An Engineering Perspective on Airborne Transmission of Covid-19

Linsey Marr

The Covid-19 pandemic revealed major shortcomings in our traditional understanding of how respiratory viruses are transmitted. Despite initial assurances that the SARS-CoV-2 virus was not airborne, it is now clear that the virus is transmitted through the air in microscopic aerosol particles. We applied the same concepts and tools used to understand particulate air pollution to the Skagit Valley Chorale outbreak, showing that airborne transmission could readily explain the observed attack rate of 53%-87%. We also extended our longstanding interest in the effect of humidity on inactivation of viruses in droplets and aerosols. Like influenza virus, SARS-CoV-2 survives best at moderate humidity levels, although the exact mechanism of decay is not known. By employing an interdisciplinary approach spanning environmental engineering, aerosol science, nanoscience, and virology, we have shown that airborne transmission of Covid-19, influenza, and other respiratory infections is more important than previously thought and that environmental conditions affect the transmissibility of pathogens.

Linsey Marr is the Charles P. Lunsford Professor of Civil and Environmental Engineering at Virginia Tech. Prior to the pandemic, she was one of a small number of researchers who studied viruses in the air. She has been cited by public health agencies and media around the world for her research on SARS-CoV-2 and other airborne pathogens.

Marr is a member of the National Academy of Engineering and a Fellow of the American Association for Aerosol Research, American Geophysical Union, and International Society of Indoor Air Quality and Climate. Marr received a B.S. in engineering science from Harvard College and a Ph.D. in civil and environmental engineering from the University of California, Berkeley and completed her post-doctoral training at the Massachusetts Institute of Technology.

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