Impact of Pharmacogenomic Testing on Hospitalization Rates in a Real-World Dataset of Patients with Major Depressive Disorder

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Background

Pharmacogenomic (PGx) testing analyzes genetic variations that may affect medication outcomes and can be a valuable tool to inform treatment decisions. Large randomized controlled trials have demonstrated that PGx-guided care significantly improves remission, response, and symptoms in patients with major depressive disorder (MDD) and at least one treatment failure. Receiving medications congruent with the PGx testing result has been shown to be a critical factor in helping to improve these MDD outcomes.1

OBJECTIVES

The current study used a large US de-identified administrative claims dataset to determine:
1. The proportion of MDD patients who filled medication prescriptions with significant gene-drug interactions pre-and post-PGx testing.
2. Hospitalizations pre- and post-PGx testing.

Methods

STUDY CONCEPT

A de-identified dataset was generated by using a Privacy Preserving Record Linkage process by joining patients who received weighted multi-gene PGx testing (GeneSight, Myriad Genetics, Inc.) with administrative claims.

Before linkage, the datasets were tokenized and Expert Determination was employed to yield a de-identified dataset with low risk of re-identification.

The study cohort was created from the linked dataset using the inclusion/exclusion criteria shown in Figure 1 in patients ≥18 years of age.

WEIGHTED MULTIGENE PGX TESTING

Medications prescribed before and after PGx testing were grouped by the GeneSight test report into the following categories: 1) no known gene-drug interactions, 2) moderate gene-drug interactions, or 3) significant gene-drug interactions.

CONGRUENCY GROUPS

Medications with no or moderate gene-drug interactions were considered congruent. Medications with significant gene-drug interactions were considered incongruent. Patients taking one or more incongruent medications were considered incongruent; otherwise, they were considered congruent.

Patients were assigned to the following groups based on congruency of medications 30 days pre- and post-PGx testing: 1) congruent-to-congruent, 2) incongruent-to-congruent, or 3) no change in congruency.

HOSPITALIZATIONS

The % of patients with any psychiatric, and non-psychiatric hospitalizations was statistically compared (Jeffreys’s test) between the 180 day pre- and post-PGx testing periods in the overall cohort with congruency group.

Results

Fig. 1: Patient selection flowchart demonstrating how the total MDD cohort was derived following all inclusion and exclusion criteria. The index date was defined as the date the PGx test result was received for the prescriptions.

Table 1: Patient Demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total Count</th>
<th>All patients with medicationsa</th>
<th>Congruent to Congruent</th>
<th>Incongruent to Congruent</th>
<th>No Change in Congruency</th>
<th>N=4,776</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>4,776</td>
<td>25,905 (55%)</td>
<td>11,357 (67%)</td>
<td>1,145 (8%)</td>
<td>4,119 (29%)</td>
<td>5,158 (25%)</td>
</tr>
</tbody>
</table>

Table 2: Medications Per Patient in the 180-Day Baseline

<table>
<thead>
<tr>
<th>Type of Medication</th>
<th>N=4,776</th>
<th>N=14,352</th>
<th>N=20,933</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antidepressants</td>
<td>3,277</td>
<td>11,020</td>
<td>15,367</td>
</tr>
<tr>
<td>Antipsychotics</td>
<td>1,158</td>
<td>3,678</td>
<td>5,371</td>
</tr>
<tr>
<td>Anticonvulsants</td>
<td>1,434</td>
<td>6,488</td>
<td>10,234</td>
</tr>
</tbody>
</table>

High levels of psychiatric comorbidities were observed in the total MDD cohort during the 180-day baseline, with 78% experiencing comorbid anxiety. These real-world results are representative of expected comorbidities in MDD patients.2

Post-PGx testing, fewer patients filled medication prescriptions with significant gene-drug interactions and the percentage of psychiatric hospitalizations was significantly reduced compared to pre-PGx testing. The percentage of patients with hospitalizations was not reduced in patients who were switched to medications with significant gene-drug interactions. These real-world results are consistent with multiple prospective studies demonstrating the utility of PGx-guided treatment for improving response and remission rates in MDD.3-5 Future directions include a comparative analysis of MDD patients who did or did not receive PGx testing.

Conclusions

Fig. 2: Following PGx testing, there was a 39% relative reduction in the proportion of patients who filled medication prescriptions with significant gene-drug interactions in all patients with medications (n=16,965). This suggests that, in a real-world setting, PGx test results are being used for medication decisions similar to that observed in randomized clinical trials.1,2

Fig. 3: Hospitalizations in All Patients with Medications at Baseline and Follow-up

Fig. 4: Post-PGx testing, there was a significant reduction in the percentage of patients with any type of hospitalization or psychiatric-related hospitalizations in the incongruent-to-congruent (n=1,273) and no change in congruency (n=14,352) groups. The congruent-to-congruent (n=440) group showed a non-significant decrease in the percentage of patients with any type of hospitalization and psychiatric hospitalizations. These results align with a post hoc analysis of the GUIDED randomized controlled study, which showed a significant correlation between patient outcomes and medication congruency.4

References:
2. Greden et al. (2019) Am J Psychiatry. 4
5. Greden et al. (2019) Am J Psychiatry. 4

*p=0.05, **p<0.001