INNOVATIVE JOURNAL OF MEDICAL IMAGING




Original Research

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

**[1]Santosh Kr Singh**

[1]Department of Allied Health Sciences, SGT University, Gurugram, India

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

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

**DOI:** 10.62502/ijmi/v1i3art3

**Received:** 19/10/2024 | **Accepted:** 22/11/2024 | **Published:** 28/12/2024

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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, imageintensive 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 decisionmaking 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]

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 radiologistalone 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 usercentered 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.

## MATERIALS AND METHODS

**Study Design:** This cross-sectional questionnaire-based study was conducted to evaluate the awareness, perceptions, acceptance, and attitudes toward the application of artificial intelligence (AI) in medical imaging among healthcare professionals and students. Data were collected using a structured online survey developed through Google Forms over a two-month period from July 14 to September 15, 2025.

**Study Population:** A total of 1,800 respondents participated in the survey, including radiologists, radiologic technologists, physicians, medical students, and allied healthcare professionals involved in diagnostic imaging. Individuals aged 18 years or older who voluntarily consented to participate and completed at least 90% of the questionnaire were included in the study. Incomplete responses and questionnaires with substantial missing data were excluded from the final analysis.

**Questionnaire Design:** The questionnaire was developed after reviewing previously published literature on AI adoption in healthcare and consisted of 25 structured questions organized into five domains: demographic characteristics, awareness and knowledge of AI, perceived usefulness of AI in medical imaging, trust and acceptance of AI-assisted diagnosis, and concerns regarding ethical issues, data privacy, algorithmic bias, and job displacement. Most responses were recorded using a 5-point Likert scale ranging from *strongly disagree* to *strongly agree*, while selected questions employed multiple-choice response options. Prior to the main survey, the questionnaire was pilot-tested among 50 participants, demonstrating good internal consistency with a Cronbach's alpha of 0.87.

**Data Collection:** The survey was disseminated electronically through email invitations, professional organizations, institutional networks, and social media platforms. Participation was voluntary and anonymous. Before accessing the questionnaire, participants were provided with study information and an electronic informed consent statement. No personally identifiable information was collected to ensure participant confidentiality.

**Statistical Analysis:** Survey responses were exported to Microsoft Excel and subsequently analyzed using IBM SPSS Statistics version 26.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participant demographics and survey responses. Associations between demographic variables and AI-related perceptions were evaluated using the Chi-square test and one-way analysis of variance (ANOVA) where appropriate. A p-value $< 0.05$ was considered statistically significant.

**Ethical Considerations:** The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Institutional Ethics Committee prior to data collection, and informed electronic consent was obtained from all participants. Participant anonymity, confidentiality, and data security were maintained throughout the study.

## RESULTS

A total of 1,800 participants completed the online questionnaire and were included in the final analysis. The demographic and professional characteristics of the respondents are summarized in Table 1. The mean age of the participants was 32.5 ± 7.8 years, with the largest proportion belonging to the 26–35 years age group (40%). Male participants constituted 55% (n = 990) of the study population, while females accounted for 45% (n = 810). Regarding professional background, radiologists represented the largest group (35%), followed by radiologic technologists (25%), medical students (20%), and other healthcare professionals (20%). Overall, 60% (n = 1,080) of respondents reported previous exposure to artificial intelligence (AI) applications in medical imaging, whereas 40% (n = 720) had no prior experience (Table 1).

**Table 1. Demographic and Professional Characteristics of the Participants (n = 1800)**

| Characteristic | Category | n (%) |
|---|---|---|
| Age (years) | 18–25 | 450 (25.0) |
| | 26–35 | 720 (40.0) |
| | 36–45 | 360 (20.0) |
| | >45 | 270 (15.0) |
| Gender | Male | 990 (55.0) |
| | Female | 810 (45.0) |
| Profession | Radiologist | 630 (35.0) |
| | Radiologic Technologist | 450 (25.0) |
| | Medical Student | 360 (20.0) |
| | Other Healthcare Professionals | 360 (20.0) |
| Previous AI Exposure | Yes | 1080 (60.0) |
| | No | 720 (40.0) |

**Awareness and Knowledge of Artificial Intelligence:** Overall, 68% (n = 1,224) of respondents reported being familiar with AI applications in medical imaging. Among these participants, 52% indicated familiarity with machine learning (ML) algorithms, 40% with deep learning (DL) models, and 35% with AI-assisted image analysis platforms. Awareness differed

significantly according to professional background ($\chi^2$, $p < 0.001$), with radiologists demonstrating the highest level of familiarity (85%), followed by radiologic technologists (65%), medical students (50%), and other healthcare professionals (40%). The distribution of AI awareness across professional groups is illustrated in Table 2.

