With batch testing, we can reopen colleges and universities

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Note: *This is the submitted version of a piece that was published in the Chronicle of Higher Education. The Chronicle cut key sections of our piece without our approval. By omitting our key criterion for reopening—that universities must first have a realistic plan for keeping R below unity—the published version weakens the messages we aimed to convey.*

Colleges and universities are high-risk environments for the COVID-19 coronavirus. The virus spreads readily when people talk in closed indoor spaces, and more readily still at nightclubs, discos, and the likes. But students go to class, and they party. What's the point of college without at least one or the other?

When spread is insufficiently controlled, a disease outbreak grows exponentially—and exponential growth is a fearsome foe. Regardless of how few are initially infected, in time the epidemic will get out of hand. Colleges and universities cannot allow this to happen. Administrators must ensure that the outbreaks cannot explode: R, the number of new infections caused by a current infection, must be kept below unity on campuses.

Though COVID-19 is most severe among older individuals and those with other health conditions, the disease is far more likely to be fatal than influenza even among college-aged students. It is too early to know much about the long-term consequences of the disease in survivors of any age. And universities have to think about the health of the entire community: maintenance workers, food service employees, professional staff, graduate students, and professors.

The pandemic is not going to go away over the summer, and a second wave in the autumn is all too likely. A vaccine will not be available for the 2020-2021 academic year. COVID-19 is hard to control because most infected people can transmit the virus for a couple of days prior to showing symptoms, and some remain asymptomatic for the entire course of the disease.

Fortunately, testing can be used to detect pre-symptomatic and asymptomatic cases. This could be highly effective means of disease control—if carried out with sufficient frequency and coupled with contact tracing.

The benefits of testing depend on the time-course of the disease and the accuracy of the tests that are used. Current consensus suggests that an infected person is contagious for a week and infected people test negative 30% of the time. Testing once a month is next to useless. In the absence of other control measures, we would probably need to test nearly every student every second day.

This sounds like a prohibitively large number of tests, but it may be feasible with intelligent planning. An approach known as batch testing allows us to stretch our testing capacity by tenfold or more. The idea is simple: combine a group of samples, students from one floor of a dormitory, say—and test the pooled sample. If anyone in the group is positive, the test will come back positive. Then you go back and test each individual in the group. But unless disease prevalence is very high, most pools will test negative. More sophisticated mechanisms can provide even greater returns to scale.

The process of collecting samples also contributes to the cost of testing, but self-administered anterior nasal swabs appear to work well, and we believe saliva-based tests will be commercially available by autumn.

In addition to frequent testing, universities can work to reduce transmission by restricting class sizes, discouraging large social gatherings and faculty meetings, encouraging use of face masks, and pleading with everyone to wash their hands. But these steps will not be enough on their own. If a university is to reopen safely, it needs a workable plan for frequent testing—every few days, not every few weeks.

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