Objective and Methods

- **Objective:** To describe the initial results of implementing pharmacogenomics (PGx) testing in a community-based psychiatry practice and potential impacts on medication management.
- **Background:** PGx can be broken down into two types of genes: pharmacokinetic (PK) and pharmacodynamic (PD) genes. PK genes provide information on how an individual metabolizes a medication, whereas PD genes provide information on drug response. Over 70 psychotropic medications have PGx variant annotations and 30 psychiatric gene-drug pairs having dosing guidelines. PGx testing may provide an opportunity to prevent adverse drug effects and clarify more effective medication options for patients with psychiatric illnesses.
- **Methods:** Retrospective chart review of prospectively maintained medical records of all adult patients with pharmacogenomics results from 8/1/2017 to 8/30/2019 under the care of psychiatry and clinical pharmacist.
- **Genetic testing:** All genotyping was conducted using the OneOme RightMed® Comprehensive Test. A total of 7 pharmacogenetic genes were included, due to changes in the test report over time, a range of 6-10 pharmacogenetic genes relevant to psychotropic medications were evaluated per patient. For the purpose of this study, the following genes were considered relevant to psychiatric medications: CYP2D6, CYP2C9, CYP2C19, CYP3A4, CYP3A5, COMT, DRD2, GRIK4, HTGR2, ORPM1, SLC6A4 and MTHFR.
- **Setting:** Integrated psychiatry practice within a community family medicine clinic, including the following care team members: psychiatrists, family practice providers, social worker, nurse, and clinical pharmacist.

Results

- **Table 1** summarizes the characteristics of the 51 patients who met inclusion criteria.
- **Every patient had genetic variations, with an average of 6.1 (range 3-9, SD=1.5) per patient among the genes related to psychiatric medications.**
- Average PHQ-9 and GAD-7 score improved by 2.4 and 1.5 points, respectively, at 3 months following PGx testing.
- The frequency of the genetic variations are summarized in Figures 2 and 3.
- Patients were taking an average of 10.5 medications at the time of the PGx test. 3.6 of which were psychiatric medications, to treat an average of 8.5 psychiatric conditions. Table 2 summarizes the gene-drug interactions revealed by the PGx test.
- An average of 1.8 gene-drug interactions were uncovered per patient, with 1.3 of those interactions being related to the patient’s psychiatric medications.
- An average of 6.1 total medication changes (2.6 specifically in psychiatric medications) were made per patient following the PGx test.
- Medication changes resulted in patients remaining on an average of 5.6 psychiatric medications, but decreasing the average number of gene-drug interactions per patient to 1.1 (0.8 among psychiatric medications).

Discussion

- The large number of genetic variations and gene-drug interactions observed per patient is consistent with previous findings and support the utility of incorporating PGx testing in a psychiatric clinic.
- Compared with other studies focused on a general population or a single disease state (primarily with major depressive disorder), the complex psychiatric population described in this study presents an opportunity to highlight the importance of accurate diagnosis and treatment of comorbid conditions before assuming genetics as a cause for medication failure. It is notable that a large number of patients in this study had comorbid psychiatric illnesses, including ADHD, bipolar disorder and substance use disorders, which are known to worsen control of anxiety or depression if not correctly identified and treated.
- The decrease in number of gene-drug interactions following testing demonstrates the potential benefit to using PGx information to guide medication therapy.