

COVID-19 early detection system tested in schools by UC San Diego and San Diego County

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As part of the surface monitoring step in the early alert program, Tamara Jerjees, Vista Grande Elementary School teacher assistant, uses a swab to sample a one-square-foot section of the center of the floor in a classroom, which is where aerosols tend to settle. Credit: County of San Diego

In an effort to help schools reduce the risk of COVID-19 outbreaks as they resume in-person instruction, University of California San Diego and the County of San Diego are testing the Safer at School Early Alert system, an evidence-informed program to detect SARS-CoV-2 at schools and child care centers.

Modeled after UC San Diego's [Return to Learn](#), a first-of-its-kind approach to safely resume teaching, learning and research at a university, Safer at School Early Alert system is scaled for individual schools and child care centers without the resources available at a research university. Through daily wastewater and surface monitoring, the Safer at School Early Alert tests for the presence of particles of the coronavirus. Combined with a responsive testing strategy, the aim is to quickly identify children or staff members who are infected with COVID-19 before an outbreak occurs.

Ten San Diego County-area TK-8 schools and two child care centers are participating in this SARS-CoV-2 early detection program, which is funded by the County of San Diego and designed by UC San Diego.

When Vista Grande Elementary School began offering a hybrid-teaching model that includes 50 percent in-person classroom capacity, they instituted [public health guidelines](#), including daily symptom screening, social distancing and requiring masks be worn by all students and staff.

Committed to a safe school environment for all, the school's principal, Tita Cordero-Bautista, and David Miyashiro, EdD, Cajon Valley Union School District superintendent, wanted to do more so they enrolled the campus in Safer at School Early Alert.

"The health, safety and well-being of our staff and students is a top priority. Our educators are using every resource at their disposal to foster an engaging learning experience filled with rigor. Still, we

understand that distance learning is not ideal for every student or family," said Cordero-Bautista.

"Many in our community are at high-risk for COVID-19. By participating in the Safer at School Early Alert system, we hope to ease concerns about school safety so that parents and students are comfortable at school while building meaningful relationships and learning."

One in three adults infected by SARS-CoV-2 will not exhibit symptoms of COVID-19, but they can still spread the virus. The virus is detectable on surfaces and in human feces. Even those without symptoms will shed the virus in their feces and breathe it into the air, where it then settles on surfaces.



Vista Grande Elementary School implemented safety protocols including mask wearing and spacing between student desks. The Safer at School Early Alert program provides an extra layer that school officials say give them peace of mind. Credit: County of San Diego

Return to Learn positioned UC San Diego as a nationwide leader in COVID-19 detection and mitigation. Daily screening, masking, physical distancing, weekly asymptomatic testing of students and daily wastewater monitoring are crucial elements of the university's larger strategy to incrementally repopulate its campus. Due to the effectiveness of Return to Learn, UC San Diego is one of the country's few major colleges that has a large student body on campus and a low rate of

infection.

"Many universities are doing testing, contact tracing, and face coverings, but what sets UC San Diego apart is our data-driven, adaptive, and comprehensive approach," said UC San Diego Chancellor Pradeep K. Khosla. "Return to Learn has helped us successfully detect and manage the presence of virus on our campus. We've learned a great deal creating this approach. We want to share that knowledge with others to promote better health outcomes in school systems and in communities everywhere."

Guided by scientific evidence and expertise generated by her colleagues who developed Return to Learn, Rebecca Fielding-Miller, Ph.D., MSPH, assistant professor at the Herbert Wertheim School of Public Health and Human Longevity Science at UC San Diego, is leading a team in designing a simple testing model that can be implemented at any school.

Safer at School Early Alert is being piloted within communities at highest risk for COVID-19, including San Ysidro, Chula Vista, El Cajon, Southeast San Diego and Vista. These communities primarily serve low income and immigrant families who have more challenges accessing COVID-19 testing and may have elevated levels of vaccine hesitancy.

"The Safer at School Early Alert system is in the validation phase right now to understand how accurate these monitoring systems are in [child care centers](#) and elementary schools. But, there is another important piece which is what happens after we receive a positive signal for SARS-CoV-2," said Fielding-Miller, the principal investigator. "Residents of the hardest hit communities are often reluctant to test for COVID-19, so we are working with these communities to try to understand how we can make testing feel safe and accessible. Because a signal going off without a test is alike a fire alarm going off without a fire extinguisher. It is not

useful. It is just scary."

The program incorporates elements of risk mitigation, viral monitoring and a strong focus on public health intervention that works for each community.

"The safe reopening of schools remains a priority for the County of San Diego," said Wilma J. Wooten, MD, MPH, County of San Diego public health officer. "What UC San Diego has demonstrated, with the Safer at School Early Alert pilot program, models the types of steps that can help us ease back into classroom education while continuing to fight the virus."

The Safer at School Early Alert system includes three elements. The first involves technology launched at UC San Diego to collect daily wastewater samples that are tested at the laboratory of Rob Knight, Ph.D., professor of pediatrics at UC San Diego School of Medicine, for shed pieces of the [coronavirus](#). A robot installed at each site collects wastewater samples, enabling researchers to detect SARS-CoV-2 three to five days ahead of individual tests. Child care sites also send used diapers to test fecal samples in children who are not yet potty-trained.



In addition to surface monitoring, a robot takes daily samples of wastewater every 30 minutes to detect the presence of SARS-CoV-2 at each campus. Credit: County of San Diego

A second step includes daily surface monitoring. Teachers or staff use a swab to sample a one-square-foot section of the center of the floor in a classroom, which is where aerosols tend to settle. These samples are tested daily at the Expedited COVID Identification Environment (EXCITE) lab at UC San Diego.

Testing children and staff at each location is the third part of the detection program. Children and staff who voluntarily consent undergo

free COVID-19 testing at their school or child care center in response to a positive result from wastewater or surface monitoring.

The first time a child undergoes the nasal swab, they may be nervous, said Fielding-Miller. To help ease their concerns, a team of certified nursing assistants talks the children through the process every step of the way ensuring they are in total control of what is happening, she said.

"We tell the kids that it is a very thorough nose picking. One of our testers says, 'I'm just going to chase your boogers around for a second,'" said Fielding-Miller.

Should a person test positive for COVID-19, the individual or parent is informed and advised to seek medical care. The school is also notified so that administrators can initiate exposure protocols.

In accordance with federal and state regulations, San Diego County Public Health is notified about positive cases. Participant privacy is a priority. Only medical and research professionals, as well as public health officials who need to know the identity of those who test positive for SARS-CoV-2, will have access to identifying information.

The program is currently processing 1,000 tests weekly using anterior nasal swabs. UC San Diego researchers developed a rigorous viral testing program that is designed to detect potential outbreaks as early as possible. Tests are processed at the EXCITE lab at UC San Diego. Test results are compared to results from the wastewater and surface monitoring systems to validate the program.

Should wastewater or surface monitoring provide a positive result, children and staff at the school or child care center receive a COVID-19 test as soon as possible so that the person(s) who may be carrying the virus and their close contacts can be quarantined to stop an outbreak.

"Our goal is to develop an intervention package that can be implemented across the county, across the state or even across the country," said Fielding-Miller. "We've heard from a lot of our [school](#) partners that the program makes them feel good and safe because there is this extra level of monitoring on their campus."

Provided by University of California - San Diego

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