



Artificial intelligence and medical education: current developments and future considerations

Dr Mariam Parwaiz

BHSc, MBChB, MPH (Hons)

Public Health Medicine Registrar

Counties Manukau District Health Board

The growth of artificial intelligence (AI) and the ongoing automation of work are features of our time, and medicine will be increasingly impacted by these trends. AI in medicine generally means the utilisation of computer algorithms and automated processes to aid in the diagnosis and treatment of patients.¹ The medical AI industry is growing rapidly, and there has been an explosion of academic interest in the subject.² Although medicine constantly evolves and adapts to new technologies over time, health care systems tend to be naturally risk-averse, and there is some caution within the medical community about the role for AI in health care.¹ The medical students of today will likely experience the opportunities and challenges associated with AI in medicine throughout their future careers as doctors.

The role for medical education in New Zealand is to equip medical students with the scientific knowledge and the professional skills and attributes necessary to function effectively as doctors, and help them progress towards mastering the science and art of medicine. While AI in medical education is still a nascent idea in medical schools in New Zealand, as time goes by and as AI inevitably becomes more of a feature of medical practice, there will be a mounting pragmatic necessity for doctors, and for medical education, to engage with it. This engagement should be done in an ethically-sound way, with the aim of providing high-quality, equitable, culturally-safe, and patient-centric care, in a manner that reflects the values and aspirations of health care delivery in New Zealand.

Researchers recognise the potential of AI in medicine to improve health care delivery, and current literature suggests that AI-based tools can be as effective and accurate as human clinicians.¹ AI competence will become an important skill to add to the vast skillsets possessed by doctors. But doctors will not only need to be comfortable using AI in their day-to-day work, they will also need to have an understanding of the principles behind both AI generally and the specific AI-based tools they will use, as well as the benefits and potential biases and flaws of these. Essentially, the doctor of the future will exist in a world where they will need to be competent at using AI; the role for medical education is to ensure future doctors are prepared for that world.

Currently, medical education arguably does not sufficiently prepare future doctors for the impending AI revolution in health care. To do so will require a transformational reform in medical education, where

medical students are taught traditional biomedical sciences and compassionate communication, alongside the principles of AI.³ As medical education academics are starting to argue, medical schools need to shift from focusing on information acquisition to 'an emphasis on knowledge management and communication'.⁴

Within the medical profession itself, there is positive news. Recently the New Zealand Medical Association (NZMA) commented on the proposed World Medical Association (WMA) Statement on Artificial or Augmented Intelligence in Medical Care, suggesting that AI should be regarded by the medical community as a technological tool that can be applied to improve the quality and efficiency of health care delivery and education.⁵ It is important that medical organisations contribute to the discourse around AI in medicine, and it should be interesting to read and review the WMA's statement once it has been ratified and published. The NZMA also suggested that the clinical impact of interventions related to AI should be subjected to high standards of empirical evaluation, with the possibility of unintended negative consequences kept in mind and beneficial impacts not presumed.⁵ This is a reasonable concern, and any AI-based tool developed should be robustly tested and validated before being deemed suitable for wider general use.

In medicine it is always necessary to act in an ethical manner, and with this in mind the Royal Australian and New Zealand College of Radiologists recently produced a draft on Ethical Principles for AI in Medicine.⁶ The eight draft principles they identified, which will likely be retained in the final version of the document, were: safety; avoidance of bias; transparency and explainability; privacy and protection of data; decision making on diagnosis and treatment; liability for decisions made; application of human values; and governance.⁶ These principles, which are also relevant to AI as applied to other medical specialities, provide an excellent framework to help ensure that AI in medicine is, and continues to be, safe and effective.

