



Ventilation Can Save Your Life from SARS CoV-2

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Corona virus can emerge from the lungs as tiny invisible particles (aerosols) when breathing, or as large visible droplets when coughing. The aerosols can float for 1-4 hours, and will migrate across a closed room. The larger, heavier droplets from coughing (or sneezing) fall rapidly to the ground near the individual. Most super spreading events occur when aerosols accumulate in crowded rooms, restaurants, bars, gyms or at weddings or religious ceremonies where people are talking, shouting, singing, or breathing hard. *Victims rarely recall anyone coughing or sneezing.*

[COVID-19 Superspreader victims rarely recall anyone coughing or sneezing. Click To Tweet](#)

The World Health Organization does not consider aerosol spread to be significant. They also did not think COVID-19 could spread through communities in January when the pandemic could have been contained. They did not endorse non-healthcare workers wearing masks until June 5. 239 scientists from 32 countries published a letter in *Clinical Biology* this week informing WHO of their errors on airborne spread of COVID-19.

Improved ventilation decreases aerosol exposure risk. You can change ventilation *now* - a year or two sooner than any vaccine will arrive. Improvements are as simple as going outside, opening a window, placing a fan in the window, or increasing air flow in an office or restaurant HVAC systems. In the case of buildings that must recirculate air, electrostatic, material, or ultraviolet filtering can produce recycled air that is *cleaner* than outside air. If you live in warmer climates, set your air conditioner to bring in fresh air rather than recirculate.

[Proper filtering can produce recycled air that is cleaner than outside air. Click To Tweet](#)

Since aerosols drift for hours, crowded spaces are risky enough to require *indoor* mask wearing even when six feet apart. Conversely, a large space, conference center, office, or theater with proper airflow and filtration may not represent any increased risk. How you would know the difference between good and bad places? Perhaps a certification process can be developed.

Looking to the Future

Most people get infected in their own home. A household member or visitor contracts the virus in the community and, without symptoms, brings it into the home, where sustained time indoors without attention to ventilation leads to infection. An open window with a fan is a small price.

[Most people acquire the COVID-19 infection in their own home Click To Tweet](#)

Being outdoors reduces infection risk substantially. In a Chinese study, there was only one infection cluster of 3 people outdoors, while at the same time 318 indoor clusters were recorded. The US Army Medical Research Institute of Infectious Diseases at Fort Detrick reports that COVID-19 virus in aerosol form will survive for 120 minutes indoors, but only 6 minutes in outdoors in summer sunlight. It is not so much the beach, but the beach party afterwards, that is the risk.

Ventilation is Key

Which brings us to professional ventilation. Coronavirus particles have the size and weight of cigarette smoke. It is a prisoner of airflow. In the workplace, targeted ventilation can eliminate the risks of working with extremely toxic compounds. "Six-feet" is the distancing rule for COVID-19, but a worker soldering under a microscope might be *six inches* away from the toxin. An industrial hygienist can design airflow that reroutes the solder fumes safely away.

In industry, the final proof of good design is air sampling and smoke tracing. Air sampling for viruses is problematic because the filter paper catches all the different viruses in the air, as well as all the pollutants, dust, and pollen. Smoke tracing functions to confirm the air flow design works as planned. I worked on a "sick building" team where the smoke trace *reversed* when a newly installed automatic door was triggered.

Vaccines are only part of the solution

Vaccines will not end the need for social distancing. When you get your shot, the advice will be to continue social distancing. We will not know how soon or for how long any of the vaccines will be effective. In the meanwhile, along with social distancing, hand washing, wearing a mask, add avoiding crowded indoor spaces, and increase ventilation when you can. If there is a plan for opening your schools, it should include open windows and ventilation.

[If there is a plan for opening your schools, it should include open windows and ventilation. Click To Tweet](#)

A Village in Florida is Missing an Idiot

Governor of Florida Martinez, and man of suspect intelligence, has spoken and removed all doubt. "If we can open Home Depot or Walmart, we can open the schools," he said yesterday, providing a great opportunity to demonstrate how misunderstanding of science will kill an army of schoolteachers in the fall.

The CDC guidance for schools calls for a radius of 3 feet around each student (6 feet between students. Standard ceiling height is nine feet, so total air volume per student is $28 \times 9 = 252$ cubic

feet. Home Depot calculates 7 feet between customers and has 32-foot ceilings in smaller stores so $39 \times 32 = 1,248$ cubic feet. Using this raw data, school rooms are likely to become saturated with COVID-19 from asymptomatic occupants 5 times faster than the Home Depot.

So in terms that Governor Martinez might grasp, if he falls on his derriere from a standing position, he will get bruise and limp for a week. If he hits the ground with 5 times the impact, he will fracture his tail bone and possibly one hip and have pain standing and walking for the rest of his life (or worse).

The brief YouTube video below shows the virus behaves in a face-to-face chat. Jump to 4:30 for the breathing illustration.

<https://www.youtube.com/watch?v=XG1Du-GOJs0>

References:

Indoor transmission of SARS-CoV-2

Hua Qian, Te Miao, Li LIU, Xiaohong Zheng, Danting Luo, Yuguo Li

doi: <https://doi.org/10.1101/2020.04.04.20053058>

An Analysis of Surface Contamination Risks on April 21, 2020 [Compliance and Risk](#)

By Paul Benda

Ventilation control for airborne transmission of human exhaled bio-aerosols in buildings

Hua Qian, Xiaohong Zheng