**Table 2. Awareness of AI Applications According to Professional Category**

| Profession | Awareness (%) |
|---|---|
| Radiologists | 85 |
| Radiologic Technologists | 65 |
| Medical Students | 50 |
| Other Healthcare Professionals | 40 |

**Perceived Usefulness of Artificial Intelligence:** Participants expressed generally positive perceptions regarding the utility of AI in medical imaging (Table 3). A majority agreed that AI could improve diagnostic accuracy (68%), enhance workflow efficiency (65%), and support better patient outcomes (56.7%). Approximately one-fifth of respondents remained neutral across these statements. Mean
perceived usefulness scores were highest among radiologists (4.2 ± 0.6) and lowest among other healthcare professionals (3.5 ± 0.7). One-way ANOVA demonstrated a statistically significant difference in perceived usefulness across professional groups ($F = 32.6$, $p < 0.001$).

**Table 3. Perceived Usefulness of AI in Medical Imaging**

| Statement | Strongly Agree n (%) | Agree n (%) | Neutral n (%) | Disagree n (%) | Strongly Disagree n (%) |
|---|---|---|---|---|---|
| Improves diagnostic accuracy | 540 (30.0) | 690 (38.3) | 360 (20.0) | 135 (7.5) | 75 (4.2) |
| Enhances workflow efficiency | 495 (27.5) | 675 (37.5) | 405 (22.5) | 135 (7.5) | 90 (5.0) |
| Supports better patient outcomes | 450 (25.0) | 570 (31.7) | 405 (22.5) | 180 (10.0) | 195 (10.8) |

**Trust and Acceptance of AI:** The survey demonstrated a moderate level of confidence in AI-assisted diagnosis. Overall, 55% of respondents expressed confidence in AI-supported image interpretation, while 60% reported willingness to integrate AI into routine clinical practice provided that human supervision was maintained. Conversely, 40% remained hesitant because of concerns regarding the limited transparency ("black-box") of AI algorithms. Confidence in AI was positively associated with previous AI exposure ($r = 0.42$, $p < 0.001$). Radiologists exhibited the greatest willingness to adopt AI (70%), followed by radiologic technologists (60%), medical students (50%), and other healthcare professionals (40%), as shown in Table 4.

**Table 4. Willingness to Adopt AI in Routine Clinical Practice**

| Professional Group | Adoption (%) |
|---|---|
| Radiologists | 70 |
| Radiologic Technologists | 60 |
| Medical Students | 50 |
| Other Healthcare Professionals | 40 |

**Concerns Regarding AI Integration:** Respondents also identified several barriers to AI implementation in clinical practice (Table 5). The most frequently reported concern was data privacy and security (55%), followed by ethical and medico-legal issues (50%), algorithmic bias (48%), job displacement (35%), and potential loss of clinical skills (30%).

**Table 5. Major Concerns Regarding AI Integration in Medical Imaging**

| Concern | n (%) |
|---|---|
| Data privacy and security | 990 (55.0) |
| Ethical and medico-legal issues | 900 (50.0) |
| Algorithmic bias | 864 (48.0) |
| Job displacement | 630 (35.0) |
| Loss of clinical skills | 540 (30.0) |

**Predictors of AI Adoption:** Binary logistic regression analysis identified several independent

predictors of willingness to adopt AI in routine clinical practice. Previous exposure to AI significantly increased the likelihood of AI acceptance (OR = 2.3; 95% CI: 1.9–2.8; $p < 0.001$). Similarly, radiologists were significantly more likely to adopt AI than other professional groups (OR = 1.8; 95% CI: 1.4–2.2; $p < 0.001$). Perceived usefulness emerged as the strongest predictor of AI acceptance (OR = 2.5; 95% CI: 2.0–3.1; $p < 0.001$). Overall, the findings indicate high awareness and favorable perceptions of AI among healthcare professionals involved in medical imaging. Nevertheless, concerns regarding data security, ethical governance, algorithm transparency, and workforce implications remain substantial, highlighting the importance of structured AI education, transparent algorithm development, and robust regulatory frameworks for successful clinical implementation.

## DISCUSSION

The present survey provides a comprehensive assessment of the awareness, perceptions, and acceptance of artificial intelligence (AI) in medical imaging among 1,800 healthcare professionals and trainees. Overall, the findings demonstrate a positive attitude toward AI adoption, with considerable variation across professional groups. Radiologists exhibited the highest level of AI awareness (85%), followed by radiologic technologists (65%), medical students (50%), and other healthcare professionals (40%), indicating that familiarity with AI is closely associated with routine exposure to digital imaging technologies. These findings are consistent with previous studies reporting that radiologists are among the earliest healthcare professionals to embrace AI-assisted diagnostic systems because of their extensive interaction with imaging data and computer-assisted workflows.

