

# Testing larger pools of combined samples can detect COVID-19 outbreaks faster, scientists say

By [Kate Baggaley](#).

An hour ago.



Larger sampling pools can help detect outbreaks. (AP Photo/David Goldman)

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France demonstrates that pooled testing, the practice of combining mucus or saliva samples from multiple individuals and testing them together, is an efficient way to track the prevalence of the novel coronavirus in relatively closed communities such as schools and nursing homes — despite the increased risk of overlooking an infected person.

The researchers developed a mathematical model to predict how many people’s samples should be pooled together to detect different

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levels of the virus, SARS-CoV-2. They found that larger pools are “extremely efficient” at estimating how much virus is circulating, and [reported the findings](#) March 4 in *PLOS Computational Biology*.

“If you can regularly test groups of people, you can detect very early the presence of the virus in the community and you can take preventative measures,” said Bastien Mallein, an assistant professor of mathematics at the Université Sorbonne Paris Nord and coauthor of the paper. “It’s kind of an early warning system.”

Pooled testing is not a new idea; the strategy was [proposed to screen soldiers for syphilis](#) during World War II. Since then, pooled testing has been used to detect sexually transmitted infections, avian flu and drug use. The advantage of pooled testing is that it can test more people at a lower cost and with fewer supplies than would otherwise be possible.

“You can go way faster, and being fast is critical if you want to really eradicate the disease at its earliest stage,” said Jean-François Rupprecht, a

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theoretical physicist and CNRS researcher at Aix-Marseille University and last author of the paper.

Since the pandemic began, pooled testing has been used to track SARS-CoV-2 around the world, including on university [campuses](#) in the United States and nursing homes in Germany. During the fall of 2020, the city of Qingdao in China [tested](#) millions of its residents in pools of three to 10 people; when a pool tested positive, officials followed up by testing each person in the group individually.

However, pooled testing does come with a drawback. Early in their infection, a person will have very low amounts of virus in their system. If that person is tested in a pool rather than individually, the amount of viral copies from their sample will be diluted, possibly below the threshold that the machine running the test can detect.

This means the test may fail to pick up on the infection, prompting a false-negative result. Still, some researchers have argued that for COVID-19, using [pooled testing frequently](#) makes up for the risk of missing a few infected people who aren't feeling sick.



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“The question was, how do we then infer the impact of pooling on the false-negative risk?” Mallein said.

He and his colleagues estimated how likely it is that pooled PCR tests — which detect genetic material from the virus — will return false negatives given different amounts of virus present in the samples. The level of virus reflects how far along an epidemic is in that community, and the size of pools needed to detect it.

The team found that pooled testing may not pick up on the virus within the first day or two of its arrival, but works well beyond that point because people carry so many copies of the virus at the peak of their infection.

In one scenario, Mallein says, their model found that to detect a prevalence — the proportion of the population with COVID-19 — of 2% in a community, public health officials would need to run 10 tests on pools of 60 people, compared with 200 tests of individuals. Overall, he adds, the findings suggest that a rise in cases would be detected earlier by testing a portion of the population every day than by testing an entire campus or nursing home weekly.

“For epidemic control, it’s better to screen more people [with pooled testing] even though you take a higher false-negative risk,” Rupprecht said.

“Even though we don’t know

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infected ... thanks to pooling we can estimate the amount of virus present in the community.”

Pooled testing shouldn’t be used to diagnose symptomatic individuals, he noted. Rather, routine screening could help officials decide which steps to take to manage a burgeoning outbreak. Although the current findings are theoretical, Rupprecht envisions adapting the model into an app that nursing homes and other communities could use to determine how many people they should pool together to keep track of the virus.

By enabling large-scale screening, pooled testing also has the potential to quickly detect new variants of the virus, he added.

*The study, “Group testing as a strategy for COVID-19 epidemiological monitoring and community surveillance,” published March 4 in PLOS Computational Biology, was authored by Vincent Brault,*

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