LETTER TO THE EDITOR

Optimizing personalized healthcare using artificial intelligence with precision medicine

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Precision medicine is a relatively recent approach to managing disease. It considers the genetic, environmental, and lifestyle-related variability unique to each individual, taking into account their predicted response to treatment or their disease risk for prevention strategies.[1] The concept of personalised healthcare to target each individual's medical needs is not exactly new, but the use of emerging technology and innovations, especially in fields like genomics and artificial intelligence (AI), has enabled this model to progress remarkably.[2]

The utility of precision medicine for this purpose can be highlighted by pointing out the several domains where individuals can be targetted during the disease management process - for instance, the principles of AI may be used for actions like altering prescriptions based on pharmacogenomic variability, minimising sociodemographic considerations negatively impacting healthcare delivery; making clinical stratifications based on risks of comorbidities; and assessment of genomic cues and clinical patterns to customise therapies, thus improving the disease burden considerably.[2] AI has already been shown to outperform existing methods in its visual diagnostic capacity and ability to integrate and analyse diversified data, thereby becoming better at making distinctive risk predictions and significantly improving individual patient outcomes in the cardinal domain of myocardial infarction.[3]

This futuristic mode of healthcare with its exciting prospects inadvertently faces some hurdles the mention of which seems imperative at this stage - for example, AI's heavy dependence on the quality, applicability, and pertinence of its data to be able to perform the tasks mentioned above; its statistical limitation to make accurate predictions at the individual level; its incapacity as yet to ascertain causation, affecting therapy selection with precision; and the concerns of data safety and privacy.[2,4] In addition, its cost-effectiveness cannot presently be judged as a result of misallocation in the market and systematic biases owing to its novelty in healthcare.[5] Nevertheless, the remarkably accelerating impact of AI in personalising medicine must be acknowledged. In this regard, the upcoming generation of progressive researchers will surely play a profound role in bridging the gap between research and its clinical applications.

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Submission complete: 25-06-2024 **1st Revision received:** 25-09-2024
Acceptance: 17-10-2024 **Last Revision received** 16-10-2024

DOI: https://doi.org/10.47391/JPMA.21300

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

References

1. Quazi S. Artificial intelligence and machine learning in precision and genomic medicine. Med Oncol 2022;39:120. doi: 10.1007/s12032-022-01711-1.
2. Johnson KB, Wei WQ, Weeraratne D, Frisse ME, Misulis K, Rhee K, et al. Precision Medicine, AI, and the Future of Personalized Health Care. Clin Transl Sci 2021;14:86-93. doi: 10.1111/cts.12884.
3. Patel SJ, Yousuf S, Padala JV, Reddy S, Saraf P, Nooh A, et al. Advancements in Artificial Intelligence for Precision Diagnosis and Treatment of Myocardial Infarction: A Comprehensive Review of Clinical Trials and Randomized Controlled Trials. Cureus 2024;16:e60119. doi: 10.7759/cureus.60119.
4. Wilkinson J, Arnold KF, Murray EJ, van Smeden M, Carr K, Sippy R, et al. Time to reality check the promises of machine learning-powered precision medicine. Lancet Digit Health 2020;2:e677-80. doi: 10.1016/S2589-7500(20)30200-4.
5. Chen W, Wong NCB, Wang Y, Zemlyanska Y, Butani D, Virabhak S, et al. Mapping the value for money of precision medicine: a systematic literature review and meta-analysis. Front Public Health 2023;11:e1151504. doi: 10.3389/fpubh.2023.1151504.

AUTHORS' CONTRIBUTIONS:
SAA: Concept, drafting, reviewing, final approval and agreed to be accountable for all aspects of the work.