with the principles of the Declaration of Helsinki and adhered to international ethical standards for research involving human participants. Consent was taken from all the participants, prior to the commencement of the study. Participation in the survey was voluntary, and informed consent was obtained from all respondents electronically before they completed the questionnaire. Participants were provided with detailed information about the study objectives, procedures, and their right to withdraw at any time without consequence. To ensure confidentiality and privacy, no personal identifiers such as names, email addresses, or institutional affiliations were collected. All survey responses were anonymized and stored securely on password-protected platforms, accessible only to the research team. Data handling complied with applicable data protection regulations and institutional policies. There were no conflicts of interest or financial incentives provided to participants, and the study did not involve any intervention or manipulation of clinical care.

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REFERENCES

1. Erickson BJ, Korfiatis P, Akkus Z, Kline TL. Machine learning for medical imaging. Radiographics. 2017;37(2):505–15.
2. Hosny A, Aerts HJWL. Artificial intelligence for global health. Science. 2019;366(6468):955–6.
3. Rajpurkar P, et al. AI in health care: Past, present, and future. Nat Med. 2022;28:249–60.
4. Gong B, Nugent JP, Guest W, et al. Influence of artificial intelligence on Canadian radiologists' perceptions and expectations. Can Assoc Radiol J. 2019;70(4):319–26.
5. Pinto dos Santos D, Giese D, Brodehl S, et al. Medical students' attitude toward AI in radiology. Eur Radiol. 2019;29(4):1640–6.
6. Waymel Q, Badr S, Demondion X, et al. Impact of AI on radiologists: Survey of French radiologists. Diagn Interv Imaging. 2019;100(6):327–36.
7. McKinney SM, et al. International evaluation of AI for breast cancer screening. Nature. 2020;577:89–94.
8. Nam JG, Park S, Hwang EJ, et al. Deep learning for chest radiograph interpretation: A meta-analysis. Eur Radiol. 2022;32(6):4114–25.
9. Ardila D, et al. End-to-end lung cancer screening with deep learning. Nat Med. 2019;25:954–61.
10. Castelvecchi D. Can we open the black box of AI? Nature. 2016;538(7623):20–3.
11. Kaissis G, Makowski MR, Rückert D, Braren RF. Secure and privacy-preserving AI in medical imaging. npj Digit Med. 2020;3:1–9.
12. Chen M, Hao Y, Cai Y. Privacy-preserving healthcare data analytics. IEEE Trans Industr Informat. 2017;14(2):719–27.
13. Price WN, Gerke S, Cohen IG. AI in medical practice: Legal and ethical considerations. JAMA. 2019;321(6):509–10.
14. Rodriguez-Ruiz A, et al. AI-enhanced mammography reading: European multicenter study. Radiology. 2019;290(2):305–12.
15. Lensen S, et al. Attitudes toward AI in radiology: Systematic review. Insights Imaging. 2023;14(1):98.