

Kaiser Permanente
Research

Eye Monitoring Center

Innovation leads to smarter screening





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— Michael Kanter, MD

In a dark cubicle in the basement of the Kaiser Permanente Baldwin Park Medical Center, 4 round orange circles flash onto Mohini Sharma’s computer screen. A certified ophthalmic assistant at the Eye Monitoring Center, she closely studies each one, following the branches within the orbs, noting the splotches, the dots. After a few minutes, she counts the number of hemorrhages in the image, which is a photo of the back of a patient’s eye: mild retinopathy.

She moves on to the next image. Each day Sharma provides results on the eyes of 120 or more patients. Before 2010, medical assistants in the medical offices took the photos, and ophthalmologists and optometrists provided the results. After the Eye Monitoring Center was established, medical assistants continued to take the photos, but the certified ophthalmic assistants, like Sharma, provided the results.

Since the program was implemented throughout Kaiser Permanente Southern California in 2012, the proportion of patients detected with diabetic retinopathy increased from about 10% to about 25%. In 2015, the center screened 136,000 patient images.

An innovation born of research

The move from individual doctors reading the images to a team of centralized technicians was an idea born of research and demonstrated by research. Today, it is fueling new research.

“We took an idea that’s very common in clinical trials research—standardizing evaluation—and operationalized it,” said Donald Fong, MD, MPH, the regional retinal lead for KPSC. “And we operationalized it on a very big scale.”

Research scientist Sharon M. Hudson, PhD, MA, led a 2015 evaluation of the new model for reading diabetic retinopathy screenings. Rather than having ophthalmologists and optometrists reading results in different offices, certified ophthalmic assistants looked at them in a centralized reading center. The study found that the new model increased the accuracy of the screening results, improved the quality of the screenings, and eliminated unnecessary follow-up visits. The study was published in *OSLI Retina*.

As a result, the Eye Monitoring Center won several awards including 2015 eValue8 Innovations Award



from the National Business Coalition on Health. It also received the 2015 David M. Lawrence Patient Safety Award, which recognizes projects that improve the safety of care for patients and accelerate the rate and scope of patient safety improvements at Kaiser Permanente.

Michael Kanter, MD, the regional medical director of Quality and Clinical Analysis, SCPMG, said the Eye Monitoring Center is “a great example” of how Kaiser Permanente can reduce the diagnostic error rate on a large scale.

“For patients with diabetic retinopathy, the center is very meaningful because they will get a more accurate screening result and more immediate care for their retinal disease,” Dr. Kanter said. “And for everyone else, it is laying a structural foundation that allows us to methodically study and address other diseases using a similar model of care.

“It’s part of creating a learning health system.”

In her research, Dr. Hudson found that centralizing the reading of retinopathy images:

- gave physicians more time for patients who needed to see them,
- allowed specially trained technicians to provide more consistent and accurate results,
- allowed photographers to get feedback that improved their images, and most important,
- increased the accuracy of the reports, meaning more patients with diabetes learn if they have retinopathy, and receive appropriate education and treatment.

COVER: Elena Padilla

Above: Dr. Sharon Hudson, Dr. Donald Fong



"This project—our research—helps save people's vision," said Dr. Hudson. "That is why I do research here: The research we do today can change lives tomorrow."

Diabetic retinopathy can cause blindness

Diabetic retinopathy is the leading cause of blindness among adults in the United States. More than 4 million people—about 28.5% of all people with diabetes—have diabetic retinopathy. Patients with diabetes have regular screenings for diabetic retinopathy to detect it or prevent its progression.

The condition is detected by taking a photo of the inside of the eye and looking for signs of bleeding or other abnormalities. For accurate detection, it is necessary for the person taking the image to get a good photo, and for highly trained people to apply consistent criteria when looking at those photos.

The research showed that, before implementing the centralized reading center, early or mild cases of retinopathy were being missed. Now, when those patients are spotted, they are scheduled to be rescreened in 1 year instead of 2.

The idea to take retinopathy reading from the physician offices to a centralized center started after Dr. Kanter saw that KPSC's frequency of retinopathy diagnosis was less than half the national average. At the same time, Dr. Fong became aware of the big differences in retinopathy rates at different KPSC medical centers. He went to Dr. Kanter to discuss possible solutions.

