

April 23, 2020

COVID Transmission and Air Conditioning Facts

Recently, the CDC posted a “Research Letter” regarding a study of air-conditioning in a Guangzhou, China restaurant in relation to the spread of COVID-19. The authors of the research letter are affiliated with the Guangzhou Center for Disease Control and Prevention and the Guangzhou Yuexiu District Center for Disease Control and Prevention. Given that many restaurants in the U.S. and around the world are in the process of making plans to reopen at an appropriate point, it is important to have the benefit of additional facts and context regarding this issue.

Can COVID-19 be spread through air conditioning systems?

The short answer is, it is unlikely. There are many factors that impact disease spread in situations like this, and air conditioning systems are at the bottom of those factors. In fact, in most cases, air conditioning systems such as those in widespread use in U.S. homes and businesses can **reduce** disease transmission, by ensuring proper fresh-air ventilation.

A recent ASHRAE [paper](#) is very clear about the beneficial roles of such HVAC systems in airborne virus 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 [on the other hand] 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.”

What happened at the restaurant in Guangzhou?

The report about this isolated case suggests that one of the restaurant’s single-unit air-conditioners may have played a role in transferring virus particles around the dining room, as patrons at two nearby neighboring tables became infected as they were in close contact. See the [linked diagram of impacted diners here](#).

However, there were 73 other diners eating on the same floor that day, some within close proximity to the infected diners, who did not become sick. Neither did any of the 8 employees who were working on the floor get sick. You can see [the entire room diagram here](#).

Should this study be considered credible?

A number of factors at play in the study raise important questions that should be addressed before drawing any definitive conclusions:

1. The authors acknowledge that the report is only a small field study with significant limitations, making it suitable for situational observations rather than for drawing larger conclusions.
2. The report makes no mention of the airflow rate from the air conditioning unit at the time, and even neglects to mention the type of air conditioning unit that was involved, which is an essential factor in understanding the situation.
3. The study did not take swab samples throughout the restaurant.
4. The study took six smear samples from the air conditioner (from both the inlet and outlet of the unit), all of which proved negative.

What do experts who study system and air-flow issues conclude?

Commenting on the report, Bill Bahnfleth, Director of Penn State University's Indoor Environmental Center and ASHRAE's Epidemic Task Force chair, said:

“The conclusions of the article are not well-supported by evidence. It's not clear whether airflow patterns caused by the air-conditioning system contributed to the infections that occurred for several reasons. First, contaminants in air diffuse from the source to other locations via air circulation, regardless of whether air-conditioning systems are present or not. Second, there is no way to differentiate air distributed by the air conditioner with air in adjacent areas; mixing of air occurs naturally and sourcing potentially infected air requires a lot of assumptions. In the restaurant report, patrons and servers were constantly moving around in these spaces, which caused a significant amount of redistribution of contaminated air within the dining area.”

What other factors could have caused this spread?

It is reasonable to assume that, while the virus remains in the air for only a short time and travels only short distances (generally less than 1m), a strong airflow would increase what have become our accepted safe distances, as the report states. This would be the case whether indoors or out; whether outside in a strong wind; or inside in a room with an open window, a ventilation fan, a draught from an open door, or an air conditioning unit. This is also why it is essential to know and measure the air flow factors at play, which the study does not do.

It is also important to note that, because the researchers did not swab surfaces at the restaurant, it is nearly impossible to rule out transmission through surfaces or contact with other diners or with servers at the neighboring tables.

Why has this been posted by the CDC if it is not reliable?

Given the many shortcomings of the study, it is unclear why the CDC posted it. There is a great deal that we have yet to learn about COVID-19. This report, if conducted more thoroughly, could have filled in some important gaps, providing some potentially useful evidence as to the effects

of air flows and the indoor environment on the transmission of this disease, especially as restaurants consider efforts to re-open safely. But at this time, until further peer-reviewed studies are undertaken, we would strongly caution audiences before basing conclusions on this field report – and would also encourage CDC to remove the study from its content page so that it doesn't unnecessarily cause unwarranted concerns to restaurant owners, small businesses, customers, public officials, and communities.

So, should local businesses and consumers be concerned about this issue?

While COVID transfer is certainly something that restaurant owners, small businesses, customers, and communities must address as they consider steps to appropriately re-open, there are many factors beyond the HVACR and water heating systems that should be included in their planning. Remember that properly ventilated, high-quality air conditioning systems can in fact **limit the spread** of infectious disease.

Hand washing with warm water and plenty of soap, surface-sanitizing, and avoidance of close person-to-person contact are still the main methods to stay healthy.

What is ASHRAE?

Founded in 1894, ASHRAE is a global society advancing human well-being through sustainable technology for the built environment. The Society and its more than 57,000 members in 132 countries, focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow's built environment today.

ASHRAE standards establish consensus for test methods and performance criteria. These include voluntary consensus standards for Method of Measurement or Test, Standard Design and Standard Practice. Consensus standards define minimum values or acceptable performance. ASHRAE is accredited by the American National Standards Institute (ANSI) and follows ANSI's requirements for due process and standards development.

Does ASHRAE have additional COVID-19 Resources?

Yes. ASHRAE created an Epidemic Task Force to help deploy ASHRAE's technical resources to address the challenges of the current pandemic and future epidemics as it relates to the effects of heating, ventilation and air-conditioning systems on disease transmission in healthcare facilities, the workplace, home, public and recreational environments. You can read the Society's [FAQs on many COVID-19-related issues here](#).

Beyond ASHRAE experts, are there others who might be able to address this issue?

Yes. There is an excellent resource at Harvard University's T.H. Chan School of Public Health. [Dr. Joseph Allen](#) is the Director of its Healthy Buildings program and is a national expert. He recently wrote an [op-ed](#) in the [New York Times](#), highlighting the benefits of adequate building ventilation in helping to stem the spread of disease. You can reach him at: jgallen@hsph.harvard.edu

Are there more resources available on the role of air conditioning systems?

Here is a link to a report in the Cooling Post that [raises some concerns about the report](#). The Cooling Post is an independent online magazine dedicated to the global air conditioning, refrigeration, and heat pump industry.

Here is a detailed [fact sheet](#) on how HVACR technology improves air quality.

Here is a [primer](#) on how split, ducted central air conditioning systems work.

Here is a link to the [Chinese report](#).