



Integrating artificial intelligence into medical education: a narrative systematic review of current applications, challenges, and future directions

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Artificial intelligence (AI) is transforming healthcare delivery and medical education. Its expanding range of applications is reshaping how healthcare professionals are trained and how clinical care is provided. In medical education, AI is enhancing knowledge acquisition, strengthening clinical reasoning, improving diagnostic accuracy, and streamlining administrative processes.

These advances are changing the ways in which medical students, residents, and practicing clinicians interact with information and develop clinical competencies. Despite these benefits, many institutions still lack comprehensive AI curricula, validated teaching strategies, and effective interdisciplinary collaboration.

The growing use of AI in clinical decision-making also raises important ethical concerns. Future physicians must acquire not only technical proficiency but also the ability to critically assess algorithm-generated outputs, recognize potential biases, and understand the limitations of AI-based systems.

AI has the potential to redefine medical education by improving teaching methodologies, increasing the accuracy of assessments, and supporting personalized learning experiences. This review highlights the need for structured, ethically grounded, and evidence-based AI training programs. A phased integration strategy—beginning with foundational AI literacy during preclinical education and progressing toward more advanced clinical applications—may provide a practical and sustainable approach.

As AI technologies continue to evolve, medical education systems must adapt accordingly. Future clinicians should be prepared not only to use AI tools effectively but also to guide their responsible and ethical integration into healthcare practice.

<http://dx.doi.org/10.5935/0004-2749.eRes32026>

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Article reference of the review

Ahsan Z. Integrating artificial intelligence into medical education: a narrative systematic review of current applications, challenges, and future directions. *BMC Med Educ.* 2025 Aug 23;25:1187.