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UPMC 'personalizes' medications for heart patients through innovative gene testing

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Patients who go to UPMC Presbyterian for heart catheterization and who receive a stent to treat clogged arteries are now being screened with a simple blood test to determine if they have a gene variant that makes them less likely to respond to a blood-thinning medication commonly prescribed after the procedure. This unique program, one of the first of its kind in the country, aims to use clinical pharmacogenomics knowledge to individualize patient treatments—part of a broader program at UPMC that could eventually include a wide variety of drugs to improve outcomes for patients.

"Increasingly we are able to pinpoint gene variations and other factors that affect how patients metabolize drugs, allowing us to more precisely target the right drug for the right patient," explained Philip Empey, Pharm.D., Ph.D., assistant professor of pharmacy and therapeutics at the University of Pittsburgh School of Pharmacy, and the leader of this program.

To launch the PreCISE-Rx (Pharmacogenomics-guided Care to Improve the Safety and Effectiveness of Medications) initiative, a multidisciplinary team created streamlined processes to test patients for the relevant genes and promptly add the results as well as treatment alerts to UPMC's electronic health record. The genetic and clinical information that is gathered also feeds UPMC's "big data" analytics effort, which is expected to lead to new scientific insights into how and why drugs work for some patients but not others, and to identify new drug targets.

"Our intent is to select the best medication for each patient based on their genes," Empey said. "Most drugs, such as antibiotics, psychiatric medications and painkillers, don't work for everybody. As we learn more about the genetic, environmental and other factors that shape drug metabolism, the current one-kind-fits-all approach will give way to personalized and more effective treatments."

In PreCISE-Rx, when the cath team places a stent to reopen a blocked heart artery, a blood sample is drawn for testing at a specialized lab at Magee-Womens Hospital of UPMC. The test determines if the patient carries certain variants of a drug metabolism gene that can prevent the antiplatelet medication clopidogrel from working properly. A commonly prescribed blood-thinning medicine, the drug is used to inhibit the formation of new clots that could reclog arteries.

"We know that some of our patients do not have an optimal response to clopidogrel so their arteries could become blocked again, which puts them at risk for heart attack and hospitalization," said A.J. Conrad Smith, M.D., director of UPMC's cardiac catheterization laboratories. "Now, with our pharmacist colleagues, we can analyze the pharmacogenomic test results along with other clinical data to choose a medication that will reduce a patient's chance of recurrent clots and a return to the hospital."

More than 700 patients are expected to be treated through this project at UPMC Presbyterian's cath lab in the coming year. Past studies show that 30 percent of patients are unlikely to metabolize clopidogrel appropriately, and about 10 percent experience complications because of the blood thinner's ineffectiveness.

Dr. Empey's research team will follow up with patients and collect data to evaluate their outcomes. The goal is to implement the program at other UPMC hospital cath labs and expand it to include other

medications to provide the best possible care for patients.

"This effort could greatly help patients while reducing the costs of hospital readmissions and recurrent illness," said Steven Shapiro, M.D., chief medical and scientific officer of UPMC. "It also holds the promise of revealing insights into the genetic basis of disease and treatment response because we can warehouse and analyze the collected data in ways that were never possible before."

PreCISE-Rx is a lead initiative of the University of Pittsburgh Institute of Personalized Medicine, which has been working since 2013 to support innovative patient care, education and research.

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