Can AI Personalize Psychiatric Medication Selection?

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Published: October 7, 2021 | AI in Mental Health

DOI: 10.5281/zenodo.17998601

Abstract

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By Rasit Dinc

The selection of psychiatric medication is a complex process that has traditionally relied on a trial-and-error approach. This can be a long and frustrating journey for patients, who may have to try several different medications before finding one that is effective and well-tolerated. However, the advent of artificial intelligence (AI) is poised to revolutionize this field by enabling a more personalized approach to medication selection. [1]

The Promise of AI in Personalizing Treatment

AI-powered analytics have the potential to enhance precision in treatment selection and improve patient management. By analyzing vast datasets, AI algorithms can identify subtle patterns and generate predictions that might elude human clinicians. This can help to predict the likelihood of a patient benefiting from a particular treatment, thus avoiding the traditional trial-and-error process. [1] AI can also help in identifying biomarkers that offer greater insight into the pathophysiological processes of mental illness, leading to a more refined taxonomy and personalized treatment. [1]

Predicting Treatment Outcomes

One of the most promising applications of AI in psychiatry is its ability to predict treatment outcomes for individual patients. A recent study introduced an AI model that can predict the probabilities of remission across multiple pharmacological treatments for major depression. [2] The model, which was trained on data from over 9,000 patients, demonstrated its ability to personalize treatment selection and improve remission rates. [2] By analyzing a patient's unique characteristics, such as their genetic data, brain function,

and sociodemographic factors, AI can help clinicians to choose the most effective medication from the outset. [1]

Challenges and Ethical Considerations

Despite the great promise of AI in personalizing psychiatric medication selection, there are several challenges and ethical considerations that need to be addressed. One of the main challenges is the potential for bias in AI algorithms. If the data used to train an AI model is not representative of the general population, the model may perpetuate existing health disparities. [1] There are also concerns about the “black box” nature of some AI models, which can make it difficult to understand how they arrive at their predictions. [1] This lack of transparency can be a barrier to trust and adoption by clinicians. Furthermore, there are important ethical considerations around data privacy and security, as well as the potential for AI to be used in ways that are not in the best interests of patients. [1]

Conclusion

AI has the potential to transform the field of psychiatry by enabling a more personalized approach to medication selection. By analyzing vast datasets and identifying subtle patterns, AI can help clinicians to choose the most effective treatment for each individual patient, thus avoiding the lengthy and often frustrating trial-and-error process. However, it is important to be mindful of the challenges and ethical considerations associated with the use of AI in medicine. A collaborative and transparent approach, involving researchers, clinicians, and patients, will be crucial to harnessing the full potential of AI to advance the field of mental healthcare. [1]

References

[1] Sun, J., Lu, T., Shao, X., Han, Y., Xia, Y., Zheng, Y., ... & Lu, L. (2025). Practical AI application in psychiatry: historical review and future directions. *Molecular psychiatry*, *30*(9), 4399-4408.

[2] Benrimoh, D., Armstrong, C., Mehltretter, J., Fratila, R., Perlman, K., Israel, S., ... & Turecki, G. (2025). Development of the treatment prediction model in the artificial intelligence in depression–medication enhancement study. *npj Mental Health Research*, *4*(1), 26.