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Research Article

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A Comparative Study Assessing the Confidence of Doctors in Conventional vs Artificial Intelligence Assisted Radiological Diagnoses for Patient Care

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Abstract

Introduction: *The integration of Artificial Intelligence (AI) into radiology has shown promise in enhancing diagnostic accuracy and efficiency, yet the confidence of doctors in AI-assisted diagnosis remains uncertain. AI's potential to streamline workflows and detect complex abnormalities is widely acknowledged, but skepticism persists regarding its reliability and the potential disruption of traditional radiological practices. This study aims to assess global doctors' confidence in AI-assisted radiology and explore factors influencing their acceptance of AI technologies.*

Methods: *This descriptive cross-sectional survey involved 384 doctors from diverse clinical settings worldwide. A self-administered questionnaire captured demographic data, confidence in AI versus conventional radiology, and perceptions of AI in clinical practice. Data were analyzed using descriptive statistics.*

Results: *The majority of participants (66.7%) expressed higher confidence in conventional radiologist-led diagnoses compared to AI-assisted interpretations. Confidence in AI tools averaged 5.35/10, with limited AI training (16.9%) and lack of trust (13%) as the primary challenges. Participants with more experience reported greater confidence in interpreting radiographs independently and relied less on radiologists. Common challenges in conventional radiology included delays (35%) and limited access to radiologists (26%). AI was seen as beneficial for routine cases but not yet trusted for complex diagnoses, with only 36.7% believing it will eventually surpass human expertise.*

Conclusion: *Doctors continue to favor conventional radiologist-led diagnostics over AI-assisted tools due to concerns about trust, reliability, and insufficient training. While AI holds potential for improving diagnostic accuracy and reducing time constraints, widespread adoption requires overcoming significant barriers. Radiologists remain crucial in clinical decision-making, and AI will likely serve as a supplementary tool until confidence in its capabilities improves.*

Keywords: Radiology, Artificial Intelligence, Technology, Confidence

1. Introduction

The integration of Artificial Intelligence (AI) into medical imaging has revolutionized the field of radiology, significantly impacting the diagnosis and treatment planning of various diseases. AI, particularly in radiology, has shown remarkable potential in enhancing the accuracy and efficiency of image interpretation. This has led to its widespread adoption, with AI-driven algorithms being utilized for detecting abnormalities in imaging modalities such as X-rays, CT scans, MRIs, and PET scans. The promise of AI in radiology lies in its ability to analyze vast amounts of data quickly and consistently, potentially identifying patterns that might be missed by human radiologists [1,2]. Despite these advancements, the confidence of healthcare providers, particularly radiologists and other doctors, in AI-assisted diagnosis remains a topic of significant debate, with varying perspectives on its reliability, accuracy, and overall utility in clinical practice.

AI in radiology has been lauded for its ability to enhance diagnostic precision, reduce human error, and streamline workflow, thereby improving patient outcomes. For instance, AI algorithms have demonstrated superior performance in detecting early signs of diseases such as cancer, which are often challenging to identify in their nascent stage [3]. The integration of AI tools into radiological practice is also seen as a way to address the growing demand for medical imaging services, which often outpaces the availability of trained radiologists [4]. By automating routine tasks and assisting with complex image analysis, AI can alleviate the workload of radiologists, allowing them to focus on more critical aspects of patient care. However, despite these benefits, there is a growing concern among radiologists and other healthcare providers regarding the reliability of AI in making clinical decisions. The skepticism stems from several factors, including the potential for AI to produce false positives or negatives, the lack of transparency in AI decision-making processes (often referred to as the "black box" problem), and the potential for AI to disrupt the traditional roles of radiologists [5]. Moreover, the variability in the performance of AI algorithms across different clinical settings and patient populations further exacerbates these concerns [6]. As a result, there is a hesitancy among some healthcare providers to fully embrace AI-driven diagnostics without rigorous validation and clear guidelines on its implementation.

