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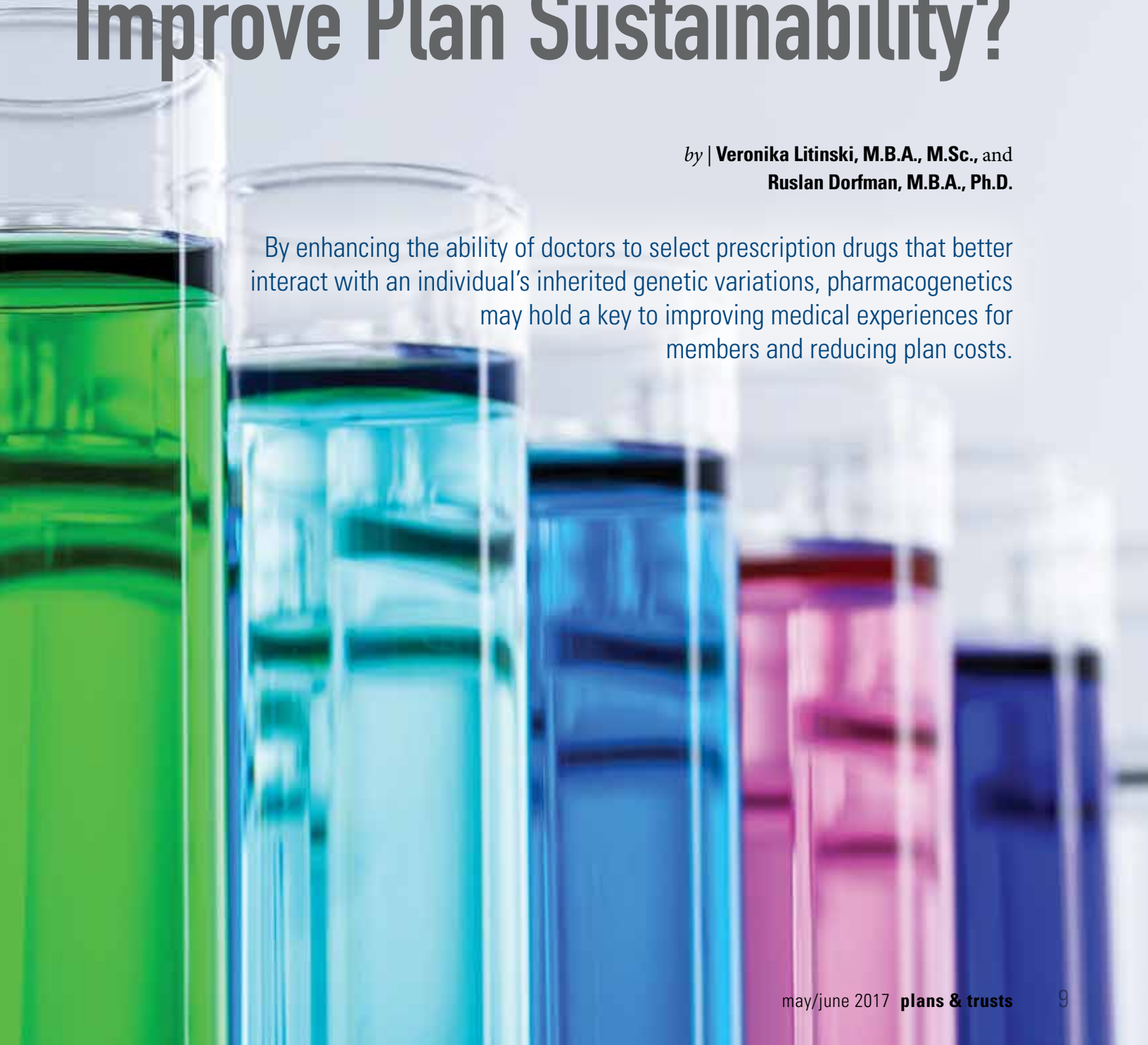
Can Pharmacogenetics (PGx) Help Your Members and Improve Plan Sustainability?

by | **Veronika Litinski, M.B.A., M.Sc.,** and **Ruslan Dorfman, M.B.A., Ph.D.**

By enhancing the ability of doctors to select prescription drugs that better interact with an individual's inherited genetic variations, pharmacogenetics may hold a key to improving medical experiences for members and reducing plan costs.