Above: Cecilia Villarreal, Mohini Sharma, Lupe Cisneros

Next page: Dr. Kristi Reynolds, Dr. Corinna Koebnick

Dr. Fong realized that the best way to detect diabetic retinopathy would be something used in clinical trials research: a centralized location with trained people to ensure consistency and quality.

So in 2010, the Eye Monitoring Center started with just Dr. Fong and a certified ophthalmic technician reading images from pilot medical centers.

It seemed to have a positive impact very quickly. But unless quality improvements are rigorously evaluated, no one can really know for certain. "So we can't say it works unless we demonstrate it with research," Dr. Hudson said. "Research is critical to determining what makes smarter medicine."

Evaluating success with research

The research showed that the results were impressive.

"The variation in retinopathy rates between medical centers used to be huge. The medical center with the highest rate had 6 times that of the lowest medical center," Dr. Fong said. "We've slashed that difference by 75%."

Dr. Fong oversees 13 staff members. Six certified ophthalmic assistants focus on reading images for diabetic retinopathy. Three look at other eye issues, such as glaucoma and age-related macular degeneration. The staff also includes a clerk and an administrative assistant. The Eye Monitoring Center has grown to handle retinopathy screenings from all the 13 KPSC medical centers, a few community clinics, and in 2016, the Kaiser Permanente Georgia Region.

"Technology allows us to view most images as soon as they are saved," said Cecilia Villarreal, a certified ophthalmic assistant and the project manager at the Eye Monitoring Center. "Patients in Georgia went from waiting 2 to 4 weeks for their results to getting them the same day or the next day."

The technicians who provide retinopathy screening results sit on one side of the office that is kept dark so they can see the images on their computer screen clearly. The other side of the office is lit normally for technicians examining different kinds of images for glaucoma and age-related macular degeneration.

Improving lives now, fueling new research

Dr. Fong's desk, adorned with pictures of his children, is on the light side of the room. When he looks around he sees not only everything the center has accomplished in a few short years, but all the ways that research can fuel new improvements in the future. He and Dr. Hudson have discussed projects ranging from increasing the already high proportion of Kaiser Permanente members with

diabetes who get their required eye checks in a timely manner, to automating the reading of the images for even more standardization.

On the dark side of the room, Sharma continues to scan one eye after another.

"It's an interesting and challenging job," said Sharma. "And, what I like most is I that learn something new every day."

When she finds something that looks different, such as a retinal detachment, she calls in Dr. Fong or another ophthalmologist. The doctor or technician calls the medical center and makes sure the patient gets an ophthalmology appointment as soon as possible.

Sharma was studying images one day in 2015 when she found a large mass.

"I showed it to Dr. Fong," she said. "It turned out to be a malignant tumor. The doctors had to remove the eye, but we saved that patient's life."



Smarter screening for hypertension

The Centers for Disease Control and Prevention estimates that only half of the 67 million Americans with high blood pressure have their condition under control. Hypertension often has no warning signs, and often is missed in patients who do not see their primary care physician on a regular basis. Kaiser Permanente Southern California researchers studied the impact of expanding blood pressure screenings to patients outside of the primary care setting.

"The idea is to catch high blood pressure during patient visits in specialty care settings such as ophthalmology or urology," said research scientist Corinna Koebnick, PhD, MSc. Dr. Koebnick was senior author of a study published

in *The Journal of Clinical Hypertension* in 2015.

"Our findings indicate that if we can identify, treat, and control high blood pressure sooner, we can greatly reduce the number of cardiovascular events. That is smarter medicine."

In a related study led by the Department of Research & Evaluation, researchers followed new mothers during their first year after delivery. The study, published in the *Journal of Hypertension*, found that women who had a hypertensive disorder during pregnancy were more than twice as likely to develop pre-hypertension or hypertension in the year after their babies were born.

"Our study suggests there is a subset of women who develop hypertension in pregnancy and present with elevated blood pressure in the first year after delivery—despite being otherwise healthy before pregnancy," said lead author and researcher Mary Helen Black, PhD, MS.

Associate Director of Epidemiologic Research Kristi Reynolds, PhD, MPH, the study's senior author, said these patients are also more likely to have their hypertension go undiagnosed because many do not visit their primary care providers regularly.

"Getting women back into the clinic for self-care after they have babies is a challenge," said Dr. Reynolds.

"When all of your time and energy is focused on your new baby, you may not be thinking about getting your blood pressure checked."