Pharmacogenetics: A Resource for Efficient Management of Psychiatric Disorders

Hannah Martin, PA Student

Faculty Advisor: Sharonda Felton, MME, PA-C

Department of Medical Science

Abstract

Current mental health treatment relies on provider and patient experiences, causing success to be ill-defined and inconsistent. Likewise, the risk of ADRs are unpredictable, especially when polypharmacy is implicated. This systematic review revealed the efficacy of pharmacogenetic-guided treatment (PGx) in the response and remission rates of adults suffering from MDD and GAD. Further research needs to be done with other disorders and age groups. Barriers to its incorporation into practice include cost and provider comfortability.

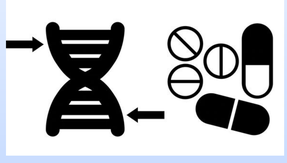
Introduction

Current treatment for mental health disorders is not methodical and requires patients to gauge their experience with each medication. While first line options are recommended, ADRs are unpredictable. Successful treatment is determined by the provider, causing any statistics to be vaguely-defined and inconsistent. Polypharmacy has increased over the last couple of decades in order to treat comorbid illnesses, unremitting symptoms, and adverse effects. However, the correct combinations of drugs varies between patients and ADRs become harder to pin down. A resolution lies in the use of enzyme analysis to group patients into poor or extensive metabolizers of certain drugs. Since current clinical practice only routinely utilizes this information for drugs involved in chemotherapy or immunosuppression, there is a lack of accepted PGx algorithms. This paper aims to identify the research surrounding PGx as it pertains to psychiatric management, its efficacy and ability to minimize polypharmacy and ADRs, with the hopes of offering guidance for integration into clinical practice.

Methods

Literature Search

- Performed in October 2021
  - Pubmed
  - ScienceDirect
  - PsychINFO
  - PsychARTICLES
  - ClinicalKEY
  - Health Science



Inclusion Criteria

- Publication date 2016-2022
- Peer-reviewed
- Clinical research study
- Adult subjects
- Full text available

Exclusion Criteria

- Nonhuman subjects
- Pharmacological testing was not performed
- Participants not diagnosed with mental health disorders
- Opinion articles

Results

MDD

- Significantly improved response/remission rates
- Significantly improved response rates for treatment resistant MDD
- ADR of genetically suitable medications was tolerable and less apparent

GAD

- Significantly improved response/remission rates
- Higher treatment satisfaction when rating provider's competency

OCD & BD & PTSD

- No significant changes in treatment responses

ADR Analysis

- 85% of participants were already taking psychiatric medications with the potential for a genetic interaction
- In 20% of participants the next intended treatment had significant interaction potential. 45% had moderate interaction potential
- 28% reported ADR when compared to 53% in the control groups
- Providers reported significantly high levels of “decision support,” as they felt more comfortable being able to anticipate ADR

Response and Remission Rates of PGx

	MDD	GAD	OCD	BD	PTSD
Bradley et al. (2018)	S	S	-	-	-
Winner et al. (2013)	S	-	-	-	-
Perez et al. (2017)	S	-	-	-	-
Thase et al. (2019)	S	-	-	-	-
Papastergiou et al. (2021)	S	S	-	-	-
Abdolhosseinzadeh et al. (2020)	-	-	NS	-	-
Greden et al. (2019)	S	-	-	-	-
McCarthy et al. (2021	S	S	-	P	NS
Hall-Flavin et al. (2016)	S	-	-	-	-
Olsen et al. (2017)	S	S	-	-	-

Discussion

PGx Benefit

- Improved response/remission rates and decreased the severity of ADR in patients with MDD and GAD
- Gives providers mechanical instead of descriptive information of effectiveness
- PGx results are not be influenced by exogenous factors. Theoretically, a patient’s condition could be adequately treated with one medication for their entire life

Limitations

- Limited studies on the use of PGx in conditions other than MDD and GAD
- Research focus on adult patients. Information needs to be collected on children and the elderly- populations that would greatly benefit
- Longevity studies need to be completed that assess if these medications, or their dosages, are any less effective as time progresses

Barriers to Practice

- Not covered by insurance. Approximately $330 for comprehensive psychotropic report
- Need to educate providers on interpreting psychotropic reports
- Providers not comfortable prescribing outside their "repertoire"
- Need to evaluate the overall patient, their comorbidities and social determinants of health

Conclusion

Research reveals an overwhelming amount of evidence suggesting how beneficial PGx can be for MDD and GAD. From this information, providers can obtain insight into how their patients will react to various drugs in the short and long term. This holds the potential to personalize future prescribing and treatment techniques while delivering faster and more effective relief to patients. This suggests that, if implemented, a general decline would be seen in ADR and the necessity for polypharmacy. While this evidence exists, there are many boundaries that exist before widespread use of pharmacogenomics is incorporated into clinical practice. While PGx is costly, this one time expense could greatly outweigh a lifetime of medical and psychiatric consultations and treatments. Our unique genetic makeup holds the key to a more personalized approach to medicine. If unlocked, this technology could save patients time, money, and unnecessary suffering.

KEY S: Significant, NS: Not Significant, P: Positive, not statistically significant, -: Not Assessed. **Additional sources available upon request.**