The NEW ENGLAND JOURNAL of MEDICINE

Perspective

AI and Medical Education — A 21st-Century Pandora's Box

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August 3, 2023
N Engl J Med 2023; 389:385-387
DOI: 10.1056/NEJMp2304993

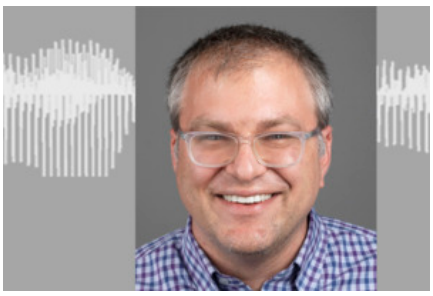
Article Figures/Media

Metrics

5 References

Article

Audio Interview



Interview with Adam Rodman on the potential effects of generative artificial intelligence on medical education and clinical practice. (09:51)

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ChatGPT (Chat Generative Pre-trained Transformer), OpenAI's chatbot powered by artificial intelligence (AI), has become the fastest-growing Internet application in history.[1] Generative AI, which includes large language models such as GPT, has the ability to produce text resembling that generated by humans and seemingly to mimic human thought. Medical trainees and clinicians already use this technology, and medical education doesn't have the luxury of

then presents as fact (termed a "hallucination"), its implications for patient privacy, and the risk of biases being baked into source data.[2] But we worry that the focus on these immediate challenges obscures many of the broader implications that AI could have for medical education — in particular, the ways in which this technology could affect the thought structures and practice patterns of medical trainees and physicians for generations to come.

Throughout history, technology has disrupted the way physicians think. The invention of the stethoscope in the 19th century helped spark the development and refinement of the physical exam, which led to the emergence of physicians' self-conception as diagnostic detectives.[3] More recently, information technology has reshaped clinical reasoning schema, as Lawrence Weed, the inventor of the problem-oriented medical record, famously argued: the way physicians structure data affects how we think.[4] Modern billing structures, quality-improvement systems, and the current electronic health record (along with the malaise associated with it) were all profoundly influenced by this approach to record keeping.

In the months since its release in the fall of 2022, ChatGPT has shown the potential to be at least as disruptive as the problem-oriented medical record, having passed both licensing and clinical reasoning exams and approximating the diagnostic thought patterns of physicians. Higher education is currently wrestling with "the end of the college essay," and medical school personal statements are sure to follow. Major health care companies are partnering with technology firms to deploy AI widely and rapidly throughout the U.S. health care system, including by integrating it into electronic health records and voice-recognition software. Chatbots intended to replace physicians for some medical encounters will imminently be commercially available.

Clearly, the sands of medical education are shifting — and have already shifted — beneath our feet, which leaves the discipline with an existential choice: Do medical educators take an activist approach to integrating AI into physician training, deliberately preparing the physician workforce for the safe and appropriate use of this transformational technology in health care? Or do we allow external forces governed by incentives for prioritizing operational efficiency and profits to determine what that integration looks like? We believe strongly that curriculum designers, program and institutional leaders, and accreditation bodies must begin to account for AI.

and adapt to the emerging academic use of AI by students and faculty. Medical students are already starting to apply AI in their studying and learning, generating disease schema from chatbots and anticipating teaching points. Faculty are contemplating how AI can help them design courses and evaluations. The whole idea of a medical school curriculum built by humans is now in doubt: How will a medical school provide quality control for components of its curriculum that didn't originate from a human mind? How can schools maintain academic standards if students use AI to complete assignments? To adequately prepare students for the future clinical landscape, medical schools need to begin the arduous process of incorporating didactics on the use of AI into clinical skills courses, lessons on diagnostic reasoning, and training in systems-based practice. As a first step, educators could identify local thought leaders and content experts and task them with defining an approach for adapting curricula to integrate AI. Such adapted curricula should then be rigorously assessed and published — work that has already begun.[5]

At the graduate medical education level, residents and fellows need to be prepared for a future in which AI tools are integral components of their independent practice. Trainees will have to become comfortable working with AI and will have to understand its capabilities and limitations, both to support their own clinical skills and because their patients are already using it. For example, ChatGPT can produce advice on cancer screening in patient-friendly language, though not with 100% accuracy. AI queries by patients will inevitably lead to an evolution of the patient–doctor relationship, just as the proliferation of commercial genetic-testing products and online medical advice platforms changed discussion topics during clinic visits. Current residents and fellows have 30 to 40 years of practice ahead of them and will need to adjust to evolutions in clinical care.

Medical educators could focus on structuring training programs to help residents and fellows build "adaptive expertise" in AI, which would allow them to respond to future waves of change. Governing bodies such as the Accreditation Council for Graduate Medical Education could incorporate expectations regarding AI education into common program requirements, which would form the basis for curricular standards and compel individual programs to make changes to their training approaches. Finally, physicians already in practice will need to develop familiarity with AI; professional societies could lead the way in preparing their members for new health care realities.

Concerns about AI's role in medical practice aren't trivial. Medicine has a millennia-long history of cognitive apprenticeship. How will this model be affected by the reality that medical students will use AI-powered chatbots from their first day of training? Learning theories emphasize that effortful study and deliberate practice are essential to growth of knowledge and skills. When any question can be immediately and reliably answered by a chatbot at the point of care, how will doctors become effective lifelong learners? Ethical precepts are the bedrock of medical practice. What will health care look like when medicine is assisted by AI models that filter ethical decisions through opaque algorithms? The

to AI? None of these questions can currently be answered, but we need to be asking them.

Philosopher Jacques Derrida outlined the concept of a pharmakon, something that can either heal or harm, and AI technology poses both opportunities and threats. Because of the stakes — the future of health care itself, we believe — medical education as a field should lead the way when it comes to integrating AI into clinical practice. This process won't be easy, especially given the pace of change and the lack of guiding literature, but Pandora's box has already opened. If we don't shape our own future, powerful technology companies will happily shape it for us.

Funding and Disclosures

Disclosure forms provided by the authors are available at NEJM.org.

This article was published on July 29, 2023, at NEJM.org.

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Supplementary Material

Disclosure Forms	PDF	156KB

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