

Disparity Dashboard



The Primary Care Equity Dashboard (which looks nothing like this) will give VA hospitals a bird's-eye view of their quality of care. It will also suggest strategies for addressing health disparities.

TOOL KEEPS TABS ON CARE INEQUITIES IN REAL TIME BY ELAINE VITONE

For some time, Leslie Hausmann (PhD '05) and her colleagues have had questions about patient care at the VA.

They wondered, how many patients are current on their flu vaccines? And their cancer screenings? How many of those diagnosed with hypertension are getting their blood pressure under control? How many of those with diabetes are keeping their hemoglobin in check?

In short, they wanted to pinpoint, whose care was falling short?

And, are there patterns? Does where patients live make a difference? What about gender, race and socioeconomic status?

So Hausmann and others at the Center for Health Equity Research and Promotion (CHERP), high on the hill in Oakland's Pittsburgh VA Medical Center-University Drive, started toying with the idea of a health disparities "dashboard."

By harnessing electronic medical records, they thought, perhaps they could get a bird's-eye view of standard benchmarks of quality care at their facility.

Hausmann, a Pitt associate professor of medicine, studies health disparities and their contributing factors, particularly bias and discrimination. (PLOS One, by the way, recently published her study of patient experiences with perceived discrimination.)

When she discusses her work with clinicians, they express interest and concern. "But they just don't feel like they have the tools to support changes in practice to address [disparities]," or even identify what disparities are affecting their patients in the first place, she says.

The dashboard project started humbly enough, with some clunky yet painstakingly coded spreadsheets Hausmann generated in partnership with VA leaders across the state. That project led to a massive, one-year effort

focused on hypertension across nine VA centers. The results were encouraging: small but significant declines in both the total number of Black veterans with severe hypertension and in Black/white hypertension disparities.

As Hausmann shared the good news with colleagues, she started getting calls requesting her how-to's. It was soon clear that someone should make this national, she says.

"And I decided, 'Well, if nobody else is going to do it, I'm going to do it.'"

With support from the VA Innovators Network, Hausmann led the development of a prototype using the national VA corporate data warehouse. With that in hand, she secured funds for a five-year endeavor to streamline the tool to be fully inte-

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grated into the primary-care workflow of VA facilities nationwide. She's now in year three of the project, which is funded by the Veterans Health Administration's Office of Health Equity and Office of Research and Development.

The dashboard, dubbed the Primary Care Equity Dashboard, allows a facility to see where they stand in quality measures and also compare themselves to other VAs across the country. "Then it allows them to do an equity deep-dive into each of those measures," Hausmann says, to understand which demographic groups need attention and then identify exactly which patients they should reach out to.

From there, dashboard users can access resources to figure out what concrete steps to take next. For example, a tab within the dashboard contains a vast library of quality-improvement tools and resources, carefully culled from the medical literature and organi-

zations aimed at addressing disparities. "We've compiled more than 200 disparities interventions for specific diseases—some focusing on patients, some focusing on providers," she says.

Quality improvement efforts often hit a wall when it comes to assessing impact, she says. The common refrain is, "We never know if what we're doing makes a difference. It's too hard to collect data ourselves—we're too busy." So the team built, right into the dashboard, a tracking mechanism allowing clinicians to watch their progress over time.

As a test drive for the dashboard, VA Pittsburgh Healthcare System is tackling racial disparities related to how well patients with cardiovascular disease are keeping up with their statin medications. The dashboard

revealed that in late 2020, white patients at the University Drive facility were 3% above the VA's national average, while Black patients were 18% below.

With funding from the Veterans Health Foundation, a team is using the dashboard to study the effectiveness of two approaches to addressing the issue: a pharmacist-led educational session and a telephone reminder for medication refills. Results are expected in early 2022.

As the team puts the dashboard to work on a national scale, Hausmann hopes it will better equip providers to dismantle some of the systems that contribute to disparities—and to make that work a priority.

"Because right now, people learn about quality improvement in general, but that's often not done through the health equity lens," says Hausmann. "This tool will shine a very bright light on the health equity component to make that shift." ■

Sterile Vision mentor
MaCalus Hogan demos
the new technology.



PROBLEM SOLVERS

STUDENTS BUILD SOLUTIONS
FOR THE REAL WORLD

BY ADAM REGER

Last year, Stephen Canton, Clinical Scientist Training Program trainee and fourth-year med student, and Dukens LaBaze, a UPMC orthopaedic surgery resident, took second place at the 2020 Randall Family Big Idea Competition, which awards \$100,000 to student inventors. Their prize-winning entry: Sterile Vision, a device that uses machine learning to keep track of surgical equipment in the operating room.

Standing among the winners at the ceremony, Canton was struck by how many of his fellow Pitt Med students were there with him. The competition draws entries from across the University. The first- and fourth-place teams also included Pitt Med students Noah Pyles (Class of 2022), James O'Brien (Class of 2022) and Jonathan Cohen (an MSTP student), who developed Polycarbin to reduce medical waste, as well as Eva Roy (Class of 2022) and Anjana Murali (Class of 2023), who built a platform called Patient Experience Navigator.

Canton recalls his reaction: "That's huge, right?"

Though impressed by his fellow med students, Canton was hardly surprised.

As a first-year med student with an undergraduate degree in bioengineering, he had worked closely with John Maier, director of research and development for family medicine, to establish the Bioengineering, Biotechnology and Innovation (BBI) concentration.