The adoption of AI in radiology is also influenced by the ethical and legal implications associated with its use. Questions regarding accountability, especially in cases where AI-assisted diagnosis lead to adverse outcomes, remain largely unanswered. The lack of standardized regulations governing the use of AI in clinical practice further complicates its integration into healthcare systems [7]. These concerns highlight the need for comprehensive frameworks that ensure the safe and effective use of AI in radiology while maintaining the trust of both healthcare providers and patients. Another significant aspect that influences the confidence of doctors in AI-assisted radiology is their level of familiarity and expertise with AI technologies. Studies have shown that radiologists with a deeper understanding of AI and its capabilities tend to be more confident in its use, whereas those with limited knowledge are more likely to express skepticism [8]. This underscores the importance of education and training in AI for healthcare providers, which can help bridge the gap between AI technology and clinical practice. Furthermore, involving radiologists in the development and refinement of AI algorithms can enhance their trust in these tools, as they can ensure that the algorithms are tailored to meet clinical needs and standards.

Despite the various schools of thought surrounding AI in radiology, there is currently no standardized measure of doctors' confidence in AI-assisted radiological diagnosis. While numerous studies have explored the technical capabilities of AI in medical imaging, few have systematically assessed how healthcare providers perceive and utilize these technologies in practice. Understanding doctors' confidence in AI is crucial, as their acceptance and trust are key determinants of AI adoption in clinical settings. Moreover, identifying the factors that influence their confidence, both positively and negatively, can provide valuable insights into the barriers to and facilitators of AI integration into healthcare. Given the critical role that doctors play in patient care, it is imperative to assess their confidence in AI-assisted radiological diagnosis. This study aims to address this gap by conducting a global assessment of doctors' confidence in AI-driven radiology. By examining the factors that influence their confidence, this research seeks to provide a comprehensive understanding of the challenges and opportunities associated with AI adoption in radiology. The findings of this study will not only contribute to the ongoing debate about the role of AI in healthcare but also inform the development of strategies to enhance doctors' confidence in AI-assisted diagnoses, ultimately improving patient care outcomes.

2. Methodology

2.1 Design

This was a descriptive comparative cross sectional survey that was performed amongst medical doctors in active clinical roles from across the world including both upper, middle and lower income countries. Convenience sampling technique was employed. These countries were also listed as LMICs as defined by the World Bank. By definition, a doctor was one who had completed their undergraduate medical training regardless of their postgraduate status. However, they are responsible as first contact physicians for patients including during emergencies or in referrals. The study was conducted between August to September 2024. Our sample size was calculated using n=Z2xP(1-P)/d2 where Z=1.96; P assumed at 50%; d=5% at 95% confidence interval coming up to a target sample size of 384.

2.2 Data Collection Tool Development

A review of studies detailing the uses of AI in radiology and the perceptions of doctors for its use in regular clinical practice was conducted. The investigators used this information to create a questionnaire to assess doctors' perspectives of using AI assisted radiology reporting. After development, the tool was conveniently pilot tested amongst 30 junior doctors and their responses (to the questions) as well as their recommendations (on how the questions were framed) were used to improve the tool.

The survey instrument contained five sections. The first section requested demographic data (i.e., age, gender, etc.). The second section included questions on how each doctor uses the available conventional radiological reporting. The third section asked participants to discuss their thoughts about AI assisted radiological diagnosis. The fourth section investigated the comparative confidence of doctors between conventional and AI assisted radiological reporting. For each scenario presented, participants were asked their preference of reporting modality. The fifth section asked doctors to reflect on their future expectations from AI in radiology. After development of the tool it was piloted and amended as suggested before use.

2.3 Data Collection

The self-administered questionnaire was sent to doctors via a link to an online form (Google Forms; Google, LLC, Mountain View, CA) in August 2024. The data collection tool requested written informed consent before a participant starts filling in their responses. No incentives were provided to the participants. To ensure high data quality only those doctors who at the time of data collection worked in clinical roles were allowed to participate. Unique identification number was automatically assigned to each recorded response.

