Environmental Health Committee (EHC) Emerging Issue Brief:

Pandemic COVID-19 and Airborne Transmission

What is the issue?

Late in 2019, China experienced a large outbreak of a novel coronavirus called *SARS-CoV-2* that caused the respiratory disease COVID-19. Initial assumptions by the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) were that this new virus had transmission characteristics of similar type and magnitude to a virus that caused a global outbreak in 2002-2003 (SARS). That outbreak subsided after 9 months resulting in about 8000 infected cases in 26 countries that occurred mostly in healthcare settings.[1] In contrast by the end of January 2020, Riou and Althaus predicted both human-to-human transmission of COVID-19 and the ensuing pandemic .[2] On February 16, WHO declared the COVID-19 outbreak a Public Health Emergency of International Concern (PHEIC). On March 12, 2020, WHO proclaimed COVID-19 a pandemic. At that time there were more than 118,000 cases in 114 countries and 4291 deaths. By early April 2020, there were more than 1.5 million COVID-19 cases worldwide and more than 80,000 deaths.

Early hypotheses based on the genetic composition of SARS-CoV-2 were that it originated in bats and passed to humans through a different animal host in the winter of 2019-2020 at a wet market in Wuhan, China.[3] These hypotheses included an assumption of transmission based on the experience of SARS-CoV in 2003 and centered on droplet transmission at close range. During the 2002-2003 pandemic, SARS-CoV was shown to have airborne disease transmission potential.[4] COVID-19 has developed into a pandemic more severe than SARS in 2003. Subsequent observational studies and modeling of COVID-19 suggest the likelihood of transmission through the air via aerosols.[5 6 7 8 9 10]

Two important questions that urgently require answers include:

1. What are the engineering interventions that may be applied to minimize the spread of the disease through the air?
2. How effective are those engineering interventions at minimizing the spread of disease?

Integral to determining rational engineering interventions is having a clear understanding of how effectively the disease is transmitted through the air by infected people. Also needed is an understanding of other types of controls, such as administrative or engineering interventions, that may be applied in hospitals and other high-risk spaces and help reduce exposure.

What does this mean for ASHRAE?

There is great concern about the possibility of transmission through the air of various pathogens, especially SARS-CoV-2, among staff and administration in healthcare facilities, workers in office environments, staff and patrons in retail settings, workers in manufacturing, residents in private and public facilities, and the general public in outdoor settings and in public transportation. ASHRAE is uniquely qualified to provide guidance on the design, operation, and maintenance of heating, ventilating, and air-conditioning systems to help reduce the dangers of pathogen transmission through the air in these settings.

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What is the role of ASHRAE in this pandemic?

ASHRAE, through its Environmental Health Committee, created the Epidemic Task Force, and has issued the following statements:

Statement on airborne transmission of SARS-CoV-2

Transmission of SARS-CoV-2 through the air is sufficiently likely that airborne exposure to the virus should be controlled. Changes to building operations, including the operation of heating, ventilating, and air-conditioning systems, can reduce airborne exposures.

Statement on operation of heating, ventilating, and air-conditioning systems to reduce SARS-CoV-2 transmission

Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air. Unconditioned spaces can cause thermal stress to people that may be directly life threatening and that may also lower resistance to infection. In general, disabling of heating, ventilating, and air-conditioning systems is not a recommended measure to reduce the transmission of the virus.

In this critical time, ASHRAE is actively seeking solutions by using its internal and external resources to develop guidance that can be used now and by supporting research on building design for future mitigation of the transmission of pathogens through the air.

To that end, ASHRAE will

- recognize the devastating consequences of global pandemic viral or bacterial outbreaks and be proactive in developing engineering guidelines for minimizing the spread of these biological hazards in building systems;
- provide guidance on the use and operation of interventions that promote healthy air quality in spaces and facilities for institutional buildings, residences, healthcare facilities, workplaces, and public transportation;
- conduct training on these interventions that are not always understood in the context of building design, construction, and operations;
- take full advantage of the knowledge among its members to create evidence-based infection control practices during this pandemic and prior to future pandemics; and
- provide Society membership and the worldwide community a greater appreciation and understanding of the role played by heating, ventilating and air-conditioning to minimize the risk of infection from airborne transmission within the built environment.

Many of these are already underway at ASHRAE through its extensive technical and educational committee structure.

Further information on the ASHRAE response to the pandemic can be found at:
https://www.ashrae.org/technical-resources/resources
Questions about the pandemic and about HVAC can be addressed to:
COVID-19@ashrae.org

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References and Endnotes

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