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Conference abstract

Artificial Intelligence Education in Radiology Training: A Systematic Review of Effectiveness, Barriers, and Future Directions

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INTRODUCTION

Artificial intelligence (AI) is rapidly transforming modern medicine by enhancing diagnostic accuracy, optimizing workflows, and supporting clinical decision-making across multiple specialties. As its applications continue to expand, there is a growing need to equip future physicians with the knowledge and skills to effectively and safely use AI technologies. Radiology, as one of the leading fields in AI adoption, has seen increasing efforts to integrate AI into training programs; however, these educational approaches remain heterogeneous, and their overall effectiveness and implementation challenges are not well established.

The purpose of this systematic review study was to characterize the current landscape of various AI education in radiology, summarizing existing curricula, outcomes, challenges, and future directions for effective integration into residency training.

METHODS

This study is a systematic review conducted in accordance with PRISMA guidelines. A comprehensive literature search was performed across PubMed/MEDLINE, Web of Science, Embase, and Google Scholar to identify relevant studies on AI education in radiology training published up to June 19, 2025. Eligible studies included those involving radiology trainees exposed to AI-focused educational interventions, such as structured curricula, hands-on simulations, didactic lectures, or integrated training programs. Two independent reviewers screened titles, abstracts, and full texts, with discrepancies resolved by consensus. Data extraction included study design, participant characteristics, type and duration of AI training, and reported outcomes. Outcomes were categorized into objective measures (e.g., diagnostic performance, knowledge scores) and subjective measures (e.g., confidence, perceptions, acceptance of AI). Quality assessment was performed using the Cochrane Risk of Bias tool for randomized controlled trials and the NIH Quality Assessment Tool for observational studies.

RESULTS

Of the 2,646 studies screened, 14 studies evaluated the performance of AI-based training programs for radiology trainees; among these, 92.9% (13/14) reported improvements in trainees' performance, including better diagnostic precision and interpretation (57.2%, 8/14), greater trainee confidence (57.2%, 8/14), hands-on experience with AI platforms (85.7%, 12/14), increased AI knowledge (85.7%, 12/14), engagement with AI-based case learning (35.7%, 5/14), understanding of AI ethics and bias (7.1%, 1/14), and acceptance of AI-assisted learning (78.6%, 11/14), whereas one study (7.1%, 1/14) found no significant benefit. Performance evaluation metrics varied across studies, with 35.7% (5/14) reporting a higher median of sensitivity, specificity, and accuracy (72%, 80%, and 81.3%) after AI training compared with before AI training (62.2%, 78.9%, and 76.5%, respectively), and 28.6% (4/14) showing improved AI knowledge scores. Hands-on simulations and didactic lectures were the most common AI training formats (78.6% and 71.4%). Risks and concerns included over-reliance on AI, limited exposure to complex or rare cases, and a lack of feedback. Recommendations highlighted the need for AI-faculty teaching, broader content coverage, and standardized multi-center AI-training programs to facilitate wider adoption.

CONCLUSIONS

This systematic review demonstrated that AI-based educational interventions consistently improve trainees' knowledge, diagnostic performance, and confidence, with 92.9% of studies reporting positive outcomes. Notable benefits included increased familiarity with AI tools, enhanced interpretive accuracy, and greater engagement with case-based learning, particularly among junior trainees. In several studies, AI integration was associated with measurable improvements in diagnostic sensitivity, specificity, and overall accuracy. These findings highlight the growing educational value of AI as both a teaching tool and a clinical support system for physicians and radiologists. While variations in study design and training approaches exist, the overall

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trend supports the incorporation of AI into structured training environments. This work contributes to the evolving field of medical education by providing consolidated evidence that AI-enhanced curricula can strengthen trainee competency and better prepare future physicians and radiologists for technology-integrated clinical practice.

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