Health equity is an important concern that must be kept foremost in mind as AI is further adopted into medical practice. According to the Ministry of Health, 'In Aotearoa New Zealand, people have differences in health that are not only avoidable but unfair and unjust. Equity recognises different people with different levels of advantage require different approaches and resources to get equitable health outcomes'.⁷ It is possible that introducing AI-based tools could have

the unwelcome effect of increasing inequities between populations, such as between socioeconomic groups, ethnic groups, or geographic groups of people. For instance, the data that AI systems use could be biased.⁸ Data containing implicit ethnic, gender, or other biases will generate results that are also biased.^{8,9} Khullar provided a clear example of this in a recent opinion piece, noting that if poorer patients do worse after organ transplantation, AI algorithms may conclude that such patients are less likely to benefit from treatment and thus recommend against it, without accounting for or mitigating for wider factors.¹⁰ As medical professionals and custodians of the health care system, we must ensure that technological advances in health care are implemented systematically, are culturally safe and free from implicit bias, and take account of the most vulnerable. We must ensure that incoming AI tools do not, and will not, increase health inequities, and preferably actually work to reduce the inequities we currently see in health.

It is necessary to state that machines cannot and should not replace human doctors. The role of the doctor will inevitably evolve over time, but doctors will not become obsolete. Humans will always be required to interpret outputs from machines, assess ethical and value-based dilemmas, and communicate empathetically.¹¹ The therapeutic relationship between doctor and patient is a fundamental tenet of medicine and will remain so. There is no substitute for the human touch. As AI becomes more and more a part of medical practice, the role of medical education in imparting the soft skills of medicine will increase in importance. These skills include an appreciation of ethics, leadership skills, communication skills, and the ability to work in an empathetic manner.¹¹ These skills are essential to being a good doctor, and will continue to differentiate us from machines.¹² Hopefully we can look forward to a future where AI tools work in an ethical and equity-enhancing manner to complement our role as doctors and improve our effectiveness in the health care system.

References

1. Loh E. Medicine and the rise of the robots: a qualitative review of recent advances of artificial intelligence in health. *BMJ Leader*. 2018;2:59–63.
2. Kolachalama VB, Garg PS. Machine learning and medical education. *NPJ Digit Med*. 2018;1:54.
3. Wartman SA, Combs CD. Medical education must move from the information age to the age of artificial intelligence. *Acad Med*. 2018;93(8):1107–9.
4. Wartman SA, Combs CD. Reimagining medical education in the age of AI. *AMA J Ethics*. 2019;21(2):E146–52.
5. New Zealand Medical Association. NZMA submission on proposed WMA statement on artificial or augmented intelligence in medical care [Internet]. 2018 [cited 15 Apr 2019]. Available at: https://www.nzma.org.nz/__data/assets/pdf_file/0004/86818/NZMA-Submission-on-proposed-WMA-statement-on-artificial-or-augmented-intelligence-in-medical-care.pdf
6. Royal Australian and New Zealand College of Radiologists. RANZCR ethical principles for AI in medicine – consultation [Internet]. 2019 [cited 15 Apr 2019]. Available at: <https://www.ranzcr.com/our-work/advocacy/position-statements-and-submissions/ranzcr-ethical-principles-for-ai-in-medicine-consultation>
7. Ministry of Health. Achieving equity [Internet]. 2019 [cited 15 Apr 2019]. Available at: <https://www.health.govt.nz/about-ministry/what-we-do/work-programme-2018/achieving-equity>
8. IBM. AI and bias [Internet]. 2019 [cited 4 Apr 2019]. Available at: <https://www.research.ibm.com/5-in-5/ai-and-bias/>
9. Angwin J, Larson J, Mattu S, Kirchner L. Machine bias [Internet]. 2016 [cited 4 Jun 2019]. Available at: <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>
10. Khullar D. A.I. could worsen health disparities [Internet]. 2019 [cited 4 Jun 2019]. Available at: <https://www.nytimes.com/2019/01/31/opinion/ai-bias-healthcare.html>
11. Balthazar P. Training medical students and residents for the AI future [Internet]. 2018 [cited 14 Apr 2019]. Available at: <https://www.acrdsi.org/Blog/Medical-schools-must-prepare-trainees>
12. Lauer AK, Lauer DA. The good doctor: more than medical knowledge & surgical skill. *Ann Eye Sci* 2017;2(36).