



# The Resilient School

## Lessons Learned from the COVID-19 Experience

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**T**he responsibly managed school will never return to pre-COVID-19 operations. COVID-19 took over one million American lives, while simultaneously degrading our educational systems. We are now realizing how to better limit future risks while honoring our educational mission. Guiding concepts regarding public health and school management need to adjust to a new reality.

### Our Changing World

Our schools now operate in an unprecedented world of eight billion. For the first time in history the majority of whom are living in compact urban areas. People frequently travel locally and globally sharing touch, breath, and consequently bacteria and viruses. Pandemic threats are in our future.

For many years, as populations expanded geometrically with urbanization and institutionalized travel, the probability of a global pandemic threat involving emerging and dangerous viral strains was anticipated by public health professionals.



Viral strains that migrate from non-human to human populations, termed zoonotic, often confound human immunities and spread rapidly. Middle East Respiratory Syndrome virus (MERS-CoV) first emerged in Arabia in 2012 and, like COVID-19, was zoonotic, having migrated from camel to human lungs. It rapidly spread to 27 other countries and was responsible for nearly 1,000 deaths before its control through hygiene and vaccination.

The Ebola virus, zoonotic from primates, also rapidly spread from its origins in the Congo to other African nations. It was addressed with the rapid development and distribution of a vaccine, but not before taking 11,000 lives.

Public health experts accepted the probability of continued viral diseases progressively emerging and spreading globally. Consequently, the Obama administration established a central public health authority, answering directly to the President's National Security Advisor. The concept was that there would be a technically competent central authority to coordinate a response to future high-risk communicable diseases. This new Global Health Security and Bio Defense Unit (GHS), was disbanded by the Trump administration

in May 2018. When COVID-19 emerged a few months later there was understandable confusion regarding both best practices and especially public health leadership in America.

If the GHS had not been disbanded, there may have been greater clarity in terms of guiding state health departments, the establishment of more responsive school guidelines, and promotion of more responsive public health practices. However, there still would have almost certainly been confusion and misunderstanding in both approaching viral disease and school facility management.

Better insights into leadership were required then and now.

## **Problematic Traditions**

A focus on disinfectants and hygiene became the default response for public health with the acceptance of the germ theory in the mid-1900s. Earlier concerns about contaminated air-causing disease were discounted in favor of “fighting germs.” Before that, families typically shared toothbrushes, there were concerns regarding bathing too often, and eating utensils were often shared pre-washing.

The understanding of germs and a focus on killing and isolating germs became universally accepted as the primary public health response to communicable diseases. Even everyday personal conduct changed. Du Pont developed cellophane to isolate food from germs and topical disinfectants including mouthwash to “kill” germs in one’s mouth became standard household products. Laws against spitting were enacted and spittoons disappeared. The default response for a healthy environment was to “disinfect germs.”

The concept that an invisible disease involving a virus (smaller than a germ and undetectable by microscope) would emerge from the breath of another person was not accepted by many in public health. It took the World Health Organization two years to finally admit that COVID-19 could be transmitted through airborne exhalations.

As COVID-19 emerged, the assumption was that one could hunt out and kill the virus—that SARS-CoV-2 was lying in wait on a nearby surface ready to contaminate another person who touched the surface giving them COVID-19. However, some virologists understood the risk of contaminated air being inhaled. Early in the pandemic, Dr. John Brooks, CDC’s Chief Medical Officer for Aerosols, implored schools to stop the “obsessive use of disinfectants” and focus on securing safe breathing zones through better ventilation and room air circulation. His warning never really got through to schools.

Dr. Brook’s responsible warning was contradicted by the World Health Organization which stated unequivocally that COVID-19 is not spread through airborne exchange and the only reasonable preventive effort involves washing hands often and wiping down surfaces. Similarly, the Trump administration supported the “killing” of viruses through disinfectants and even at one point suggested, in a somewhat offhand comment, that disinfectants may be ingested. Drinking topical disinfectants obviously represents a risk.

By the spring of 2021, there was consensus from many healthcare professionals that if responsible practices were put into place with an emphasis on air

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exchange, occupant sensitive distancing and room circulation, schools could be reopened with reasonable safety. Johns Hopkins Bloomberg School of Public Health published a detailed description of school ventilation guidelines, criticizing the focus on deep cleaning of surfaces and the importance of breathing zone hygiene.<sup>1</sup>

In April 2021, *Scientific America* published a detailed analysis of how and why public schools should be reopened with appropriate ventilation controls and other hygiene measures.<sup>2</sup>

Finding the best practices for reopening schools and responding to future viral or bacterial threats is a work-in-progress with data being gathered, analyzed, and converted into evolving guidelines. The objective is to avoid prolonged closure if possible.

There are generally three categories of precautionary and responsive action for administering a responsible school system in terms of limiting health risks:

## **1. Isolation**

Reducing exposures may be approached through different forms of isolation. In some districts or countries, education shifted to small student cohorts, thereby reducing interaction among students. School systems also promoted self-isolation in response to a person's first signs of illness or, in some cases, probable exposure to disease. Schools have identified special physical areas within school facilities to provide isolation and have built internet communication systems to preserve the rhythms of education if a student is isolated at home. Public safety-oriented school websites sharing approaches and guidelines are provided by some public health groups. These emerging policies will be important. The guiding objective is no longer to kill viruses but to reduce the sharing of breathing zones.

## **2. Filtering**

A virus represents no risk once the bronchial fluid membrane in which it is embedded is ruptured. If inhaled and exhaled breath is filtered through a reasonably tightly woven mask, the bronchial fluid membrane will tend to rupture and risk will be eliminated. However, wearing of masks inhibits quality communication both in terms of muffling sound and distorting communication through facial expression. A flexible policy regarding masking makes sense. Under what conditions the increased safety balances the limiting of communications cannot be anticipated without understanding the nature of the threat. Different viral and bacterial threats will have different characteristics. Flexibility regarding masking within a school is important.

Filtering an overall building in terms of recirculating air and air introduced from outside may be helpful in terms of increasing the volume of ventilation and dilution through air changes per hour. However, it must be understood that intact bronchial fluid will never reach a school's major ventilation systems. Hence, systemwide filtering is of limited value in screening out viruses. The recurrent source of contamination is from within the common area.

### 3. Benchmarking

Differential CO<sub>2</sub> testing and input regarding exposure risk will provide the school with reasonable information for protecting school occupancy. The school must make safety decisions regarding the size of groups, the length of time in certain areas, and various activities. To make these determinations, school administration requires feedback regarding which activities and conditions create exposure to bronchial fluid which may contain a virus. As an example, in musical activities the use of plastic face guards for wind instruments has been suggested. It might work. It would be possible to test the CO<sub>2</sub> burden to determine exposure levels, factoring in the duration of the exposure.

Essentially, any gathering such as lunch rooms, class assemblies and athletic activities can provide a numeric ranking of relative risk using CO<sub>2</sub> as a proxy. Taking into consideration the nature of exposure, and the local incidence and prevalence of any potential viral or bacterial disease, the school will have data with which to make determinations regarding activities and safety.

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<sup>1</sup>*School Ventilation: Vital Tool to Reduce COVID-19 Spread*, John Hopkins Bloomberg School of Public Health, Center for Health Security May 2021.

<sup>2</sup>[www.Scientific American.com/article/Our Schools-Can Open Safely During Covid The Latest Evidence Shows](https://www.scientificamerican.com/article/our-schools-can-open-safely-during-covid-the-latest-evidence-shows).