

## FIRESIDE CHATS

# Improving Treatment Outcomes with Pharmacogenomics

DrugBank is a widely used data source for companies working in the pharmaceutical, healthcare, and technology space. Our data integrates seamlessly into in-house products to enhance outcomes for data-driven decision-making.

GenXys prescribing decision support software tool makes use of structured drug data such as DrugBank's to inform prescribing options that improve patient safety and reduce healthcare costs. We chatted with Andrea Paterson, a key member of the GenXys team, to learn more about the GenXys solutions and how pharmacogenetics is making a real difference in the delivery of modern health care, whether it be digital, virtual, or face to face.

### Please introduce yourself.

My name is Andrea Paterson. I'm a clinical pharmacist and I have been working with GenXys for the past 5 years. I lead our Algorithm Team, and my team is responsible for developing the evidence-based treatment algorithms that power our clinical decision support software. Our treatment algorithms offer over 40,000 different prescribing options. I also practice at an interdisciplinary primary care clinic, which is really important to my role at GenXys as it allows me to keep up to date with clinical practice and to develop software that is relevant and useful to clinicians.



Andrea Paterson  
Algorithm Team Manager

### ABOUT GENXYS HEALTH CARE SYSTEMS

GenXys is a global leader in medication decision support and pharmacogenetic solutions. GenXys' flagship digital prescribing assistant and medication review tools are used to enable optimized, personalized, and informed prescribing choices.

#### WEBSITE

genxys.com

#### INDUSTRY

Health Care, Pharmacogenetics

#### USE CASE

Personalized Medicine

### Can you tell us about GenXys?

GenXys is leading the way in precision prescribing with our comprehensive software and pharmacogenetic solutions. Our software product, TreatGx, was built to help improve medication safety and efficacy, and to reduce healthcare costs by personalizing treatment options. Our vision is to have every prescription, globally, powered by our software. It is already in use widely across North America. We have also just launched ReviewGx, which is focused on comprehensive medication management and medication review. Our solutions are often referred to as prescribers' digital assistants.

## What does an Algorithm Team Manager do?

We have four main R&D teams within GenXys: the pharmacogenetic lab team, which does the genetic extraction and analyses; the software engineering team, which enables the digital processing in the backend and a modern user interface on the front end; the health technology design team; and my team, the algorithm development team.

Our multifactorial condition-based algorithms are used by the TreatGx medication decision support software to present patient-specific treatment options. For each condition, we undertake a systematic analysis of the latest research including systematic reviews and international guidelines. We also consult with subject-matter experts. We use the highest levels of evidence available to create a condition-specific treatment algorithm. The algorithm development team uses pharmacogenetics and other patient data to provide personalized medication dosing for each patient. It is the combination of evidence into the multifactorial algorithms that is unique. We make the seemingly impossible possible, and all with a user interface which makes complex medical information appear simple. But I guess that's what good quality software is meant to do.

## How does DrugBank get used in GenXys?

We use several different datasets to help integrate the vast amount of data that we use in our software, including DrugBank datasets. The drug-drug interaction dataset from DrugBank is big for us. Clinicians don't want to use our software to get medication treatment options only to then have to refer to another software program to get drug-drug interactions. Health professionals want one interoperable solution to provide accurate medication guidance, either as part of their electronic health record or as a standalone solution. DrugBank's drug-drug interaction database plays a big part in ensuring that the safest medications for a patient are displayed. The drug-drug interaction database allows us to easily integrate that information. We also use a variety of other datasets, like the prescribable name search, to allow for patients and health professionals to enter their medications. These medications and the properties we require for each medication can then be stored in a very structured and searchable way.

## How many conditions do you have in your software currently?

We currently have algorithms for 41 conditions, and regularly update current ones and add more. The conditions are those commonly seen in both primary and secondary care. TreatGx and ReviewGx are the only applications we know of that take personal health variables and pharmacogenetics into account for real-time display of condition-specific treatment option. The health variables our software incorporates along with the pharmacogenetics include liver and kidney function, lab results such as QT Prolongation, other conditions, biophysical attributes, the condition being treated for, and drug-drug interactions.