Most respondents acknowledged the clinical benefits of AI, with nearly 70% agreeing that AI can improve diagnostic accuracy, while 65% believed it enhances workflow efficiency and 58% considered it beneficial for improving patient outcomes. The higher perceived usefulness among radiologists compared with other professional groups further emphasizes that direct clinical experience influences confidence in AI applications. Statistical analysis also demonstrated significant differences in perception across professions (ANOVA, $p < 0.001$), suggesting that educational background and

clinical responsibilities substantially affect AI acceptance. These findings support previous evidence that AI is increasingly viewed as a clinical decision-support tool rather than a replacement for healthcare professionals.

Trust in AI-assisted diagnosis remained moderate despite the generally positive perceptions. Approximately 55% of respondents expressed confidence in AI-supported reporting, whereas 60% indicated willingness to integrate AI into routine practice under human supervision. Importantly, respondents with previous exposure to AI technologies demonstrated significantly greater confidence ($\mathbf{r} = 0.42$, $p < 0.001$) and were more likely to support AI implementation. Logistic regression analysis further confirmed that prior AI experience (OR = 2.3; 95% CI: 1.9–2.8), professional role (OR = 1.8; 95% CI: 1.4–2.2), and perceived usefulness (OR = 2.5; 95% CI: 2.0–3.1) were independent predictors of AI adoption. These findings indicate that practical exposure and structured training programs are essential for improving user confidence and accelerating successful clinical integration.

Despite favorable attitudes, several important concerns were identified. Data privacy and security emerged as the most frequently reported challenge (55%), followed by ethical and medico-legal issues (50%), algorithmic bias (48%), job displacement (35%), and loss of clinical skills (30%). These concerns mirror those reported in contemporary AI literature, highlighting the necessity for transparent algorithms, explainable AI (XAI), robust cybersecurity measures, and clearly defined regulatory frameworks. The persistent concern regarding the "black-box" nature of deep learning models indicates that improving model interpretability will be crucial for increasing clinician trust and ensuring safe clinical deployment. Overall, the findings demonstrate that healthcare professionals recognize the substantial potential of AI to improve diagnostic accuracy, workflow efficiency, and patient care. However, successful implementation requires addressing barriers related to trust, transparency, ethical governance, and data protection. Continuous professional education, hands-on AI training, multidisciplinary collaboration, and evidence-based regulatory policies will be essential to

maximize the clinical benefits of AI while maintaining patient safety and professional accountability.

## CONCLUSION

This study demonstrates that healthcare professionals generally possess positive perceptions toward the use of artificial intelligence in medical imaging, with radiologists showing the highest awareness and acceptance. AI is widely recognized for its potential to improve diagnostic accuracy, enhance workflow efficiency, and support better patient outcomes. Nevertheless, concerns regarding data privacy, algorithm transparency, ethical governance, and medico-legal responsibility continue to limit widespread adoption. Prior exposure to AI, professional background, and perceived clinical usefulness were significant predictors of acceptance. Strengthening AI education, promoting explainable AI, and establishing robust regulatory and ethical frameworks will be essential for achieving safe, effective, and sustainable integration of AI into routine radiology practice.

## DECLARATION

**Ethics Approval and Consent to Participate:** The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Ethics Committee prior to commencement of the study. Informed electronic consent was obtained from all participants before completion of the online survey.

**Consent for Publication:** Not applicable.

**Availability of Data and Materials:** The datasets generated and analyzed during the current study are available from the corresponding author upon reasonable request.

**Competing Interests:** The authors declare that they have no competing interests.

**Funding:** The authors received no specific financial support from any funding agency in the public, commercial, or not-for-profit sectors for this study.

**Authors' Contributions:** All authors contributed substantially to the study conception, questionnaire design, data collection, statistical analysis, interpretation of results, manuscript preparation, and critical revision. All authors read and approved the final manuscript.

**Acknowledgements:** The authors sincerely thank all healthcare professionals, radiologists, radiologic technologists, medical students, and other participants who voluntarily contributed their time and valuable responses to this survey.

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**How to cite:** Singh SK. Perceptions of Artificial Intelligence in Medical Imaging: A Cross-Sectional Survey of 1,800 Participants. Innov. J. Med. Imaging 2024;1(3):12-18. doi: 10.62502/ijmi/v1i3art3