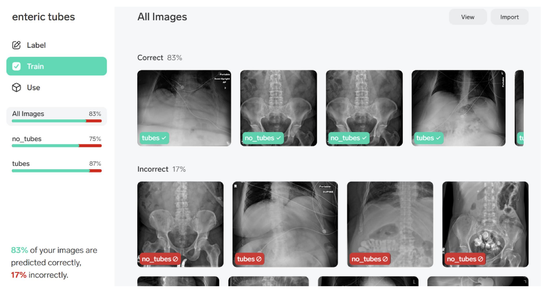
Approaching the Standardization of Artificial Intelligence Education in Radiology Residency

Cole Newton, OMS III; Isaac Roy, OMS II; Shandon Poulsen, OMS III; Kai Nethercott, OMS III; Cole Zanetti, DO

Rocky Vista University

INTRODUCTION

Artificial intelligence (AI) is rapidly transforming the field of radiology, influencing not only image interpretation but also diagnostic workflows and broader clinical decision-making. As AI tools become more widely adopted in clinical practice, there is an increasing need for radiologists to be trained in these technologies to ensure they can implement them effectively and critically assess their outputs. Residency programs are responding to this need by attempting to equip trainees with the knowledge, skills, and practical experience necessary to integrate AI into patient care. However, education in radiological imaging is far from uniform: graduate medical education programs show considerable variability, with courses differing in length, content, and the availability of hands-on learning opportunities. This lack of standardization presents challenges for both trainees and educators seeking to develop consistent, evidence-based curricula. The literature review we we conducted analyzes current approaches to AI education in radiology residency, highlights existing discrepancies across programs, and explores future directions for establishing standardized, longitudinal training that prepares residents to meet the demands of an AI-augmented clinical environment.



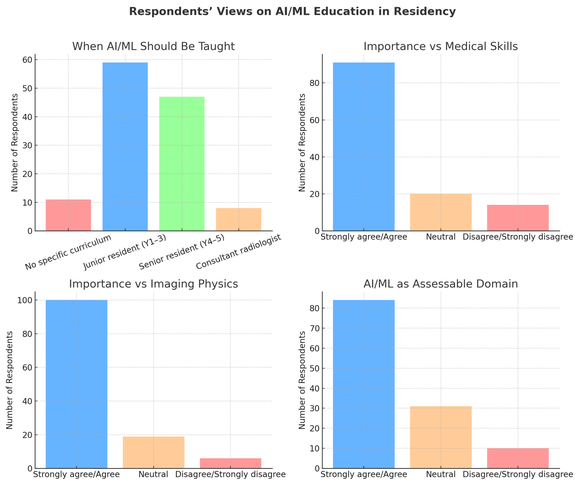
An AI learning program created to train residents on how to create, evaluate, and refine their own learning models (Richardson)

METHOD

Articles indexed in MEDLINE via PubMed, EBSCO, Embase, and Google Scholar were systematically searched. The search strategy was designed to capture literature at the intersection of three primary domains: Artificial Intelligence (AI), Radiology/Medical Imaging, and Education/Residency Training. Keywords and controlled vocabulary (e.g., MeSH and Emtree terms) were combined with Boolean operators to ensure comprehensive coverage across databases. Searches were limited to English-language articles and publications. Titles and abstracts were screened for relevance, followed by full-text review to identify studies that directly addressed the integration of AI into radiology residency or related medical education programs. Additionally, LitMaps was utilized to identify relevant articles through citation mapping and to discover studies that may have been missed in traditional database searches. Reference lists of included studies were also examined to identify additional sources.

RESULTS

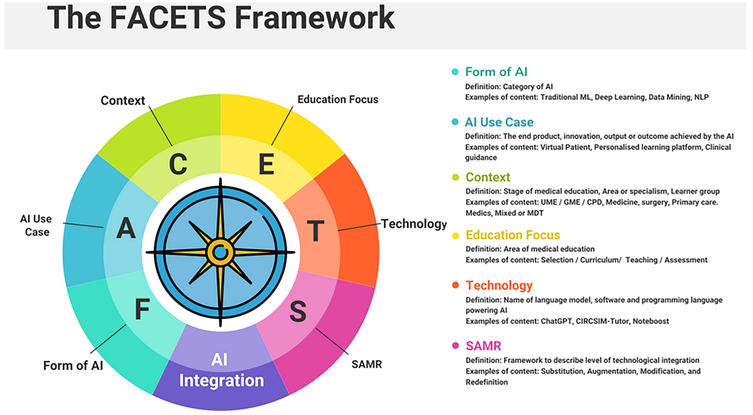
Educational strategies identified include didactic sessions, journal clubs, hands-on learning, and certificate programs. Systematic reviews and resident surveys consistently indicate a preference for longitudinal, hands-on, and case-based learning throughout residency. Key challenges in implementing AI education are the absence of standardized curricula, scheduling constraints for residents, and limited faculty expertise. Discrepancies exist in course content depth and assessment methods, with frequent omission of essential topics such as algorithmic bias, data management, and regulatory oversight.



Surveys taken among Radiology residents across the nation about attitudes toward training in artificial intelligence indicate an overwhelming desire for a robust education in AI tools during training (Ooi)

ANALYSIS AND DISCUSSION

Based on our review analyzing the state of AI education in radiology residency, there is an urgent need to standardize AI competencies. As AI tools become integral to diagnostic imaging, trainees must gain technical proficiency while critically evaluating algorithm outputs, understanding limitations, and applying AI safely. Evidence-based, longitudinal guidelines are needed that integrate practical skills, ethical considerations, bias mitigation, and regulatory frameworks. Embedding these competencies into residency curricula will ensure radiologists are prepared to implement AI effectively, maintain patient safety, and uphold professional accountability. A structured, consistent approach will equip the next generation of radiologists to thrive in an AI-augmented clinical landscape.



A framework developed to appraise AI tools used in radiology training. This model can be utilized by the ACGME and ABR to evaluate a standard curriculum to implement in programs across the nation (Gordon)

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