You may have heard the term *precision medicine,* but what does it really mean and how does it apply to plan sponsors and members? *Pharmacogenetics* (PGx) explains how drug response is related to a person's inherited genetic variations. Analyses indicate it can empower users, giving them a closer look at prescription medications and how their body can process them, and produce cost savings for health plans.

How PGx Can Make a Difference

More than 90% of North Americans carry at least one genetic variation affecting drug response. When a PGx report is available, treating physicians gain additional insights for a more tailored (or precise) approach to prescribing. In efforts to improve drug efficacy and safety, Health Canada, the U.S. Food and Drug Administration and the European Medicines Agency have included information with reference pharmacogenetic (PGx) testing for over 200 medications.

PGx is a predictive tool—It reveals how a patient will respond to a medication. It helps doctors choose safer drug therapies with more effective treatments and fewer side effects. This personalized approach is based on a person's unique genetic profile for specific drug-metabolizing enzymes. Experts agree that understanding genetics is fundamental to the effective targeting of drug therapies.

For a typical employer in Canada, the annual cost of providing benefits is slightly over 10% of gross annual payroll. These growing costs stem from both price inflation and increasing reliance on prescription medications as core treatment for chronic conditions. An aging workforce means more chronic conditions and more pressure on benefit plans. Beyond prescription costs, chronic conditions also are strongly linked to absenteeism, short-term disability and long-term disability, which lead to significant additional drain on costs and productivity.

Unfortunately, the failure rate of medications remains very high. Individual variation in response to prescription drugs is a substantial part of this issue. Variation in response ranges from failure to benefit from a drug to adverse drug reactions and drug-to-drug interactions when several drugs are taken at the same time. In fact, serious drug-related side effects are the fourth leading cause of death in Canada. Although not a panacea, personalized medicine offers the potential for a more tailored approach to prescribing. Also, PGx has been shown to improve adherence to treatment in mental health and heart health programs by 7-30%.[1]

At present, PGx is not covered by provincial health plans in Canada, although it is used by research hospitals such as Montreal Heart Institute and SickKids Hospital. Some health plans include PGx service as a health benefit either as a fully covered benefit for plan members making drug claims or as a wellness offering with a copay. PGx is eligible for reimbursement through a health spending account (see

PGx Coverage

Type of Deployment	Advantages	Limitations
PGx as a voluntary health benefit covered through health spending accounts (HSAs)	• Existing funding stream, no new costs to the plan • Best fit for small employers with generous HSA allocations	• Requires consistent outreach/promotion to plan members to become familiar with PGx • Limited financial benefit to health plan sponsor
PGx as a voluntary health benefit fully covered by the health plan but targeting specific plan members based on their utilization profile or medical status	• Limits testing to people on specific medications (e.g., antianxiety) or high claimants who will most benefit from PGx • Subscription or per unit billing • Estimated 6-10% reduction in the cost of the annual drug plan	Requires PGx service to include: • Information technology system to facilitate qualifying plan members • Assistance program to ensure that PGx insights are applied to individual care • Well-crafted communication and education for plan members.

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figure). It can be purchased as a subscription-based health benefit or paid for on a per unit basis.

How Do Plan Members Benefit From PGx?

Canadian providers have access to PGx testing on drugs that represent 50% of claims covered by private insurers. In the United States, the 30 most commonly prescribed high-risk drugs with pharmacogenetic indications accounted for 738 million prescriptions in 2013.[2,3]

There is evidence of PGx positively impacting patients taking multiple medications. In a recent U.S. study in which elderly patients taking multiple medications received PGx testing, hospitalizations were reduced by 39% and emergency department visits were reduced by 71%.

A group of community pharmacists in Canada conducted the Innovative Canadian Pharmacogenomic Screening Initiative in Community Pharmacy (ICANPIC) study to assess the percentage of patients whose medications were changed based on their PGx profile. One hundred patients participated, with an average age of 56½ years old. Reasons for participation included symptoms not resolved by prescribed medications, adverse side effects of prescribed medications and personalization of therapy.

All participants first received a standard review of their prescribed medications in order to identify drug therapy problems (DTPs) caused by drug-to-drug interactions. In the same session, PGx was introduced, and a cheek swab was collected from the patient. After receiving patients' PGx reports, pharmacists performed a second medication review, taking into consideration the drug-gene interactions. When warranted, pharmacists issued pharmaceutical opinion letters to attending physicians to inform treatment.

