

# Hypertension in children

Asking questions that improve real-world care for kids







**R**emarkable research findings are often the result of exceptional questions.

At Kaiser Permanente Southern California, those questions that improve practice can come from just about anywhere, including leadership, clinicians, and researchers.

Sometimes they even come from the inability to answer an initial question.

Five years ago, Corinna Koebnick, PhD, MSc, a research scientist with the Department of Research & Evaluation, wanted to research children's repeated blood pressure readings within Kaiser Permanente. But she couldn't. The data for repeated blood pressures weren't available.

She didn't stop there. She asked, "Why?"

"The most recent recommendations were that clinicians should determine a child's blood pressure by averaging 2 or more repeated blood pressure readings," Dr. Koebnick said. "But I couldn't do that when I looked at the real-world data. Most of the time the blood pressure reading wasn't repeated in the medical record."

### Researchers work with clinicians to find answers

During her search to discover why so few high blood pressures were repeated, Dr. Koebnick met with Robert James Riewerts, MD, the regional chief of pediatrics for the Southern California Permanente Medical Group, and Beatriz Kuizon, MD, a pediatric nephrologist who had initiated some efforts to add a reminder to nurses and clinicians to repeat elevated blood pressure readings. Together they worked on educating physicians.

Then, they drafted 2 new studies to assess the success of their efforts. The studies showed that the rate of taking second or third blood pressure readings among children at KPSC improved by over 40%. The first of 2 papers published in 2017.

They are now working to take this to the next step—to make sure every child with an initial high blood pressure reading is re-checked.

### Hypertension is rare—but can be serious—for children

High blood pressure can progress to sustained hypertension and lead to stiff arteries, even at an early age. Hypertension is a chronic condition (mainly affecting adults) in which elevated blood pressure forces the heart to work harder than normal to circulate blood throughout the body. It is a major contributing risk factor for heart failure, heart attack, stroke, and chronic kidney disease and accounts for an estimated 18% of cardiovascular deaths in the United States.



Dr. Corinna Koebnick and her physician collaborator Dr. Beatriz Kuizon work to make sure that hypertension isn't missed in pediatric patients.

Dr. Koebnick's research showed that 2.3% of youth ages 3 to 17 years at KPSC had sustained high blood pressure over time. Children with elevated blood pressure are 2 to 3 times more likely to develop hypertension as adults.

But children's blood pressure can be variable, and being nervous at the doctor's office sometimes can cause them to have elevated blood pressure readings even when they aren't hypertensive.

### Pediatricians see increases in hypertension

Dr. Kuizon has been seeing increasing numbers of children with hypertension in her practice at the Los Angeles Medical Center.

"Children with hypertension are usually asymptomatic but may already have target organ damage," she said, "and they're more likely to develop hypertension in adulthood. So early identification and intervention may reduce long-term consequences from hypertension."

But often, because false readings are so prevalent and high blood pressure among children is so rare, actual cases of hypertension weren't being caught.

### Building a case for re-checking blood pressure

The first study that Dr. Koebnick led showed that nearly one-quarter of children and teens who had their blood pressure screened at a primary care appointment had a reading in the hypertensive range, but less than half of those high readings could be confirmed when the blood pressure was repeated.

Dr. Koebnick gave presentations to physician groups to increase awareness about the need for follow-up when blood pressure is still high after being repeated. Dr. Kuizon championed her work and spread the word beyond those meetings.

In 2015, a best practice alert was added to the Kaiser Permanente HealthConnect® electronic health record system to remind clinicians and office staff to take that second, and maybe third, reading when a child's blood pressure is high.

### Best practice alerts change practice

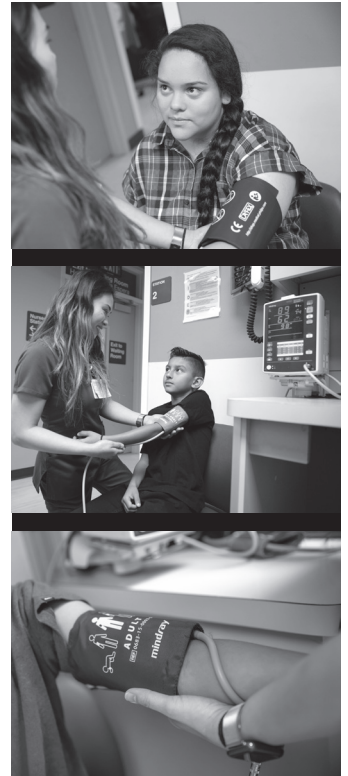
A second study looked at whether the alert changed practice. It did. After implementation of the alert, the odds of repeating a blood pressure test were significantly higher in all areas of KPSC.

The study also showed that children with obesity have higher odds of having their blood pressure tests repeated than children who are not obese. Younger children are less likely to have blood pressure tests repeated than older children.

Dr. Riewerts noted, "We were concerned that we weren't appropriately picking up children who truly had hypertension, but that can be like looking for a needle in a haystack. This helped us find those needles."

In the end, real-world data showed the gap between the guidelines and day-to-day practice, and children with high blood pressure will be more quickly identified in the future.

"It was really, really great work," Dr. Riewerts said.



A nurse takes blood pressure readings of pediatric patients at Baldwin Park Medical Center.



## Untying the knot of weight, poverty, and race in hypertension

Dr. Claudia Nau and Dr. Deborah Rohm Young

**R**eal-world evidence, such as that at Kaiser Permanente Southern California, can give insight into real-world issues. For example, how does a person's race or ethnicity affect their chance of developing hypertension if where they live and what they weigh aren't factors?

"We know that higher rates of hypertension are associated with lower economic status, obesity, and some races/ethnicities," said Deborah Rohm Young, PhD, MBA, director of the Division of Behavioral Research for the Department of Research & Evaluation. "And so, it made us think, maybe this association is really not related to race—maybe it's a factor of either obesity status or poorer socioeconomic status."

Dr. Young led the team that analyzed the electronic health records of 4,060,585 overweight or obese adults from the Patient Outcomes Research to Advance Learning network. PORTAL includes Kaiser Permanente in Southern California, Northern California, Colorado, the District of Columbia, Georgia, Hawaii, Maryland, Oregon, Virginia, and Washington, as well as HealthPartners in Minnesota and Wisconsin, and Denver Health in Colorado.

From this sample of geographically, ethnically, and economically diverse patients, the researchers found that people who are African-American, American Indian/native Alaskan, Asian, or native Hawaiian and other Pacific Islanders have a significantly greater chance of developing hypertension than people who are white or Hispanic—even if they are in the same weight category or live in neighborhoods with similar education levels. The study was published in 2017 in *The Journal of Clinical Hypertension*.

Claudia Nau, PhD, an R&E research scientist and one of the co-authors of the study, focuses on the social determinants of health and prevention of obesity and chronic disease. She noted that "race, socioeconomic status, and obesity are closely intertwined. Better understanding of the interplay of these factors can help target and tailor interventions."

Hypertension is one of the risk factors for cardiovascular disease and stroke that many people can change by losing weight, eating better, exercising more, and taking medication.

"Your weight status and where you live are key factors for developing hypertension," Dr. Young said. "But there are other factors within race and ethnicity that also increase your risk."