2.4 Data Management and Analyses

Unique identification number was automatically assigned to each recorded response. Data was stored securely online and offline with the investigator's personal work systems and accessible by only the investigators. The data was analyzed using excel to calculate proportions and produce different graphs.

2.5 Ethical Considerations

A written informed consent was obtained from all participants prior to the response collection to the survey. No incentive was provided to the participants. This study posed no physical risk to participants. The names and any identifier details of the participants were not asked to protect the privacy of the participant. The data collected was password-protected, and all documents were stored in a password-protected folder to which only the researchers had access.

3. Results

3.1 Demographic Characteristics of Participants

Participants in the study were classified into predefined age groups. The majority (62%) were under 30 years old, 28% were between 30 and 40 years old, and 10% were older than 40 years. Participant mean age was approximately 33 years (age range from 25 to 58 years), with a higher proportion of male participants (72% respondents identified as male; 28% as female). Participant medical practice experience was classified into practice ranges based on number of years of service. Approximately one third of participants (34%) had been in medical practice from one to five years, one half (46%) from six to ten years, and one fifth of participants (20%) for more than ten years. The mean duration in medical practice across the cohort was 7.5 years (practice duration range from two to 25 years). In terms of the current country of medical practice, the majority of respondent participants (45%) were based in Europe, followed by Asia at 30%, Africa at 15%, and other regions at 10%. With regard to professional grade, the participant distribution according to role within their medical institution was as follows: Medical officers constituted the smallest fraction at 22%, registrars comprised the largest fraction at almost half (48%), while consultants accounted for just over one quarter (30%).

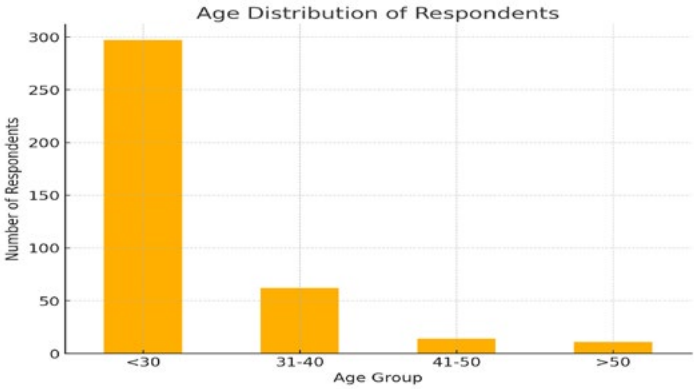

Figure 1: Age Distribution of Participants

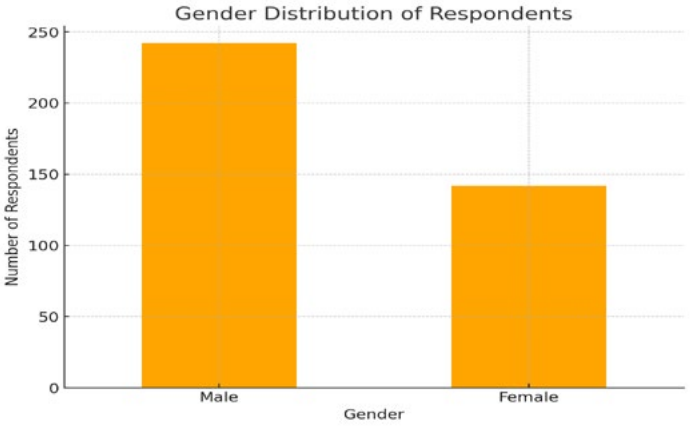

Figure 2: Gender Distribution of Participants

3.2 Confidence in Interpreting Radiographs and Reliance on Radiologists for Diagnoses

The participants were asked to rate how confident they felt in interpreting radiological images independently. The responses indicated that confidence varied among the candidates. Approximately 35% of the respondents declared a high level of confidence in interpreting radiological images and rated their own confidence as 6.5 out of 10, while the overall average rating showed a moderate level of confidence (averaging 3–9 highest to lowest). Consultants, followed by registrars, who had more than 10 years of experience reported feeling highest levels of confidence. Junior doctors (particularly those with less than five years' experience) scored themselves lowest in terms of confidence, with an average score of around 4.5 out of 10.

