Analysis of a Panel-Based Pharmacogenomics Testing Program among Members of a Commercial and Medicare Client of a Pharmacy Benefits Manager

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Background

- Traditional medication prescribing usually takes a trial and error approach. It is estimated that between 25% and 50% of prescribed medications do not result in the desired therapeutic outcome.[1]
- Pharmacogenomics (PGx) is a field of medicine that studies how genetic variation contributes to different responses to drugs in different patients. The goal of PGx is to use a patient's genetic information to guide medication therapy to help reduce adverse drug events and optimize drug efficacy. PGx can lead to improved treatment outcomes and reduced costs.[2]
  - It is estimated that over 90% of patients have clinically actionable genetic variations.[3]
  - Drugs with PGx recommendations cover many therapeutic classes that are commonly prescribed including analgesics, antidepressants, and antihypertensives.[4]
- One approach to PGx testing is using a pre-emptive, panel-based PGx test, where multiple genes are tested at the same time. An advantage of this approach is that the results are available to guide future medication use and a patient can have results for their lifetime.
- Utilization of PGx information by providers to optimize medication therapy for patients has had relatively slow adoption.
  - There are many factors that have contributed to the slow adoption of PGx testing, but it is partially due to a lack of coverage by payers.[5]
  - Little is known about how coverage of a panel-based PGx test will affect a member's medication therapy.

Objective

Determine how giving providers specific medication optimization recommendations, based on results of a panel-based PGx test, impacts members' medication regimens.

Methods

Study Population

- Members of a client with commercial and Medicare populations were eligible for PGx testing if they were taking two or more medications with known gene guidance for at least 90 of the last 180 days

Design

- A retrospective analysis of pharmacy claims data
- Intervention group: members who participated in PGx testing
- Control group: members who did not participate in the PGx testing, but who were eligible to participate

Intervention

- Letters inviting eligible members to participate in PGx testing were sent in December 2019, February 2020, and July 2020.
- If a member chose to participate, they were sent a PGx test kit from a third-party vendor. Members performed a cheek swab and returned the completed kit to the vendor. The vendor then conducted the panel-based PGx test.
- Pharmacists at Navitus analyzed the PGx test results and determined formulary-aligned recommended changes, if applicable, to a member's medication regimen.
- Recommendations that could be made included: monitor for lack of efficacy or side effects, increase dose, decrease dose, switch to a different drug, and/or discontinue current drug.
- PGx test results and analysis of a member's current medication regimen, including suggested medication changes were mailed to providers between 1/10/2020 and 6/4/2020.

Outcome

- To determine if changes were made to medications based on recommendations, medication utilization during the four months prior to when the provider letter was sent was compared to medication utilization during the four months after the letter was sent.

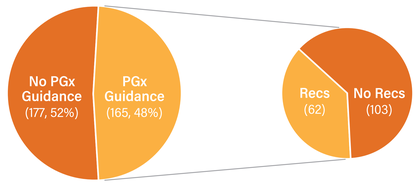
Results

Table 1.
Baseline Member Demographics

	Intervention	Control
Female, n (%)	26 (52)	23 (45)
Male, n (%)	24 (48)	28 (55)
Age, years (SD)	58.0 (12.2)	61.8 (12.7)
Total number of medications	342	376
Total number of medications with PGx guidance	165	152
Average number of medications per member, mean (SD)	6.8 (3.4)	7.4 (3.1)
Average number of medications with PGx guidance per member, mean (SD)	3.3 (1.2)	3.0 (1.1)

- Included in the analysis were 101 total members - 50 in the intervention group and 51 in the control group.
- There were no significant differences in baseline characteristics between the intervention and control groups.

Figure 1.
Medications in the Intervention Group



- Members of the intervention group were taking a total of 342 medications. Of those medications, 165 (48%) had PGx guidance.
- Of 165 medications with PGx guidance, 62 (38%) had recommendations.
- Of members who received PGx testing 76% had at least one recommendation.

