

## Lead levels in children

Making it easier for parents to get their kids screened







**W**hen Gloria Chi, PhD, MPH, arrived at the Department of Research & Evaluation for a 2-year assignment as an Epidemic Intelligence Service officer from the Centers for Disease Control and Prevention, she had a keen interest in researching how the environment affects our health.

Before the end of those 2 years, the newly minted PhD from the University of Washington would spark a change in the way Kaiser Permanente Southern California manages the testing for lead exposure—a major environmental hazard—in children.

“What started off as a very simple, straightforward question became a complex project addressing an important need,” said Steven Jacobsen, MD, PhD, senior director of research for KPSC. “Dr. Chi was able to determine where the need for lead testing was the greatest, and that has provided insights we’re using to reach out to parents of our pediatric members who are at greatest risk.”



Dr. Gloria Chi meets with her mentors Dr. Jean Lawrence and Dr. Sara Tartof.

### Dr. Chi brought CDC presence to R&E

In 2016, Dr. Chi became the first EIS officer assigned to KPSC’s Department of Research & Evaluation, and the only one at that time at a nongovernmental agency.

EIS officers investigate public health threats in the United States and around the world. Most spend the 2-year training program at CDC headquarters in Atlanta while others are assigned to state and local health departments throughout the country or to other federal agencies.

Dr. Chi was interested in the intersection of public health and substantive real-world data. Her dissertation focused on the effects of air pollution on cardiovascular health.

The EIS position with R&E’s Division of Epidemiologic Research was a perfect fit. Her primary supervisors and mentors were Jean M. Lawrence, ScD, MPH, MSSA, and Sara Tartof, PhD, MPH, both of whom had been EIS officers themselves.

When her assignment ended in May 2018, Dr. Chi had studied topics ranging from heart attack trends to diabetes surveillance to coccidioidomycosis antimicrobial treatment patterns. She investigated an outbreak of bacterial infections among ventilator-dependent patients at a non-Kaiser Permanente facility, the type of investigation that is typical for EIS officers. She also had written 5 manuscripts and given 8 presentations.

And she studied lead testing.

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— Steven Jacobsen, MD, PhD



Dr. Robert Riewerts at work in his office at Baldwin Park Medical Center.



Dr. Tim Ho and Royann Timmins, RN, discuss the new outreach program.

### Lead exposure can harm children

"Coming to the EIS fellowship," Dr. Chi said, "I was wondering if I could do additional work in environmental epidemiology and explore what kinds of measurements we have of our KPSC members' exposures to environmental pollutants."

After a discussion with leadership, she pursued lead testing.

Today, at least 4 million U.S. households have children who are being exposed to high levels of lead, according to the CDC. For infants and young children, high blood lead levels can decrease their ability to learn, and even low levels of lead can be dangerous. In both young and old, lead can damage kidneys, blood, and the nervous system, and at very high levels can progress to coma, convulsions, or death.

Common sources of lead exposure for children include breathing contaminated dust and soils around older homes that contain lead-based paint or eating paint chips that contain lead.

Lead exposure often has no obvious symptoms, so it frequently goes unrecognized. Among KPSC members, it is generally caught only through blood tests, said Robert James Riewerts, MD, the regional chief of pediatrics for the Southern California Permanente Medical Group.

### Lead exposure was in the news and on her mind

Dr. Chi said looking at lead levels in children makes sense right now because of increased awareness following news of elevated lead levels found in the water in Flint, Michigan. She also noted that there have been concerns in Southern California due to a now-closed battery recycling plant in Vernon, 5 miles south of downtown Los Angeles.

The state of California requires all children covered by Medi-Cal (Medicaid) to be tested for lead, but the rate of testing statewide is low. Recent reports indicate that only 25% of children who receive their medical insurance coverage through Medi-Cal are routinely tested for lead exposure.

Dr. Chi, in collaboration with R&E biostatisticians Lie Chen, DrPH, MSPH, and Jeff Slezak, MS, dug into the data available at KPSC with 3 objectives: to determine the trends of



Once a doctor signs an order for a blood test for a child, Complete Care sends a letter to his or her parent.

elevated blood lead levels from 2008 to 2015; to determine the associations between sociodemographic characteristics and lead testing and elevated blood lead levels; and to identify where geographic clusters of elevated blood lead levels among children might exist.

She found that:

- Children covered by Medi-Cal were more likely to receive blood lead tests than children who received their KPSC insurance through other sources.
- Children living in neighborhoods with older homes and greater socioeconomic disadvantage had higher rates of testing than children living in newer and more affluent neighborhoods.
- The proportion of children tested that had high elevated blood lead levels is decreasing.
- There were “hot spots” of higher lead levels in areas of Los Angeles and San Diego counties.

Dr. Chi also found that children living in poorer neighborhoods with older homes had risks of elevated blood lead levels that were more than twice as high as children without either of these risk factors.

### Overcoming barriers to lead testing

Dr. Jacobsen recognized that the results could be translated directly into practice, and connected Dr. Chi with clinical and operational leadership at KPSC. They saw her work would enable them to create new tools to improve health.

“Her findings show there’s no question that parts of our population in Southern California are more likely to be at risk for lead poisoning than others, and therefore would benefit from being tested,” said Dr. Riewerts.

Currently, physicians and nurses receive alerts on the Kaiser Permanente HealthConnect® system when a patient is due for lead testing. But there are often barriers to getting the test, which requires a blood draw, said Tim Ho, MD, MPH, the regional assistant medical director, Quality and Complete Care for SCPMG.

Often when parents bring their children into the medical clinic it is because they are sick, he said.

“So, a physician may recommend that the child get tested for lead during that office visit. But the parent often wants to wait until the child is well, and then gets busy and forgets to return,” Dr. Ho explained.

To address the situation, physicians ordered blood tests for children who were on Medi-Cal but had not yet been tested. Then, in summer 2018, letters began to go out to parents of those children explaining the reason for the test. So now, all parents have to do is bring their child to a Kaiser Permanente laboratory.

“We wanted to remove as many barriers as possible,” Dr. Ho said.

That outreach campaign began in June 2018.

### Dr. Chi provided a great example of collaboration

“Gloria was a trailblazer,” Dr. Tartof said. “Her dedication, experience analyzing medical record data, and the presentation of her findings at the EIS conference and elsewhere demonstrated to the CDC that KPSC is an excellent site for an EIS officer.”

The success resulted in a second match between an incoming EIS officer and KPSC. The CDC assigned R&E a new EIS officer, Lisa Oakley, PhD, MPH, who will be with us from August 2018 to June 2020.