In contrast, participants were asked how often they relied on

reports from a radiologist to make a diagnosis. The majority 58% of the sample reported that they frequently relied on radiologists, 32% reported occasionally seeking radiological consultation and 10% reported rarely relying on radiologists. The mean reliance score was 7.8 out of a possible score of 10 with a range from 5 to 10 indicating that most residents frequently relied on radiologists for diagnostic input especially when their comfort with image interpretation was lower.

A clear inverse correlation was apparent between the confidence of participants in interpreting radiological images and their reliance on radiologists. Those who indicated less confidence (mean confidence rating 4.5) tended to rely more heavily on radiologists (mean reliance rating 8.5), implying that practitioners with less self-confidence compensate by relying more heavily on radiologists to enhance diagnostic certainty. In contrast, those who indicated greater confidence in image interpretation (mean confidence rating 8) reported less reliance on radiologists (mean reliance rating 5.5), indicating increased independence in clinical decision-making.

3.3 Challenges in Relying on Radiologists for Diagnostic Reports

Respondents described a number of notable issues when relying on radiologists for diagnostic reports. The most common issue noted by respondents was time constraints with respect to interpretation (79 participants, 35%). This is reflective of the time delay to receive the radiographic report to dictate patient management; this is especially impactful in emergency/critical or time-sensitive patient circumstances.

Limited access to radiology expertise was the second most commonly cited issue, noted by 58 participants (26%). This was particularly impactful in resource limited environments or settings when attempting to obtain a radiologist opinion resulted in delays in care/provide inferior diagnostic advice. Some patients (51 participants, 23%) had an adverse experience because of a combination of access to limited or no expertise and time constraints between interpretation resulting in a complex compounding dynamic. Following that combined experience, 48 (21%) respondents noted that a high workload could lead to more time interpretation delays, producing stress in the system.

Some participants (28, 12%) noted a combination of time constraints and high workload. There were a number of complex cases (26 participants, 11%), whereby there was a necessity for specialized diagnostic interpretation, which takes longer than expected for diagnostic detail. There were some overlapping dynamic responses; 14 participants (6%) noted time constraint, limited access to expertise and high workload as presenting issues at the same time. This indicates that time constraint, limited access to expertise, and a high workload were closely dynamic factors in interpretation challenges in clinical environments.

3.4 Usage of AI-Assisted Tools and Confidence in AI Interpretation

Among participants, those who identified as using AI-assisted tools for radiological image interpretation made up a sizable chunk of the study. The frequency of use of AI tools varied among participants, with most participants (50%) indicating their level of use was "occasionally", followed by an indication of "sometimes" from 21% of participants [and] "often" from 15%. This suggested that, although AI-assisted tool usage seemed to have a footprint into clinical practice, it was not yet consistent. As it concerns confidence, the participants provided an average confidence score of 5.35 (1 to 10 scale) for using AI as a part of interpreting radiological reports. Of responses, scores ranged between 1 and 10 for confidence. Again, many participants showed relative confidence in this area, with a median of 5. An approximation of the data suggested 50% of participants were at or below this median. Because IQR is reported, the middle 50% of participants rated their confidence scores between 2.5 and 7.5, indicating a clear amount of hesitance to rely solely on AI to make a conclusive interpretation.