## What about interesting or exciting things happening in the field?

I think the wider expansion and acceptance of pharmacogenetics and its role in patient care is really exciting. There is now a greater emphasis on preventative care and the possibility of pre-emptive pharmacogenetic testing. There have also been some really great articles looking at pharmacogenetics becoming the standard of care. Along with understanding how pharmacogenetic data can improve treatment decisions in certain conditions, we will have to put tools in the hands of clinicians so they can successfully use the data to inform treatments.

## What are some interesting trends in the field of pharmacogenomics/pharmacogenetics?

COVID-19 has changed the whole model of delivery of care. It has accelerated the adoption of virtual health and I think more people are looking for digital prescribing tools to help them include all this new information. There is so much information at our fingertips and integrating that is very hard, if not impossible. That's where sophisticated software plays an integral and meaningful role. We are filling that void. Instead of patients and their pharmacist or physician relying on a traditional 50-page pharmacogenetic paper report, we are interpreting that pharmacogenetic information in a clinically usable and relevant way. The TreatGx tool automatically combines pharmacogenetic results with all the other important patient information. This is a gamechanger for health professionals, who no longer need to be geneticists or wade through a static, point-in-time report. Pharmacogenetics is being adopted more and more, as is medication decision support. These are adoption trends in the healthcare field that I think we will continue to see long after COVID. It is particularly important because we find that one of the biggest barriers to the implementation of pharmacogenetics in clinical practice is the confidence and knowledge levels of clinicians. If the information isn't digestible or is too time consuming to read through, test results simply won't be used.

Furthermore, we think there will be more emphasis on automation in storing information and implementing that information for future therapies. Many people are getting pharmacogenetic testing done and there is much more recognition in the medical field in terms of how important this information is in determining a personalized medication treatment plan. It's also useful to have the pharmacogenetic data on file to inform future treatment for the same patient via an automated information system.

Data is key and understanding how to integrate that data into treatment decisions will be even more important. We see more and more care centers using pharmacogenetics. The FDA has recently published a list of pharmacogenetic markers that are recognized to have an association with metabolism or effect of certain drugs, and along with internationally recognized and reputable academic organizations such as CPIC and PharmGKB, there is a growing body of robust evidence on which to draw.

The ball is rolling, and we are seeing it trend this way, but we still have more work to do in terms of refining the best, most effective way to integrate pharmacogenetics into clinical practice. There are conditions where the use of pharmacogenetics should be a 'preferred standard of care' and GenXys, along with our partners and customers, are vocal advocates for its inclusion in a responsible, evidence-based care model.

## What are some of the challenging issues in pharmacogenetics?

One of the really tricky questions has been: when do you do pharmacogenetic testing and who do you do it on? I think there's also been a move to try and identify patients who might be good candidates for pharmacogenetic testing, and frequently those patients seem to be patients struggling with mental health issues. They've tried a couple of antidepressants without success, so doing pharmacogenetic testing in advance of trying additional medications can help narrow down the search for a good treatment option.

Another challenge is trying to navigate and change the system, so we see fewer adverse reactions to medications. Instead of focusing on class-based evidence that has been collected over the last 20-30 years, we should be focusing on individual patients and their needs more often. We can use AI and data-driven decision making in real time at the point of care to help improve outcomes and reduce adverse effects.

## You work a lot in pharmacies and clinics, but you also work with insurance companies. Can you tell us about what you're seeing in terms of trends there?

Insurance companies want to help their members to have better health outcomes, because it's a win-win-win model. It helps the individual, it helps the employer or plan sponsor, and it helps the insurance company. Helping to reduce, or at least contain, spiraling health costs is in everybody's interest, but it has to be done using a responsible and evidence-based approach. This can be accomplished by getting individuals on the right medications at the right doses from the start. Insurance companies, health systems, and health authorities are starting to recognize this. Traditionally, there is a lot of trial and error or a 'one size fits all' approach to prescribing medications.

