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UPDATE—Schools and COVID-19

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We wish to comment on some recent COVID-19 issues and respond to questions:

- **COVID-19 Testing Students**—is potentially valuable but requires considerations.
- **Ventilation and CO2**—is wise but requires more than upping air exchange.
- **Toxic Disinfecting Chemicals and Procedures**—necessary but be careful.

Testing Students for COVID-19

We've been asked if testing students "make sense." It may provide valuable information but administration may be complex and responding to the results must be qualified.

The best experiential information regarding results and problems with student testing comes from Europe.

The most aggressive student testing has been in Austria where students, including elementary students, test themselves with a nasal swab twice a week. Participation in the testing is mandatory. According to the school administrators there have no problems with the students drawing their own samples and preserving them according to guidelines. However, the program hasn't been monitored by an independent third party. The European Center for Disease Control and Prevention is observing the process but has not reported on problems or outcomes.

Recent publications by the Journal of the American Medical Association have indicated that unlike other viral testing procedures saliva testing appears to be as accurate as nasal swabs and is not invasive.

France and Germany are both also monitoring Austria and considering testing. Students in the city of Berlin, where COVID-19 rates are higher, have been offered voluntary saliva tests twice a week. In France they are seriously discussing also providing voluntary nationwide testing of students.

There are several concerns. First, antigen testing systems have a history of false negative reports for infected but asymptomatic individuals. The majority of infected children under 16 tend to be asymptomatic and inferring that an infectious child is non-infectious may place others at risk if other controls (masking, distancing and grouping) are relaxed as a response to negative test results.

There are also regulatory and financial concerns. Having a child formally manage a chain of custody for a biologic laboratory sample is both unusual and inherently risky. Paying for adult monitoring may be problematic and expensive if invasive nasal testing is implemented.

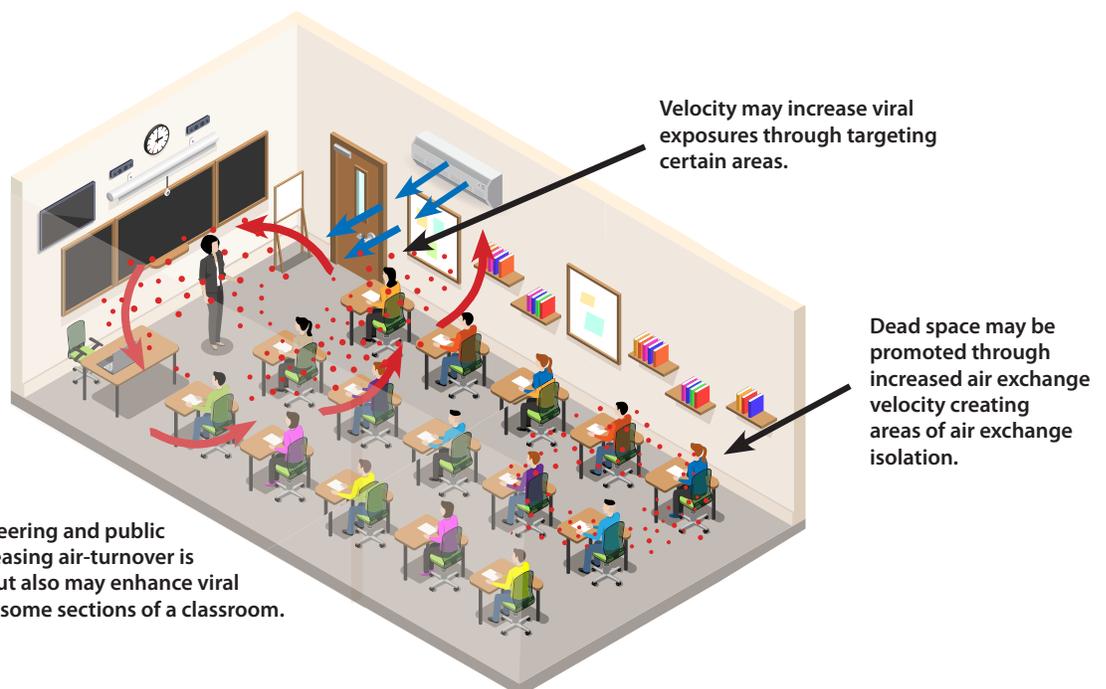
The Austrian government working with Chinese providers of nasal testing kits is supporting the testing allowing the schools to pay a little under three dollars per test. In the United States direct costs have dropped to between \$13 and \$22 if the tests involve “pooling.” This means that batches of tests are reviewed in a group and only if the virus is detected in the grouped batching is their subsequent individualized testing. This process can potentially both false-negative and false-positive results. A false positive test would be detected since it would trigger additional testing. A false-negative test would not and hygienic controls should not be reduced as a result of testing.

Both pricing and protocols are evolving and testing may become more practical for schools.

One way to approach this issue may be to enter into testing only if there appears to be a significant increase in infections within a community. If tests become less costly and procedures that enhance administration and result accuracy are introduced, testing should be considered. Under heavy community contamination conditions, it may be helpful.

Ventilation and CO₂

Understandably many schools are increasing ventilation/room air changes per hour. This makes sense but also may be problematic if velocity increase is not carefully executed. As an example the carefully studied Skaqit Valley choir outbreak was found to relate to less than one air change per hour. School recommendations (ASHRAE) have been upgraded to 6.7. However, research on room ventilation by the University of Colorado at Boulder has also identified problems if velocity is increased without appropriate monitoring. Essentially, they discovered that air movement can both create “dead zones” and spread virus. Observing airflow and especially CO₂ differential (dCO_2) testing are important elements to secure healthier ambient air in conjunction with maximizing air exchange.



The most responsible way to determine virus risk within a classroom is to measure the amount of exhaled breath likely to be re-breathed. This can be determined by measuring the difference between the carbon dioxide outside the school building and inside a room. Outside thresholds can involve huge variations, depending upon the time of year and characteristics of building location. Research conducted in March 2018, edited by Harvard Chemistry Professor Dr. Stephen Wofsy, supported the importance of determining outside CO₂ levels through direct on-site measurement. For instance, one cannot infer high thresholds in urban areas opposed to suburban areas. It's also important to use a CO₂ measuring device that works to appropriate standards. Infrared internal detection systems providing archived and exportable data for comparison are important in relying upon CO₂ detector readings.

A paper describing the CO₂ differential process is located on our website and participating in a free webinar describing detailed school dCO₂ monitoring procedures should be considered.

This CO₂ differential process provides valuable support for school COVID-19 programming, but it must be executed properly with the correct equipment. Working with inaccurate information represents a greater risk than no information.

Toxic Disinfecting Chemicals and Procedures

The excessive use of toxic cleaning and disinfecting compounds and other types of oxidation, or plasma procedures that are effective in removing or deactivating the (SARS-2) virus may themselves be toxic. The possibility of toxicity is dependent upon dosage and patterns of use. Reviewing the Material Safety Data Sheets for cleaning/disinfecting compounds and careful analysis of virus purging mechanical systems that oxidize organic or decay viral compounds is important.

School COVID-19 responses are new and many of the promoted remedies have not been thoroughly vetted.

We hope this update was helpful, please let us know if you have any questions or comments.