Economic Utility: Combinatorial Pharmacogenomics and Medication Cost Savings for Mental Health Care in a Primary Care Setting

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ABSTRACT

Purpose: This study was an analysis based on a previously completed prospective study investigating medication costs of patients with mental illness guided by using the GeneSight proprietary combinatorial pharmacogenomic (PGx) test. The primary objective of this study was to determine potential cost savings of combinatorial PGx testing over the course of 1 year in patients with mental illness treated by primary care providers (PCPs) and psychiatrists who had switched or added a new psychiatric medication after patients failed to respond to monotherapy. The current evaluation details cost savings of treatment decisions congruent and incongruent with the combinatorial PGx test recommendations specific to PCPs and psychiatrists.

Methods: This study was a subanalysis of a 1-year, prospective trial comparing medication costs of 2168 patients undergoing GeneSight testing. Pharmacy claims were provided by a pharmacy benefits manager, comparing medication costs 6 months before combinatorial PGx testing and followed up for 1 year after the testing. This analysis compared congruence and cost savings per patient based on the type of health care provider administering care.

Findings: Using data from a large pharmacy benefits manager, we found that PCPs treat the majority of mental health patients receiving psychotropic medication prescriptions, including treatment-resistant patients. PCPs congruent with combinatorial PGx testing provided the most medication cost savings for payers and patients at $3988 per member per year ($P < 0.001$).

Implications: Health care providers treating patients with mental illness can significantly reduce medication costs by following the combinatorial PGx report recommendations. PCPs, who treat the majority of patients with mental illness, reported a significant reduction in medication costs for both central nervous system and non–central nervous system drugs. (*Clin Ther*. 2017;39:592–602) © 2017 The Authors. Published by Elsevier HS Journals, Inc.

Key words: depression, mental health, pharmacogenomics, primary health care, psychiatry.

INTRODUCTION

Major depressive disorder (MDD) affects 6.8% of the US population and is a source of significant economic burden, with direct costs of $98.9 billion per year.[1] Psychiatric medications alone cost $30.3 billion per year, and costs for antidepressants are increasing up to 10% annually.[2–4] Depression is projected to rival only HIV/AIDS and heart disease as a leading cause of burden of disease by 2030.[5] It is estimated that mental illnesses have a disability-adjusted life year burden of 11%, causing at least 15 million disability-adjusted life years annually.[6] The social stigma of mental illness can prevent many individuals from seeking treatment, adding to reduced work productivity and increased health care burden. Of those individuals who do seek treatment for MDD, only one half are expected to respond to their first antidepressant and only one third are expected to achieve remission.[7] This lack of efficacy of medication treatment leads patients on a journey of multiple failed medication trials, often enduring undesirable side effects; as a result, patients are considered treatment resistant.[2]

Primary care providers (PCPs) treating patients for psychiatric illness are more likely to manage patient

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treatment than to refer to a psychiatrist.[8–10] Often, obstetricians/gynecologists (OB/GYNs) may also serve as PCPs for female patients and therefore also frequently prescribe central nervous system (CNS) medications.[11] However, studies have shown that the severity of depression in patients seeking care from PCPs or psychiatrists does not differ, indicating the heavy burden of mental illness that PCPs are treating.[12] In the United States, 96% of counties have an unmet need for psychiatrists, leaving the burden of mental health care to PCPs.[13] PCPs report difficulty in finding outpatient care for patients with mental illness due to the shortage of mental health professionals and mental health insurance coverage options.[14] The United States faces not only a shortage of psychiatrists but also a shortage of PCPs, who tend to treat patients before referrals to psychiatrists.[15] In some states, up to 50% of psychiatrists are aged >55 years, meaning that the number of practicing psychiatrists will shrink drastically as they reach retirement age.[16] In addition, fewer medical students are choosing psychiatry as a specialty. According to the American Medical Association, the total number of physicians in the United States increased by 45% from 1995 to 2013, while the number of adult and child psychiatrists grew by only 12%. This shortage of psychiatrists further increases the mental health burden for PCPs dealing with patients who have failed multiple medications due to nonresponse or side effects.

Fortunately, many health care providers (HCPs) have embraced new technologies such as combinatorial pharmacogenomic (CPGx) testing as a means to improve patient outcomes and reduce medication trials.[17] Combinatorial PGx testing uses a patient's unique genetic profile to predict which medications may be less tolerable or efficacious for that individual patient. PGx includes pharmacodynamic genes important for predicting medication response and side effects, and pharmacokinetic genes, including metabolism enzymes, important for predicting medication exposure and appropriate dosing. Approximately 20% to 95% of variability in response to medication is due to a patient's genetic profile.[18] It is important that PGx testing shows clinical validity and utility, meaning that the genes included on a PGx test are predictive of medication response and that HCPs can use the results to guide patient treatment decisions.

Previously, PGx had limited ability to predict patient response to medications based on single genes.[19] However, the recent utilization of combinatorial PGx testing has proven to be much more successful at identifying patients taking genetically incompatible medications who are less likely to respond compared with patients taking more genetically compatible medications.[20] Combinatorial PGx testing integrates a patient's unique genetic information across multiple genes with the pharmacology, pharmacokinetics, and pharmacodynamics of commonly prescribed medications to classify these medications based on a patient's level of gene–drug interactions. This combinatorial process allows HCPs to personalize medication selection for their patient.

To date, the only psychiatric combinatorial PGx testing platform with multiple prospective clinical trials supporting its clinical validity and utility over treatment as usual (TAU) is the combinatorial pharmacogenomic test GeneSight Psychotropic, powered by CPGx technology (Assurex Health, Mason, OH).[21–23] The proprietary GeneSight CPGx test algorithm stratifies 38 psychotropic medications into a use as directed (or "green") category, a use with caution (or "yellow") category, and a use with increased caution and with more frequent monitoring (or "red") category based on the severity of gene–drug interactions specific to each patient (Figure 1). One study found that patients whose treatment was guided by using the combinatorial PGx test result exhibited 70% greater improvement in symptoms compared with patients whose treatment was not guided by these results.[22] A retrospective health care utilization study found that patients taking "red" category medications according to the combinatorial PGx test result had significantly more health care visits, more disability claims, and more medical absence days.[24] A second economic study, conducted by Medco (a pharmacy benefits manager), used data from >13,000 patients and prospectively showed that patients using the combinatorial (PGx) test saved $1036 per-member per-year (PMPY) on medication costs versus those patients who did not undergo combinatorial PGx testing.[25] Thus, average medication costs PMPY increased by $1725 from the pretest period to the end of study with TAU, which was significantly higher than the mean increase of $690 in the combinatorial PGx test group ($P < 0.0001$). The Medco study included patients treated in