If we practice this approach, it's difficult to say that one particular person who is on this particular medication is going to see improvements. As an example, personalized prescribing can play a big role in treatment of mental health conditions. In addition to pharmacogenetics, other factors such as kidney function, other medications the patient is taking, other conditions, and patient acceptance of certain side effects, can help to guide the selection of the most suitable medication choice for the individual. For patients who are on disability due to a mental health condition, an effective medication can drastically improve their quality of life and enable them to get back to work faster. The payers will also be a big beneficiary on a number of fronts.

## AI plays an important role in this as well. Can you talk about how AI plays into your role at GenXys?

AI and machine learning techniques will play an increasingly important role in the development and refinement of our solutions. There are many exciting opportunities, and we have had guidance from some of the world's most advanced thinkers in this space. For example, searching the literature for relevant information is one potential application of AI. It's our job to stay up to date on all the new research studies and clinical guidelines and being able to use AI to make that system of research more efficient or being able to flag important papers would be really helpful.

I am also excited about the prospect of using AI for personalized prescribing. We want to take patient-reported health outcomes that have been entered into the system, such as medication effectiveness or side effects, and feed that back into our software to enhance current treatment algorithms and build new ones. That way we can start to get a picture of how to be more effective for patients by better understanding their reactions to medications and adapting our algorithms to improve their care.

## “ Going back to your work at GenXys, what has been the most game-changing experience you've seen while working there?”

Instead of focusing on class-based evidence that has been collected over the last 20-30 years, we should be focusing on individual patients and their needs more often. We can use AI and data-driven decision making to help improve outcomes and reduce adverse effects.

When I first started at GenXys, my work seemed to be more of an academic pursuit because our software wasn't live yet. That is, we weren't doing any pharmacogenetic testing and TreatGx was not in use by clinicians. When we went live and started testing and rolling out the software, we heard really positive stories from patients and clinicians about how TreatGx helped them - that was game-changing. We have lots of examples of patients saying, "I tried multiple medications and I wasn't having any luck, and then I did your test, I used the software, and this medication really helped." Or similarly, we have health care providers who say they were able to provide a better, more stable treatment plan for a complex patient. Real stories like that where you're actually seeing the impact of personalized care in everyday life is what I think is super rewarding, and it really tipped the scales for me in terms of the "wow" factor. If we can really make a difference and continue to improve our software, we really are on the cutting edge of what is possible for 'mass population' ready personalized prescribing. Now that is personalized medicine!

Thank you to Andrea and the GenXys team for their insightful conversation about improving treatment outcomes with Pharmacogenetics. If you are looking for more information about GenXys please reach out to them directly.

DrugBank offers a number of commercial products to help customers like GenXys get the structured and comprehensive drug-drug interactions they need for pharmacogenetics. If you are interested in learning how our products can help your company, please email us at [info@drugbank.ca](mailto:info@drugbank.ca).

## DRUGBANK FIRESIDE CHATS

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[drugbankplus.com/downloads](http://drugbankplus.com/downloads)



## DRUGBANK

DrugBank is the world's largest knowledge base of structured pharmaceutical data. DrugBank enables data-driven decision making in the healthcare, pharmaceutical, and medical spaces. By using DrugBank, companies and researchers can more efficiently discover or repurpose new drugs, and improve treatments for patients. The core of DrugBank's knowledge base consists of proprietary authored content describing the clinical level information about drugs such as side effects, drug interactions, as well as molecular level data such as chemical structures, metabolism, and what proteins a drug interacts with.

Visit [www.drugbankplus.com](http://www.drugbankplus.com) to learn more



GenXys provides the world's most comprehensive precision prescribing software and pharmacogenetic solutions to solve healthcare's most pressing challenges, including the prevention of adverse drug reactions.

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