



Preserving Clinical Reasoning in the Age of AI-Assisted Medical Education

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Abstract

Artificial intelligence (AI) is rapidly transforming medical education by enabling personalized learning, rapid knowledge retrieval, and automated academic support. While these technologies offer substantial benefits, their growing use raises concerns about cognitive over-reliance and the potential erosion of independent clinical reasoning among medical students. AI systems can produce fluent and persuasive outputs even when inaccuracies or reasoning errors are present, potentially fostering misplaced confidence if learners are not trained to critically appraise such information. This letter examines the risks associated with excessive dependence on AI in medical training and emphasizes the need to integrate these tools within pedagogical frameworks that prioritize critical evaluation and verification. Preserving independent diagnostic judgment alongside responsible AI adoption is essential to ensuring safe and effective future clinical practice.

Key Words: Artificial intelligence, Automation bias; AI literacy, Clinical reasoning; Medical education.

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Dear Editor,

The rapid integration of artificial intelligence (AI) into medical education has created new opportunities for knowledge acquisition, personalized learning, and efficient information retrieval. Large language models and AI-driven platforms are increasingly used by medical students to summarize complex material, generate explanations, and assist with clinical reasoning tasks. Emerging evidence suggests that these systems can perform at levels approaching professional examination standards, strengthening interest in their role as educational support tools (1). However, alongside these benefits, concerns are growing regarding the unintended cognitive consequences of excessive reliance on AI-assisted learning.

Medical training has traditionally emphasized deliberate analytical reasoning, management of uncertainty, and reflective clinical judgment developed through repeated diagnostic practice. Increasing reliance on AI systems to generate differential diagnoses, interpret clinical data, or draft clinical documentation risks outsourcing essential cognitive processes. This phenomenon, often described as cognitive offloading or automation bias, may diminish the effortful reasoning required to develop diagnostic expertise (2, 3). In educational contexts, such dependence may weaken the cognitive apprenticeship through which clinical competence is cultivated.

A further challenge lies in the epistemic nature of AI-generated information. These systems often produce coherent and convincing responses even when their underlying reasoning is incomplete or incorrect. This can create a false sense of reliability, particularly among novice learners who may lack the experience needed to critically evaluate outputs. Without explicit training in verification and critical appraisal, students may inadvertently internalize inaccuracies or develop unwarranted confidence in algorithmic recommendations (1, 4).

Scholars in health professions education have therefore emphasized the need for structured frameworks to guide AI integration into medical curricula. Masters highlights that ethical AI adoption requires attention to transparency, bias, accountability, and responsible data use, while also ensuring that learners maintain intellectual independence from algorithmic decision-making (5). Similarly, Paranjape and colleagues argue that AI literacy should extend beyond technical familiarity to include understanding system limitations, appropriate contexts for use, and strategies for integrating AI outputs with clinical reasoning and patient-centered care (6).

Rather than prohibiting AI tools, medical schools should develop pedagogical strategies that incorporate them within supervised and critically reflective learning environments. For example, students could compare their own diagnostic reasoning with AI-generated suggestions, identify discrepancies, and analyze potential sources of error. Such approaches encourage learners to use AI as a tool for reflection rather than a substitute for independent thinking. Assessment strategies should likewise prioritize reasoning processes, justification of clinical decisions, and the ability to critically evaluate technological recommendations.

Ultimately, the central challenge for medical education is not whether AI will be used, but how it will shape the cognitive development of future physicians. Without deliberate safeguards, AI-assisted learning may shift training away from cultivating clinical reasoning toward supervising algorithmic outputs. Preserving independent diagnostic judgment while responsibly integrating AI technologies will be essential to ensuring safe, ethical, and effective clinical practice in the era of intelligent systems.

CONFLICT OF INTEREST: None.

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