

Reducing heart disease:

Researchers investigate blood pressure at home and abroad



Reducing heart disease has long been a focus for Kaiser Permanente Southern California's Department of Research & Evaluation. And as a learning health care organization, clinicians are often able to quickly incorporate results of the studies into practice.

Because high blood pressure is a major risk factor for heart disease and stroke, research conducted in 2018 delved into several aspects of blood pressure. One study considered how low is too low for blood pressure, another how variability in blood pressure can affect falls, and yet another how to decrease disparities in blood pressure treatment adherence rates between white and black patients.

Also in 2018, Kaiser Permanente began using data from its comprehensive electronic health record system for global benefit through an international program called Resolve to Save Lives.

"They came to us to see if we could provide some real-world evidence on the long-term effects of various combinations of antihypertensive medication to help find the best combinations for patients in countries with few resources and little chance for regular follow-up labs," said Kristi Reynolds, PhD, MPH, director of R&E's Division of Epidemiologic Research. "This is an exciting opportunity to provide real-world evidence that will guide international guidelines aimed at saving lives around the globe."

Hypertension becoming a global concern

The work is coming full circle for Dr. Reynolds. She began graduate school at the Tulane University School of Public Health and Tropical Medicine with a focus on infectious diseases. However, she completed



At the West Los Angeles Medical Center, Dr. Jeffrey Brettler discusses finding the right antihypertensive regimens for patients in low-income countries with Tiffany Luong.

her doctoral studies in cardiovascular disease after realizing that cardiovascular disease may be more important in the long term. She feels now she made the right choice.

"While there's still a lot of effort looking at infectious diseases in underdeveloped countries, people are living longer, their diets have changed, and they aren't getting as much exercise," Dr. Reynolds said. "So we are seeing that high blood pressure has become a big challenge globally."

Resolve to Save Lives is an initiative of the global public health organization Vital Strategies, which helps governments and communities prevent deaths

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Cover: At the Los Angeles Medical Center, Dr. John Sim shows patient Eduardo Escobedo how the 24-hour ambulatory blood pressure monitoring device can help determine a patient's true blood pressure. Using this device on patients, current research will test whether a larger "white coat" effect is associated with a higher risk of falls among older adults with treated hypertension.



Dr. Kristi Reynolds and Teresa Harrison discuss research efforts at Kaiser Permanente aimed at helping people with hypertension locally and across the globe.

from cardiovascular disease and epidemics, with a focus on low- and middle-income countries. Marc G. Jaffe, MD, who was the clinical leader of Kaiser Permanente's National Integrated Cardiovascular Health Guidelines Team, is now the senior vice president of Resolve's Cardiovascular Health initiative.

Dr. Jaffe was familiar with the work that had been done by Dr. Reynolds and Jeffrey William Brettler, MD, the regional hypertension physician lead for the Southern California Permanente Medical Group. Dr. Jaffe asked them to help in the project.

Implementation of results could save lives globally

"KPSC has great records on patients' experiences with high blood pressure medications and combinations of medications, and we have actually published on their long-term outcomes," said Dr. Brettler. "When you go into under-resourced developing countries, you want to use the most efficient regimens you can get. Through our research, we can discover what those regimens should be."

Dr. Brettler noted that from a global perspective, by developing simple regimens to control hypertension "you can potentially affect more lives than almost any other intervention."

Physician investigates how low is too low for blood pressure

Closer to home, John J. Sim, MD, a nephrologist with the Kaiser Permanente Los Angeles Medical Center, had noticed something in his practice as efforts to lower patients' blood pressure increased. Older patients with very low blood pressure were feeling poorly and falling more often.

He pursued research that was published in the *American Journal of Preventive Medicine* in 2018. The study found if patients taking prescribed hypertension medications have episodically low blood pressures—systolic blood pressure under 110mmHg—they were twice as likely to experience a fall or to faint as patients whose treated blood pressure remained at 110mmHg or above.

Blood pressure findings implemented into hypertension guidelines

"Our study looked at what happens in a real-world clinical environment with very successful hypertension control rates where people are treating to a goal of less than 140 and often less than 130," Dr. Sim said.

The results were incorporated into the KPSC hypertension guidelines for physicians. It also informed work being led by Dr. Reynolds, who is looking at the variability of patients' blood pressure over 24-hour periods.

Treating hypertension can be a balancing act

Hypertension affects nearly two-thirds of adults ages 60 years and older in the United States. But falls are the leading cause of injury-related hospitalization and death among older U.S. adults, so clinicians often must weigh the cardiovascular benefits of increasing hypertension medication against the potential risk for falls, Dr. Reynolds said.

Blood pressure readings taken in the clinic may be higher than average for some patients due to what's called "white coat" effect, or stress at being at the doctor's office. Also, readings naturally fluctuate throughout the day, especially among older adults treated for hypertension.

The idea of 24-hour blood pressure monitoring to determine a person's true blood pressure has become common in Europe. But it's not practical for the 860,000 or so KPSC members with hypertension.

Inquiry based on previous hypotension findings

"So, we started to think, who are the patients who could really benefit?" Dr. Reynolds said. "Dr. Sim and I had a couple of conversations about the potential for overtreating older adults. There's anecdotal evidence that the "white coat" effect may be larger in older adults—and that's where we came up with the study idea."

Their research will test whether a larger "white coat" effect is associated with a higher risk of falls among older adults with treated hypertension, or whether people whose blood pressure drops substantially after a meal are more likely to have falls. The study is funded by the National Heart, Lung, and Blood Institute of the National Institutes of Health.

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– Kristi Reynolds, PhD, MPH

In early 2019, the researchers started fitting patients with the 24-hour blood pressure monitors. They will continue to monitor the patients for a year to determine the results. They plan to enroll 1,250 patients over the 4-year study period.

"Ultimately, we hope the study will help physicians determine when it's safe to increase patients' anti-hypertensive medication," Dr. Reynolds said.

Reducing racial disparities in blood pressure control

In another study, Dr. Reynolds examined the racial disparities in hypertension control. Hypertension control at KPSC increased from 54% in 2004 to 86% in 2012. Like elsewhere in the country, however, control rates were lowest in black patients. In 2010, KPSC started measures to reduce those disparities. They included staff education, walk-in blood pressure clinics, a more stringent approach to medication adherence, and monthly reporting on hypertension racial disparity throughout the region.

The study, not yet published in 2018, followed patients from 2008 to 2016. It showed that hypertension control increased across all racial/ethnic groups and blacks experienced the largest improvement in hypertension control.

Helping people with hypertension live their best lives

Overall, the Department of Research & Evaluation is investigating blood pressure both near and far to help people live their best lives wherever they call home.

"It's important to study blood pressure because it's a major risk factor for stroke and heart disease. High blood pressure is extremely prevalent in the United States and is becoming more prevalent across the globe," Dr. Reynolds said. "Yet it is a disease that can be treated and controlled."