3.5 Perceptions of AI in Care Provision

Across all participants, 39% agreed that the use of AI-assisted tools led to increased diagnostic accuracy in the primary care setting; 29% had a neutral stance; and, 19% disagreed. There was 50% agreement among participants that AI tools provide quicker diagnostic timings, with a neutral argument for 22% and a disagreement for 9%. When asked about the degree to which AI tools can be easily implemented in the primary care environment, the responses were more variable: 38% of participants were neutral, 30% disagreed, while only 18% agreed AI tools would be easy to implement.

3.6 Challenges of using AI in Care Provision

For challenges participants encountered when using AI-assisted tools in radiology, the results differed considerably. The most common challenge reported was "not enough training on AI tools," indicated by 16.9% of participants. The second most noted challenge was “not trusting AI outputs,” reported by 13% of all participants, followed by technical difficulties or other related issues at 8.9%. A significant number of participants, 7.8%, responded that they experienced multiple challenges including “not trusting” AI outputs, technical challenges, lack training, and difficulty integrating AI tools with conventional systems. Regarding combination challenges, 6.8% of participants reported experiencing challenges due to both “not trusting.” In terms of reporting difficulties including both “not trusting” and technical solutions, the participants noted both issues without discrimination.

Integrating AI tools into their practice presents an additional dual axis, as these tools should be treated independently from the previous trust and implementation factors explored. Sixth, however, 1% of the sample indicated that they never used AI tools.

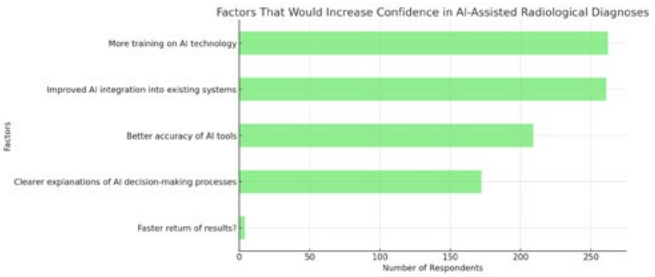

Figure 3: Factors that would increase Confidence in AI Assisted Diagnosis

3.7 Preference, Confidence and Trust in Diagnostic Methods

When deciphering radiological reports, the highest number of participants preferred conventional diagnosis led by radiologists which accounted for 66.7%. On the contrary, just 13.3% showed more confidence in using AI-assisted diagnoses while 20.1%. This trend was replicated in managing complex cases whereby 74% of respondents would feel at ease if they practiced conventional methods with a mere 12.5% preferring computer assistance. In terms of decision-making support at primary care level, 68% believed that conventional radiology offered better assistance than AI and 18% claimed both approaches were equal in their level of assistance. More than half (70%) trusted traditional radiology compared to 22.4% who thought both were equally good and a mere 7.6% who considered AI enhanced diagnosis as being more credible.

3.8 Future of AI in Care Provision

Regarding the belief that AI-assisted radiological diagnosis will, in due course, be superior to conventional techniques, views were almost evenly divided: About 36.7% of the respondents agreed that, one day, AI will be more accurate and reliable than conventional techniques; 34.1% disagreed, whereas 29.2% expressed uncertainty. Regarding the recommendation of AI-assisted tools to others, most of the respondents, 38.5%, gave a rating of 3 out of 5, followed by 20.6% who rated their likelihood as 2, while only 1.6% showed a high likelihood-rate of 5. These results reflect a cautious or reluctant recommendation of AI-assisted tools among the participants.

The recommendations suggested by attendees for the AI tool focused most on increasing the accuracy of the AI, better integration with existing systems, and increased training for users. A minority, but large, emphasized that continuous education regarding AI integration was necessary for any hope of trust and familiarity. Also, comments that came out of the perspectives of the participants were from optimism to skepticism: some acknowledged that AI could play a large role one day, others had nothing strong they could say.