Table 2.
Recommendation Acceptance Rate

Type of Recommendation	Number of Recommendations Made	Number of Accepted Recommendations
No recommended change	103	N/A
Monitor	56	2
Increase dose	8	2
Decrease dose	26	1
Discontinuation or alternate drug	36	7

- In total, there were 62 medications with recommendations. More than one recommendation could be given for a drug; 80% of medications with recommendations had more than one recommendation given (e.g. monitor for lack of efficacy and increase dose as needed).
- When recommendations were given, a change was made to the medication 27% (17/62) of the time and the specific recommendation was adopted 19% (12/62) of the time. There was a significant difference between the number of medication changes in the PGx group and the control group (X2=0.024).

Table 3.
Medication Classes with the Most Recommendations

Drug Classes	Number of Members with a Recommendation
Antidepressants	18
Antihyperlipidemics	10
Proton Pump Inhibitors	7
Beta Blockers	6

- The classes of medications that had the most recommendations were antidepressants, antihyperlipidemics, and proton pump inhibitors. These three classes consisted of 55% of recommendations made.
- There were 25 members who were carriers of high-risk genetic variants. These genes correspond to risk of serious adverse events if certain drugs are used. For example, increased risked for carbamazepine-induced hypersensitivity. The most commonly, members were at risk for Gilbert's Syndrome (7 members), increased thrombotic risk (6 members), and carbamazepine-induced hypersensitivity (4 members).

Limitations

- Letters with recommendations were mailed between 1/10/2020 and 6/4/2020, which was during the beginning of the COVID-19 pandemic in the United States. During this time many providers' offices were closed or operating at limited capacity, which could have impacted providers' abilities or inclination to make changes to patients' medication regimens.
- Project timeline limitations required use of a four-month interval pre and post-letter to determine if there had been changes in medication regimens. Due to the COVID-19 pandemic and other factors, this timeframe might be too short to see changes. Additionally, this timeframe is too short to measure other outcomes, like changes in cost and other health outcomes.
- One advantage of a panel-based PGx test is that results can be used to guide future medication decisions. This study did not examine this aspect of the program, and therefore cannot capture the full benefit from PGx testing.

Conclusions and Future Direction

- The use of a panel-based PGx test resulted in recommended medication changes for the majority of members (76%) who underwent testing.
- The most common recommendations were given for antidepressants, antihyperlipidemic drugs, and proton pump inhibitors.
- When recommendations were given, the most common recommendations were for dose decreases or use of an alternate drug.
- Giving providers specific recommendations on medication changes based on the results of a PGx test can result in changes to members' medication therapy. When recommendations were given, a change was made to the medication 27% of the time and the specific recommendation was adopted 19% of the time.
- In order to increase adoption of recommended medication changes in the future, direct telephonic communication with providers could be employed. Additionally, integration or PGx recommendations into the electronic medical record could be used.

Disclosures

This research was conducted by Navitus Health Solutions, Madison, WI without external funding.

References

1. Spear BB, Heath-Chiozzi M, Huff J. Clinical application of pharmacogenetics. *Trends Mol Med.* 2001;7(5):201-4. doi:10.1016/s1471-4914(01)01986-4
2. Verbelen M, Weale ME, Lewis CM. Cost-effectiveness of pharmacogenetic-guided treatment: are we there yet?. *Pharmacogenomics J.* 2017;17(5):395-402. doi:10.1038/tpj.2017.21
3. Smith DM, Peshkin BN, Springfield TB, et al. Pharmacogenetics in Practice: Estimating the Clinical Actionability of Pharmacogenetic Testing in Perioperative and Ambulatory Settings. *Clin Transl Sci.* 2020;13(3):618-627. doi:10.1111/cts.12748
4. Table of Pharmacogenomic Biomarkers in Drug Labeling. Food and Drug Administration. https://www.fda.gov/drugs/science-and-research-drugs/table-pharmacogenomic-biomarkers-drug-labeling. Updated February 2, 2020. Accessed July 30, 2020.
5. Anderson HD, Crooks KR, Kao DP, Aquilante CL. The landscape of pharmacogenetic testing in a US managed care population. *Genet Med.* 2020;22(7):1247-1253. doi:10.1038/s41436-020-0788-3

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