Artificial Intelligence in Medical Education

To the Editor: I read with great interest the commentary by Carin,¹ which makes several thought-provoking points on the application of artificial intelligence (AI) and deep learning (DL) within medical education. As a clinical medical student with a background in data science and AI, I would like to offer a perspective on the integration of deep learning into undergraduate medical curricula.

Carin states that future clinicians should learn to understand the fundamentals of DL, appreciate opportunities for its use, and recognize its limitations. This poses a question: When and how should these skills be taught? In ushering in a new era of AI-literate clinicians, it would be important to offer medical students teaching in the relevance and applications of DL and other novel technologies from the beginning of their clinical education. Early exposure would not only allow learners to communicate the uses and limitations of these technologies effectively to colleagues but also offer them the expertise and confidence to advocate for their use in research, teaching, and clinical practice from the beginning of their careers.

As an example, my institution in London offers a novel intercalated degree in mathematics and computing targeted at third-year medical students.² By teaching skills in programming and AI, the course seeks to produce physicians who will drive forward the process of adopting these technologies in both clinical and research settings. During the 1-year program, students are offered basic training in pure mathematics, programming, mathematical modeling and AI theory before being given the opportunity to undertake supervised biomedical research projects incorporating AI and DL. The course has been well received by students, suggesting that similar curricula could be useful in developing awareness of these potentially transformative technologies. Even a basic understanding of AI may help to alleviate the “black box” effect, a recognized obstacle to its widespread adoption in medicine.³ Similar programs may also help address the growing regulatory challenges of implementing AI in medicine by offering students skills in critically appraising interventions based on these technologies.

DL and AI have significant potential to transform medical education and clinical practice. As these technologies gain traction in clinical practice and pedagogy, it may become necessary for medical educators to find space for them in undergraduate curricula. However, significant attention should be given to when, how, and why these skills are introduced to students.

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References

To the Editor: I greatly appreciated the commentary by Dr. Carin¹ for calling attention to the frontier of artificial intelligence (AI) within medical education. I agree with his argument for the inclusion of AI in medical education and would like to propose a direction for future curriculum development.

An AI medical curriculum should provide trainees with the skills to critically evaluate AI applications akin to critiquing a research article introducing a new medication, procedure, or surgical technique. Machine learning and AI applications will become more common in clinical medicine, and physicians must have the expertise to evaluate whether to incorporate these algorithms into their practice.

The assessment of AI applications requires a unique curriculum because current evidence-based medicine (EBM) guidelines are incomplete for the evaluation of AI medical algorithms. The issues of “black box” interpretability, data security, and decision liability create problems not addressed by traditional biostatistics.² Unfortunately, there is not yet a consensus methodology for critiquing AI algorithms for medical use. However, recent publications in Nature³ and JAMIA Open¹ have begun to offer promising schemas for systematic evaluation. The schema proposed by Park and colleagues⁴ is the most complete and was published only in October 2020.

Ultimately, I believe medical educators should allow for the field of medical AI to develop a consensus best practice method for algorithm evaluation. In many ways, the current AI environment mirrors the EBM paradigm of the 1990s, where a central work, such as the JAMA article “Users’ guides to the medical literature,”⁵ must be established before widespread adoption into medical education. Once a similar consensus is formed within medical AI, educators will have a clear outline to develop a curriculum that trains students to critique AI products for inclusion into their clinical practice.

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References
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