4. Discussion

This study provides enormous value to the amount of confidence doctors apply to traditional radiology diagnoses compared to those bolstered by artificial intelligence. In addition, this study investigates some of the challenges and perceptions on the integration of AI into the clinical environment. Key themes that emerge from the findings include the interrelation between diagnostic confidence and professional experience, relying on radiologists, and mixed mind-sets about AI-assisted tools.

The most salient finding emerging from this study is a clear relationship between years of professional practice and the level of confidence in interpreting radiological images. Experienced practitioners, consultants, and registrars with more than ten years of experience expressed significantly higher levels of confidence in their ability to interpret radiographs independently, compared to less experienced medical doctors. This agrees with the generally accepted notion that clinical expertise develops gradually, dependent on exposure to complex situations, continued learning, and the development of skills in differential diagnosis in a stepwise process [9]. Experienced clinicians often possess more fully developed schemata, allowing them to recognize patterns in radiological images at a higher level. Expertise such as this is particularly important in radiology, as small changes in image appearance may greatly alter the results of diagnosis.

Another parallel finding is the negative correlation recorded between reliance on radiologists and confidence in the interpretation of radiographs. For example, those practitioners who evidenced low levels of confidence with a mean confidence score of 4.5 were more reliant on radiologists, having a mean reliance score of 8.5. This trend seems to indicate a compensatory effect, where doctors refer patients to specialists due to uncertainty, as complete reliance on oneself without developed relevant skills can result in diagnostic failure [10]. On the other hand, more experienced practitioners demonstrated less reliance on radiologists, which could be interpreted as an indication of their better judgments independently in routine cases [11]. This would suggest that confidence in medical image interpretation rises with clinical experience, but it also underlines an important role for the radiologist, especially for practitioners who are less experienced.

These challenges identified in this study regarding dependency on radiologists-that include time constraints and limited availability of skills-are not new. They have been documented in large amounts of academic literature, especially in contexts described by resource limitations. 35% of the respondents reported delays in receiving radiological reports, which indicate the usually critical gap between clinical needs and the production of diagnostic output, especially in emergency situations [12]. According to 21% of participants, there is usually a high volume of work for radiologists, which can also contribute to these delays. This can lead to delays on the patient's waiting time and impede quality care. Further, 26% of the respondents reported lack of access to radiological expertise as an increasingly heinous problem, particularly in deprived regions of Africa and parts of Asia. In these regions, shortage of radiologists imposes a serious stress on health services, and clinicians are at times forced to make diagnostic decisions bereft of requisite support.

This challenge has been highlighted in other studies, which have called for AI tools that could reduce this gap by providing automated preliminary reads for images [13]. However, it also needs to be weighed against the requirement for sufficient training and trust in the output from AIs. Results of this study showed an average rating of 5.35 out of 10 as the level of confidence in AI-assisted radiology interpretation, despite the increasing infusion of AI into clinical practice. This is indeed supported by literature reviewed during the conceptualization of this research, which has proved that AI, although promising, remains a tool approached with caution by medical professionals [14]. The interquartile range of confidence levels (2.5 to 7.5) indicates a significant variability in how comfortable practitioners feel using AI in their diagnostic process. This hesitancy can be attributed to several factors, including insufficient training on AI tools (cited by 16.9% of participants) and a lack of trust in AI-generated outputs (13%).

A major barrier to the integration of artificial intelligence in healthcare is the prevailing skepticism about its diagnostic competencies. Although AI has demonstrated the ability to match or even outperform human performance in specific radiological applications, significant concerns over its reliability in complex settings requiring fine-grained evaluative judgments persist [15]. Moreover, technical and integration challenges cited by 8.9% and 6.8%, respectively, still hinder the seamless integration of AI into current clinical workflows. This therefore emphasizes the need to improve the robustness of AI systems, as well as to validate their compatibility with existing healthcare infrastructure.

