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SEWAGE SURVEILLANCE

Covid-19 Is Threatening the In-Person Semester. Can Wastewater Testing Help Save It?

By *Nell Gluckman*

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CHENEY ORR, BLOOMBERG VIA GETTY IMAGES

Workers collect a sample from a dorm's sewage line to be tested for Covid-19 at the U. of Arizona. The university screens the sewage from each dorm for traces of the coronavirus.

When Ian Pepper finally found traces of the coronavirus in one of the sewage samples his lab had been collecting all over the University of Arizona campus, he felt a jolt of excitement.

It was a moment he had been anticipating all summer. With help from the university's facilities team, members of Pepper's lab had been testing wastewater flushed out of dorms and other campus buildings, and gathered from manholes, for months. Last Tuesday a positive test showed up in a sample taken from outside a dorm.

"Kind of surreal" was how Pepper described it. "As humanitarians, of course we want the samples to be negative. But as researchers, we want the samples to be positive."

Now they had to act. Pepper, an environmental-science professor, reported the positive test. Around 11 p.m. that night, he was awakened by a call from Robert C. Robbins, the president, who wanted to talk about next steps. The next day, Pepper's team tested the wastewater from the dorm in question — Likins Hall — five more times, and each time they found the virus.

Next the students who live in Likins were given individual tests; two tested positive for Covid-19, Pepper said. Those two were quarantined elsewhere. The effluvium from Likins Hall has been negative ever since.

Wastewater testing, or surveillance, may prove to be an important tool in detecting and stopping coronavirus outbreaks — at a time when campuses need all the help they can get. So far, the national return-to-campus-during-a-pandemic experiment has [yielded sobering results](#), with campuses like the University of Alabama at Tuscaloosa and Illinois State University topping 1,000 cases of Covid-19 and other colleges quickly moving instruction online as cases skyrocket. As more students return to more colleges, sewage testing may be a welcome bright spot.

“Everyone is jazzed,” Pepper said.

This detection method could be particularly useful because the virus shows up in people’s feces about a week before they start showing symptoms of Covid-19. (Both people who tested positive in Likins Hall were asymptomatic, Pepper said.) Furthermore, pathogens stay in sewage pipes and tanks, “bouncing around like Ping Pong balls and not being ejected with one flush,” Pepper said during a news conference last week. That’s important because it means that even if an infected person did not use the toilet right before a sample was drawn, pathogens would still be detectable.

Colleges and universities around the country have ramped up their use of the method — Pepper said he’d been in touch with 10 or 12 colleges since the news of his success broke last week. Some campuses have relied on their own scientists and labs, while others are contracting with private companies.

Targeted Testing

At Clemson University, David L. Freedman, an environmental-engineering professor, has been working since May with Sirem, a company based in Knoxville, Tenn., to test the university’s wastewater-treatment facility and two others nearby. After hearing about the University of Arizona’s work, he decided that once students came back, he would move testing “upstream” and start sampling the material that flows out of the dorms. In-person classes start at Clemson, in South Carolina, on September 21.

“I suspect that initially the levels will be low or undetectable,” Freedman said. “But as students in the dorms start circulating off campus, spread will start taking off.”

Freedman added that testing wastewater is a relatively inexpensive way to detect the virus. Clemson is paying Sirem \$450 for each sewage test, he said, and has budgeted \$70,000 for the fall semester. Colleges should theoretically have to perform many

fewer sewage tests than individual clinical tests in order to detect the virus. They can then use clinical tests, at \$100 to \$150 each, to isolate the positive cases.

Sirem is working with six to eight colleges and universities, said Duane Graves, its operations manager. A company in Cambridge, Mass., Biobot, is working with about a dozen campuses, Newsha Ghaeli, its president, said.

Ghaeli said wastewater testing was not meant to replace individual clinical tests, but to allow them to be more targeted.

“Maybe we can decrease the frequency of clinical testing and instead ramp up testing when we do see a spike in wastewater,” she said. Biobot’s tests cost about \$1,200 each.

At the University of South Carolina at Columbia, [where there were more than 1,000 positive cases](#) of Covid-19 this week, scientists began testing wastewater about two weeks ago. R. Sean Norman, an associate professor of environmental health sciences and director of the Molecular Microbial Ecology Lab, said it would be useful to spot trends.

An upward trend means “something’s not getting contained properly,” he said, and “more testing needs to take place.”

Norman is also [working with the Centers for Disease Control and Prevention](#) to test wastewater-treatment facilities across South Carolina, and in Texas and California as well, to spot statewide and national trends that could be used to drive policy.

Sewage surveillance has been used before [to detect polio](#) and opioid usage, he said, “but it definitely is now becoming mainstream with this pandemic.”

At the University of Arizona, Pepper said his lab was hiring more technicians and planning to test some apartment buildings that house a lot of students near the

campus. For Pepper, this episode has been proof of his personal slogan, one that he uses under his email signature and plans to adorn on T-shirts: “Poop doesn’t lie.”

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