BBI taps into a deep well of medical student talent that Canton observed. Drawing on

resources from across Pitt, the concentration supports students working in such areas as bioengineering, biomedical informatics and tissue engineering, offering everything from mentoring to longitudinal research support. About 20 first- and second-year students are actively engaged in the concentration.

"The people attracted to this like to look at problems and find solutions," he says.

But the know-how students might apply to solve a clinical problem is quite different from what's needed to transform an idea into a device or procedure that can actually have an impact on patients' lives.

Through faculty mentoring and a recommended course, Idea to Impact, students learn about the commercial channels their ideas will have to travel to reach the marketplace.

The O2 Cube, a solar-powered device that fills oxygen cylinders, is a perfect example of an innovation that is poised to make a difference in the real world.

Its inventor, James Newton, will complete his MD as well as his MS in bioengineering from Pitt this spring. After learning of the desperate need for oxygen in low-resource areas, he and his partners designed the O2 Cube to furnish hospitals with inexpensive oxygen. Through events like the Blast Furnace pitch competition offered by Pitt's Innovation Institute, they secured funding that allowed them to test an early version of the O2 Cube in Malawi, where lack of oxygen can exacerbate health problems like pediatric pneumonia.

"We learned a lot from that experience,"

Newton says. "We came back and pivoted on the design, and we've been hacking away at prototyping this solar-powered system."

The students were able to use the Swanson School of Engineering prototyping facilities for their pilot device. And Pitt's Innovation Institute and sciVelo are available to help guide their inventions toward the marketplace.

BBI's emergence is part of a broader shift toward recognizing innovation as important academic work, Maier notes. Pitt Med faculty can now include patents and company formations in their promotion applications, alongside journal publications and grants. And the professional background of Anantha Shekhar, the John and Gertrude Petersen Dean of the School of Medicine and senior vice chancellor for the health sciences, who joined the University in June 2020, includes founding several biotech companies.

"The dean appreciates how this type of work fits into a model of developing new knowledge and bringing it to bear on people," Maier says.

Both Canton and Newton will continue their entrepreneurial journeys as they pursue careers in medicine. Newton formed a company, Lean Med, in 2018, and has secured patents for inventions used in sinus operations.

And Sterile Vision was recently accepted to AlphaLab Health, a six-month accelerator program that provides up to \$100,000 of support for innovators.

"I'm riding the wave," Canton says. "I just love this stuff." ■



Kiani (shown here) and Ebrahimkhani (lower right) have devised a new way to prevent the immune response from destroying gene-therapy viruses.

SAFE DELIVERY

GENE-EDITING APPROACH KEEPS CRISPR KEEN

BY ERIN HARE

Maybe you've heard about CRISPR-Cas9, that powerful method of editing genomes that uses an RNA-guided enzyme. Well, there's a little problem with it.

Gene therapy generally relies on viruses to deliver genes into a cell. In the case of CRISPR-based gene therapies, molecular scissors can then snip out a defective gene, add in a missing sequence or enact a temporary change in its expression. But the body's immune response to the virus can thwart the whole endeavor.

To overcome that obstacle, researchers at the University of Pittsburgh created a system that uses CRISPR in a different way. Their system briefly suppresses genes that are related to antibody production, specifically antibodies to the adeno-associated virus (AAV), which is often used as a delivery vehicle in CRISPR.

Results published in the September 2020 *Nature Cell Biology* show that the technique allows the virus to dispatch its cargo unimpeded.

"Many clinical trials fail because of the immune response against AAV gene therapy," says study cosenior author Samira Kiani, associate professor of pathology at Pitt and member of the Pittsburgh Liver Research Center (PLRC) and McGowan

Institute for Regenerative Medicine. "And then you can't readminister the shot because people have developed immunity."

So Kiani and her longtime collaborator Mo Ebrahimkhani, associate professor of pathology at Pitt and a member of PLRC and the McGowan Institute, set out to modify gene expression related to the body's immune response to AAV. But this gene is important for normal immune function, so the researchers didn't want to shut it down forever, just tamp it down momentarily.

Because CRISPR is such a convenient system for editing the genome, the pair figured they would put it to use for altering the master switches that orchestrate genes involved in immune response.

"We're hitting two birds with one stone," says Ebrahimkhani. "You can use CRISPR to do your gene therapy, and you can also use CRISPR to control the immune response."

When they treated mice with their CRISPR-controlled immune suppression system and then exposed them to AAV again, the animals didn't make more antibodies against the virus. These animals were more receptive to subsequent AAV-delivered gene therapy

compared to controls.

Beyond gene therapy, the study also shows that CRISPR-based immune suppression can prevent or treat sepsis in mice, highlighting the potential for this tool to be broadly useful for a range of inflammatory conditions, including cytokine storm and acute respiratory distress syndromes, both of which can crop up with COVID-19, though more studies are needed to engineer safety features.

"The main goal of this study was to develop CRISPR-based tools for inflammatory conditions," says study lead author Farzaneh Moghadam, a PhD student in Kiani's lab. "But when we looked at bone marrow samples, we saw that the group treated with our tool showed a lower immune response to AAV compared to the control group. That was very interesting, so we started exploring how this tool contributes to antibody formation against AAV and could potentially address safety and efficacy concerns with gene therapy trials."

Kiani has cofounded SafeGen Therapeutics with the goal of bringing this technology to the clinic. ■

