

Can the use of Precision Medicine benefit the treatment of Major Depressive Disorder?

Exploring the ways in which Precision Medicine (PM) can be used to treat patients with Major Depressive Disorder (MDD) and addressing the challenges raised.



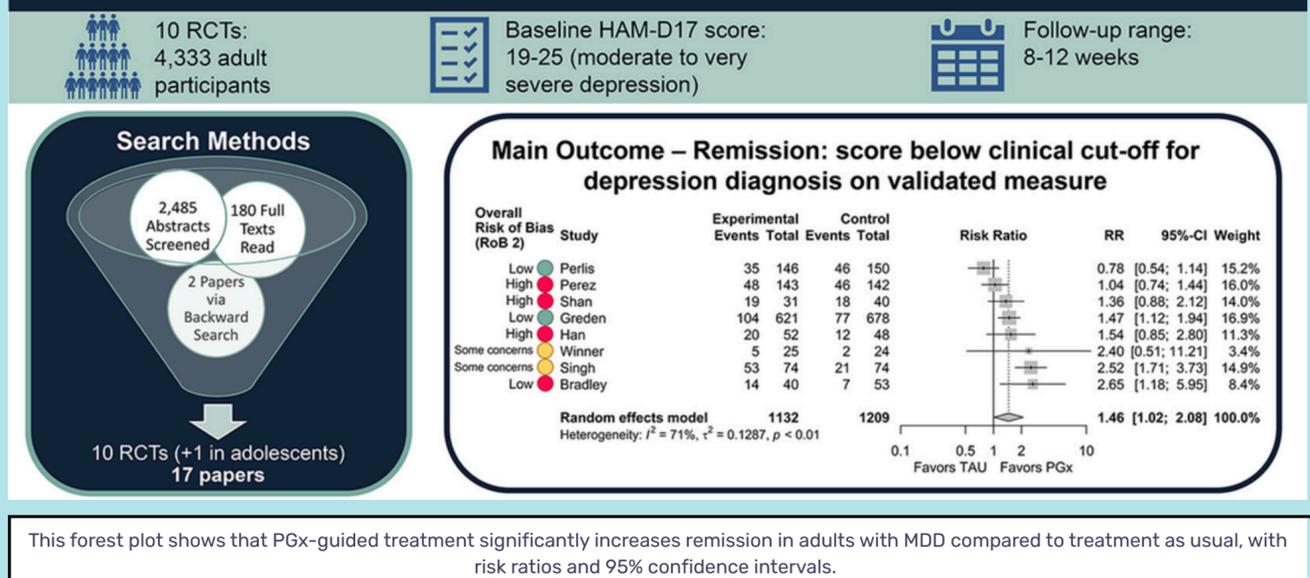
SCAN FOR REFERENCES

Introduction

Bunka, M. et al. (2023)

Major depressive disorder (MDD), the clinical title given to depression, is a heterogenous condition which differs considerably between each individual. MDD diagnosis and treatment have conventionally been made using a uniform approach with no attention to innate differences in genetics or neurobiological systems (Borrione L., 2020). Through harnessing genomics, proteomics, and imaging technologies, a new-found field named precision psychiatry is offered, serving to target treatment that matches the make-up of individuals suffering from MDD.

Evaluating treatment outcomes in pharmacogenomic-guided care for major depression: A rapid review and meta-analysis



Methodology

A systematic literature review was undertaken in line with PRISMA standards. Peer-reviewed studies published between 2010–2025 were sourced from PubMed, PsycINFO and ScienceDirect using targeted medical and genomic search terms. The data was critically appraised using the Cochrane Risk of Bias Tool, and findings were integrated through narrative synthesis to identify translational and clinical implications.

Results

Pharmacogenomic (PGx) testing improved antidepressant response and remission rates compared to standard care. Biomarker-based approaches, particularly inflammatory markers such as CRP and IL-6, showed promise in identifying subtypes of depression and guiding targeted therapy.

INCLUSION CRITERIA	EXCLUSION CRITERIA
Peer-reviewed studies published between 2010–2025.	Non-peer-reviewed articles, editorials, or opinion pieces.
Human participants diagnosed with Major Depressive Disorder (MDD).	Studies focusing solely on other psychiatric conditions.
Studies examining PM approaches	Studies lacking a focus on PM or without clear methodology.
Quantitative or mixed-methods research (RCTs, cohort, case-control, or predictive modelling).	Qualitative studies without measurable clinical or predictive outcomes.
Publications available in English.	Non-English language studies.
Adult populations (≥ 18 years).	Studies involving paediatric or adolescent populations.

Analysis & Discussion

Koutsoleris 2018, found that machine learning processes had been effectively applied to foresee one-year functional outcome in individuals with a medical condition at risk for recent-onset depression, through the means of scientific and imaging data. Supporting this observation, Siegfried, 2018 noted predictive models was able to recognise depressed patients with comparable precision to traditional depression diagnosis surveys.

The Precision Medicine in Mental Health Care randomised controlled trial (RCT) assessed the application of certain Pharmacogenomic (PGx) tests for MDD, using Drug-Gene Interactions (DGIs) (Oslin, 2021). 38.4% of patients in the pharmacogenomic-guided care group presented improvement in MDD symptoms and 29.7% in the TAU group (Gilbody, 2008).

Defective inflammatory immune responses are a prevalent pathophysiology underlying MDD. Osimo, 2020 included patients with MDD (N=40) that were nonresponsive to fluoxetine (AD) and allocated them to intake celecoxib (NSAID) by random. It concluded there was a major improvement in MDD symptoms after the celecoxib, a cyclooxygenase-2 inhibitor (Müller, 2006).

Challenges and barriers must be addressed. Privacy concerns and public stigma surrounding the use of technology and genomics are becoming increasingly widespread (Areán, 2005). This may adversely impact public health policies, lessening the weight of mental health as a prospective aim for precision medicine.

Conclusion

In conclusion, mass research emphasises that although the use of precision medicine in MDD is still in its early phases, the possible benefits are revolutionary for patients. The evidence present depicts the primary approaches in which precision medicine can drive the treatment of MDD to equate the efficacy of treatments for cancer and chronic heart disease (Howren, 2009). Yet, ethical and cost-effective considerations must be investigated thoroughly to provide frameworks to overcome evident barriers of precision psychiatry.