According to the study, PGx reports resulted in drug switches (56% of cases), drug dose modifications (16%), discontinuation of medication (4%) and continued monitoring (25%).

Real-Life Application

Here is an example of how this could work for a member: Four months ago, Jim suffered a heart attack. After a brief stay in a hospital where doctors inserted a stent to open a blocked heart vessel, he was released with prescriptions for three different medications: Brilinta® to reduce blood clotting, a statin and an antihypertensive drug. The cardiologist explained that these medications would reduce his risk of stroke or another heart attack. While at the pharmacy to fill his prescriptions, Jim learned that Brilinta would cost over $800 per month. During a followup appointment, the cardiologist explained that an older, less expensive drug called Clopidogrel could be prescribed. However, it is known to be ineffective in over 20% of patients. In addition, Jim started experiencing dizziness and muscle aches—side effects associated with his drug regimen. He couldn't return to work.

Jim's wife researched the side effects of medications online and came across a PGx service. The PGx report showed that Jim could safely switch to Clopidogrel and save more than $600 per month. Jim's physician reviewed the report and decided to switch Jim's statin to rosuvastatin, which reduced the muscle aches. Jim was able to return to work.

DNA Access and Privacy Concerns

Members may be concerned about the privacy of their DNA when it comes to PGx testing. Integrating genetic insights into health care is very new. Thus, plan administrators have a responsibility to provide relevant in-

formation to plan members to make informed decisions.

For example, information about a genetic predisposition to developing Alzheimer's disease could be used against a person's interests by family or health organizations. A well-known consumer company that measures genetic information warns that individuals who discover genetic information about health conditions may be subject to charges of fraud if they don't disclose this information upon inquiry from an insurance company.

A targeted PGx service assesses only an individual's metabolism and capacity to absorb and process specific drugs. It does not assess the risk of catastrophic illness. Most people have some variations affecting drug response; thus, PGx cannot be used for determining an individual's life or disability insurance rates.

Plan administrators manage all aspects of a benefit plan, from enrolment and eligibility to payments and reporting, so it is their responsibility to ensure that PGx service providers manage personal information in a secure manner in accordance with best practices codified in the Personal Information Protection and Electronic Documents Act (PIPEDA). Below are some best practices for PGx testing.

- Limit the collection of data. Only specific, well-identified DNA variations related to drug response should be analyzed.
- Once testing is complete, destroy remaining DNA.
- Get individual consent to share the data report.
- Use a unique bar code for the DNA sample so that no personal information appears on the report.
- Ensure the health plan only receives aggregated information about overall utilization.

Economic Rationale for PGx

Let's look at an example involving mental health. Only about 30% of patients respond well to their first antidepressant.[4] Standard care involves finding an appropriate medication through trial and error, which typically takes about 84 days. With PGx, doctors can start a person on the right medications within a month. For plan members and sponsors, this can translate to 54 fewer days on sick leave and savings from not paying for medications that don't work. These savings can be significant. For example, compare the $500 cost of a PGx service with the cost of medical leave: The cost of antidepressants is about $1.50 per day and, assuming an average salary of $200 per day, productivity losses associated with depression can exceed $12,000 per person for 60 days of disability leave. Early PGx medication optimization can reduce the duration of disability, potentially generating 13 times the return on investment (ROI) over the cost of PGx service.

Each PGx service provider offers its own ROI rationale based on cost and service delivery. One analysis of a personalized medicine service for four chronic conditions showed the following results. For every 1,000 plan members, 183 will qualify for PGx service because they initiate treatment for depression/anxiety, pain management, high risk of stroke and/or high cholesterol. Over two years, the cost of the service was $60,500. The direct medical cost with the service was $541,200, compared with $834,300 without the service, for a difference of $293,100. The drug cost for the four target conditions mentioned above was $195,900 with the service and $359,900 without the service, for an additional savings of $164,000.

Along with the qualitative experience of patients achieving faster recovery because of the right medication therapy, it is anticipated that the overall plan experience will show other benefits. For example, based on the analysis above, for every 1,000 plan members over a two-year period, plans could see:

Takeaways

- *Pharmacogenetics* (PGx) can help to explain a person's inherited genetic variations and likely response to prescription medication.
- PGx can help doctors choose safer drug therapies with more effective treatments and fewer side effects for patients.
- Plan administrators must ensure PGx service providers manage personal genetic information in a secure manner.
- PGx may have the ability to benefit individual users through improved treatment efficacy and patient adherence.
- PGx also could produce cost savings for health plans by reduced spending on ineffective drugs and avoidance of adverse reactions and related absenteeism.