The strong preference in this study for conventional radiologist-led diagnoses over AI-assisted methods reported herein-66.7% vs. 13.3%-underlines the continuing trust gap between AI and human practitioners. This finding is consistent with previous studies, which have shown that doctors generally place higher confidence in human radiologists for interpreting complex cases [16]. Many practitioners feel that the interpretative skills of experienced radiologists cannot yet be fully replicated by AI. Besides, the preference for conventional techniques in the management of complex cases was 74%, which outlines that, though artificial intelligence may be immense in helping routine diagnostic work, it has not yet reached a stage co-extensive with human skills in difficult diagnostic situations.

This is further reflected in the reactions of respondents when considering the future of AI in care provision. Only 36.7% of the participants believed that artificial intelligence will eventually surpass traditional radiological diagnostics in terms of accuracy and reliability. This cautious view illustrates broad concerns about the limitations of current AI technologies, which include problems related to explain ability, biases within algorithms of AI, and the generalizability of AI models across heterogeneous patient groups [17].

This points to the still-existing barriers to wide AI adoption in healthcare because a large part of the participants took a relatively neutral stance on recommending these AI tools to their colleagues, 38.5%. This study is optimistic about the future of AI in radiology, despite the challenges and skepticisms outlined. The participants provided suggestions for ways improvements could be made to AI tools: improving the accuracy of these tools, better integration into existing systems, and improving user training. These are supported by other research that proffers continuous education regarding artificial intelligence systems as a way to instill trust and truthfulness in health professionals [18]. Increasing transparency and explain ability of AI algorithms is the second effort that will ease many fears about using them in clinical decision-making. Results are indicative that while AI-assisted tools have a potential effect in improving diagnostic precision and easing the burden of strained time, yet their wide acceptance requires overcoming technical and cultural barriers. Confidence in the outputs of AI, ease of integration with existing systems, and an adequate training program for healthcare professionals are basic prerequisites for realizing the potentials of AI in patient care improvement.

5. Conclusion

Results from this study indicate that the general feeling among practitioners is that conventional radiologist-led diagnoses remain trusted and preferred for the time being, as opposed to AI-assisted radiological tools. Notwithstanding the rapid developments of AI technology and the fact that it has already started to show promise in improving diagnostic accuracy and efficiency, confidence in AI still receives only a moderate rating among medical professionals. This work examined the extent to which clinicians, especially the less experienced ones, still have deep trust in radiologists regarding valid diagnostic interpretations. Lower confidence in AI-assisted diagnoses is further diminished by concerns about interpretability and reliability, emphasizing that today a substantial trust gap exists between AI technologies and healthcare providers.

While AI has shown promise in smoothing diagnostic workflows and taking off some time pressures, especially in resource-constrained settings, it is equally clear that barriers to its integration into clinical practice remain significant. Issues range from lack of training on AI systems to handling complex cases and a host of technical malaises in integrating AI into existing healthcare infrastructure, thus putting the brakes on wider acceptance. More importantly, however, doctors still express apprehensions over the lack of transparency in AI decision-making, barring tools from trusting questions that may be taxing and need very much human expertise.

These are challenges that must be met with serious efforts if AI is to find general acceptance in radiological diagnosis. Improvement in the explain ability of AI systems, enhancement in the field of accuracy, and ensuring sufficient robust training for healthcare professionals will be important in bridging this gap. Until then, though, it seems obvious that traditional radiologist-led diagnostics will remain the backbone of radiologic interpretation. AI is a promising addition to clinical practice, but it still has a ways to go before it can be used synonymously with human radiologists in terms of trust and reliability. Thus, radiologists are not about to become obsolete anytime soon, and until AI proves its clinical

relevance on the ground in decision-making and gains confidence among health workers, it will serve as an adjunct.

Conflict of Interest

The authors hereby declare no conflict of interests.

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Appendix

1. Data collection Tool

https://docs.google.com/forms/d/e/1FAIpQLSf77gdpPxm8DY8xr6IhKZQsPv0MYgTwKKqctctr_sRJN1xhrA/viewform?usp=sf_link