- More plan members with depression/anxiety in remission: 15 more members
- Fewer days lost due to depression/anxiety, opioid and anticoagulant treatments: 2,433 days.

In addition, there may be measurable cost savings due to the reduced number of medical appointments and days off.

How to Maximize Value for the Plan

To achieve the health and economic benefits of PGx, its insights need to be considered when health decisions are made.

- **Assistance with applying results.** Pharmacogenetic science is relatively new, and many physicians lack training in interpreting test results. Complex cases frequently require the assistance of clinical pharmacists to resolve drug-to-drug and drug-gene interactions. Historically, in hospital PGx implementations, clinical pharmacists play a critical role in patient care. Thus, some mechanism should be in place to ensure proper result interpretation and to facilitate required medication changes.
- **Privacy and security properly addressed.** Rolling out PGx as a benefit requires that PGx service providers include information technology (IT) solutions to ensure the privacy of plan members' health and genetic data. Automated test qualification and adjudication systems via a portal outside of a workplace can help to alleviate concerns about sharing private information with employers. It also ensures that only qualified plan members receive unhindered access to the new benefit.
- **Systems to measure ROI.** The goal of pharmacogenetics as a benefit is to ensure sustainability of private health plans. Therefore, plan sponsors need to have access to transparent and robust ROI calculators that can assess the real-world impact of PGx on drug plans.
- **Plan member outreach.** Similar to population immunization, the health economic success of PGx as a benefit depends on the uptake rate. PGx service providers should work with plans to coordinate the roll-out of educational communications. It is critical to explain the benefits and limitations of pharmacogenetics, anticipated health outcomes and implications for drug plans.

BIOS

Veronika Litinski, M.B.A., M.Sc., is chief operating officer at GeneYouIn in Toronto, Ontario. She led the development of innovation strategy at Baycrest Hospital, a leading centre for the study of memory and aging. Litinski piloted the launch of Cogniciti, a for-profit arm of Baycrest, with the mission of helping millions of adults with significant memory concerns get earlier assessment, diagnosis and treatment. Before taking on a leadership role with Cogniciti, she led the health care and life sciences practice at MaRS Discovery District. Prior to joining MaRS, she worked in corporate finance with UBOC and as director, venture finance, with GATX Capital in San Francisco, California. A graduate of Moscow State University and the University of San Francisco, Litinski began her life sciences career in cancer research at Lawrence Berkeley National Laboratory. She has been named a Canadian e-health champion and regularly supports trade missions with the Canadian Department of Foreign Affairs.

Ruslan Dorfman, M.B.A., Ph.D., has expertise in personalized medicine, molecular genetics and technology building. Inspired by direct interactions with families from all over the world who have been challenged by cystic fibrosis, he co-founded GeneYouIn to facilitate access to advanced genetics for the general public. Dorfman managed large-scale research and development programs at SickKids Hospital in Toronto, Ontario. He advised Bridgepoint and Mount Sinai hospitals in Toronto, Ontario on the implementation of personalized medicine programs. Dorfman has published 30 peer-reviewed papers on the genetics of cystic fibrosis and pain.

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Conclusion

As with any purchase decision, plans must weigh costs versus deliverables. Workplace and health care stakeholders have an interest in ensuring that plan members have optimal access to treatments. Decisions about health benefits have concrete implications for individuals and their families as well as the health and well-being of the organization.

To summarize, PGx services can benefit plans and members through better individual health outcomes for those needing medication and reduced overall costs to the plan. Members can benefit by experiencing:

- Reduced risk of adverse side effects
- Improved efficacy of treatments promoting better patient adherence to the treatment regimen
- Lifetime value: DNA doesn't change. When a PGx service is designed around the needs of the individual, it includes drugs a person may need in the future, including those used when undergoing minor surgery or routine hospital procedures.

Cost savings for health plan sponsors are driven by reduced spending on drugs that aren't working for individuals. Savings also come from avoidance of adverse reactions and medical absenteeism.

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Endnotes

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